



United States Department of the Interior

NATIONAL PARK SERVICE
Glen Canyon National Recreation Area
Rainbow Bridge National Monument
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March 2, 2017

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<input checked="" type="checkbox"/> Concur No Effect	Brady's pin-cushion cactus
<input checked="" type="checkbox"/> Concur Not Likely to Adversely Affect	Species: Condor, Mso(CH), Cuckoo
<input type="checkbox"/> No Comment	LCFL, SWFL, Jones cycladenia, Siler pincushion cactus
U.S. FWS Utah Field Supervisor	
Date 3/2/17	

Dear Mr. Crist,

We are requesting your written concurrence of our determination of effects regarding federally listed species as contained in the enclosed Biological Assessment (BA) for the proposed Glen Canyon National Recreation Area Off-road Vehicle Management Plan/Environmental Impact Statement in accordance with section 7(a)(2) of the Endangered Species Act of 1973 (as amended) (Act), codified in 50 CFR §402.02 and §402.14. The U.S. Fish and Wildlife Service (FWS) was notified of the planning effort in a scoping newsletter sent in August of 2007. Technical assistance and informal consultation commenced in October of 2007. Numerous subsequent telephone conversations, correspondences, requests for information and comments, and submittals of draft BAs occurred from October 2007 through December 2016, as identified in the BA. In December 2016, the National Park Service (NPS) held a conference call with the FWS to review the revised BA and receive verbal concurrence on the species determinations to the extent possible. The FWS provided comments on the BA to the NPS on Friday, February 24, 2017.

With this letter, we submit our final BA containing a description of the proposed management action, species addressed, discussion of effects, and our effect determinations for the following federally listed species and designated critical habitat: California condor (*Gymnogyps californianus*), Endangered; Mexican spotted owl (*Strix occidentalis lucida*), Threatened; Southwestern willow flycatcher (*Empidonax traillii extimus*), Endangered; Yellow-billed cuckoo (*Coccyzus americanus*), Threatened; Brady's pin-cushion cactus (*Pediocactus bradyi*), Endangered; Jones cycladenia (*Cycladenia humilis* *vas. Jonesii*), Threatened; and Siler pincushion cactus (*Pediocactus sileri*), Threatened.

We have determined that this proposed action "may affect, not likely to adversely affect" the California condor (*Gymnogyps californianus*), Jones cycladenia (*Cycladenia humilis* *vas. Jonesii*), and Siler pincushion cactus (*Pediocactus sileri*) as the effects of this action are insignificant and discountable for the reasons stated in the BA. We have determined that the proposed action will have "no effect" on the Brady's pin-cushion cactus (*Pediocactus bradyi*).

Additionally, based on recommendations made during informal consultation, we are also now recommending "may affect, not likely to adversely affect" for the Mexican spotted owl (*Strix occidentalis lucida*), Southwestern willow flycatcher (*Empidonax traillii extimus*), and Yellow-billed cuckoo (*Coccyzus americanus*). This recommendation is a change from the previous recommendation

given in the BA submitted in November 2016. The BA now includes additional conservation measures for all three species that will mitigate adverse impacts. In addition, it clarifies that there is no suitable Southwestern willow flycatcher nesting habitat and no yellow-billed cuckoo suitable breeding habitat with 0.5 miles of the project area greatly reducing the potential for adverse impact to those species.

We appreciate your thorough review and assistance in this consultation process as we are committed to the conservation of federally listed species occurring in Glen Canyon National Recreation Area. Please contact Erin Janicki at our office at (928) 608-6212 if you have any questions regarding this request.

Sincerely,



For William Shott
Superintendent



Enclosure: Biological Assessment

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***OFF-ROAD VEHICLE MANAGEMENT PLAN AND
ENVIRONMENTAL IMPACT STATEMENT
BIOLOGICAL ASSESSMENT***

GLEN CANYON NATIONAL RECREATION AREA

MARCH 01, 2017

NATIONAL PARK SERVICE – U.S. DEPARTMENT OF INTERIOR

Prepared by:

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1.0 Introduction

The Endangered Species Act of 1973 (16 U.S.C. 153 *et seq.*), as amended (ESA or Act) in section 7(a)(1) directs federal agencies to conserve and recover listed species and use their authorities in the furtherance of the purposes of the Act by carrying out programs for the conservation of endangered and threatened species so that listing is no longer necessary (50 CFR §402). Furthermore, the Act in section 7(a)(2) also directs federal agencies to consult (referred to as section 7 consultation) with the U.S. Fish and Wildlife Service (USFWS) when their activities “may affect” a listed species or designated critical habitat. Additionally, NPS Management Policy (2006) directs the NPS to “inventory, monitor, and manage state and locally listed species in a manner similar to its treatment of federally listed species to the greatest extent possible”.

1.1 Purpose of this Biological Assessment

This biological assessment (BA) analyzes the potential effects of the proposed Off-road Vehicle (ORV) Management Plan and Environmental Impact Statement (plan/EIS) in the Glen Canyon National Recreation Area (Glen Canyon) on federally listed threatened, endangered, proposed *animal (wildlife and fish)* and plant species, and critical habitats, pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (ESA). Federally listed threatened and endangered animal and plant species and critical habitat meeting the following criteria are addressed in this assessment:

1. Known to occur in the Park based on confirmed sightings;
2. May occur in the Park based on unconfirmed sightings;
3. Potential habitat exists for the species in the Park; or
4. Potential effects may occur to these species.

1.2 Current Management Direction

Current management direction for federally listed and proposed threatened and endangered species can be found in the following documents, filed at our office:

- Endangered Species Act of 1973, as amended (ESA or Act)
- 1916 NPS Organic Act
- NPS General Authorities Act of 1978
- NPS Management Policies 2006
- Migratory Bird Treaty Act (MBTA)
- National Environmental Policy Act (NEPA)
- Species-specific recovery plans which establish population goals for recovery
- Species management plans, guides, or conservation strategies
- Glen Canyon National Recreation Area (1979)

2.0 Consultation History

During initial scoping for the plan/EIS in August 2007, a scoping newsletter was sent to the USFWS Ecological Service Field Offices in both Utah and Arizona. The Arizona Ecological Services Field Office sent the NPS a letter dated October 5, 2007, which provided a list of threatened and endangered species that occur in or close to Glen Canyon. On January 7, 2008, the NPS requested species and habitat information from the Utah Ecological Services Field Office. Email communication follow-up occurred

later that month. On November 3, 2010, the Arizona Ecological Services Office sent a letter reiterating the information from the 2007 letter, providing additional information on California condors, and recommending additional communication with the Arizona Game and Fish Department (AZGFD) and affected tribes with regards to sensitive species.

On November 18, 2014, NPS provided a biological assessment to the USFWS addressing the effects of proposed management actions on species listed under the Endangered Species Act. Additional information on the Mexican spotted owl was provided on December 10, 2014. Location specific information on the California condor and bald and golden eagles was discussed telephonically with the USFWS in mid-December 2014. In response to a request from the USFWS for Applicant Committed Conservation Measures made on December 19, 2014, NPS updated the biological assessment and created a separate document that outlined the Applicant Committed Conservation Measures proposed for the plan. This was transmitted to USFWS on January 20, 2015.

After review of the updated biological assessment, USFWS requested additional information on February 5, 2015. Telephonic and email consultation with representatives of the USFWS Arizona and Utah Ecological Services Field Offices continued, with both offices providing comments on February 11, 2015. The NPS updated the biological assessment and transmitted the modified biological assessment with Applicant Committed Conservation Measures on March 24, 2015. The NPS held a conference call with representatives of the USFWS Arizona and Utah Ecological Services Field Offices to discuss the biological assessment. An updated list of federal listed species was requested from and provided by the USFWS on October 19, 2015 using the Information for Planning and Conservation (IPaC) project planning tool.

The NPS submitted a revised biological assessment to USFWS on December 24, 2015. A conference call was held on January 28, 2016 to discuss the revised biological assessment. The USFWS provided written feedback and additional questions to the NPS on February 5, 2016. The NPS has made further revisions to the biological assessment in response and is submitting a further revised biological assessment to USFWS to request concurrence.

3.0 Proposed Management Action and Alternatives Considered

3.1 General Description

The purpose of the Glen Canyon Off-road Vehicle Management Plan (plan/EIS) is to evaluate off-road use by conventional and non-conventional motor vehicles along designated routes and within designated areas, and on-road use by non-conventional motor vehicles and to develop management actions that preserve Glen Canyon's scientific, scenic, and historic features; provide for the recreational use and enjoyment of the area; and promote the resources and values for which the area was established as a unit of the national park system. The plan/EIS presents four action alternatives and assesses the impacts that could result from continuing current management (the no-action alternative) or implementation of any of the action alternatives.

Figures 1-4 (the No-Action Alternative as described in the plan/EIS) represents the current use of motor vehicles in Glen Canyon. The figure also includes current levels of off-road use in the Ferry Swale area and certain other areas which the NPS has allowed, in some cases by posting signage and information about access to that area.

Table 1 summarizes current management for motor vehicle use (No-Action Alternative) and the proposed changes in this use (Alternate E. Preferred Alternative).

The Preferred Alternative of the plan/EIS manages off-road use of all motorized vehicles on designated routes and in designated areas, and on-road use of off-highway vehicles (OHVs) and street-legal all-terrain vehicles (ATVs). **The plan/EIS does not propose the physical construction or development of any new roads, routes, or areas. Roads, routes, and areas described in the plan/EIS currently exist and are currently being used by motor vehicles.** Areas identified below are existing use areas within the action area. Figures 5-9 (the preferred alternative as described in the plan/EIS) depict the geographic scope of the proposed actions. In summary, the preferred alternative proposes the following actions in Glen Canyon:

- Conventional motor vehicles, OHVs and street-legal ATVs would be authorized for use within the designated area at Lone Rock Beach (~250 acres) and within the designated Lone Rock Beach Play Area (~180 acres) only by permit. A safety flag would be required to be displayed on vehicles used at Lone Rock Beach Play Area.
- Conventional motor vehicles and street-legal ATVs would be authorized for use at 14 designated accessible shoreline ORV areas (~7170 acres) only by permit, subject to water-level closures. Seasonal closures to street-legal ATVs would be implemented from November 1 through February 28 at eight of these ORV areas.
- Vehicle-free areas would be designated at Lone Rock Beach, Bullfrog North and South, and Stanton Creek ORV Areas.
- Street-legal ATVs would be authorized for use on existing paved park roads with the exception of the Lees Ferry Access Road. Only conventional motor vehicles would continue to be allowed on the Lees Ferry Access road.
- Street-legal ATVs and OHVs would be authorized for use on most existing unpaved park roads.
- No street-legal ATVs or ORVs would be authorized on park roads in the Orange Cliffs Unit, with the exception of the eight miles of the Poison Spring Loop.
- Approximately twenty miles of existing ORV routes would be designated for use by conventional motor vehicles, street-legal ATVs and OHVs, primarily in the Ferry Swale area.

Appendix A lists the specific elements of the plan/EIS including any new motor vehicle use requirements and changes in motor vehicle use at existing accessible shoreline ORV areas and on existing park roads and proposed ORV routes.

Table 1: Current and Proposed Actions from the Plan/EIS.

LOCATION	ALTERNATIVE A: NO ACTION	ALTERNATIVE E: MIXED USE (NPS PREFERRED ALTERNATIVE)
Lone Rock Beach	Off-road use by conventional motor vehicles, OHVs, and street-legal ATVs occurs on app. 250 acres. Speed limit of 15 mph.	Same as Alternative A except an off-road permit would be required and NPS would designate app. 20 acres as a vehicle-free zone during seasons of highest use and would vary the size and location of these zones in relation to the fluctuating lake level.
Lone Rock Beach Play Area	Off-road use by conventional motor vehicles, OHVs, and street-legal ATVs occurs on app. 180 acres.	Same as Alternative A except an off-road permit and safety flag would be required.
Accessible Shoreline Areas	Off-road use by conventional vehicles occurs on app. 5,950 acres at 13 existing areas, subject to water-level closures: <ul style="list-style-type: none"> • Blue Notch – app. 325 acres • Bullfrog North and South – app. 2,250 acres • Copper Canyon – app. 30 acres • Crosby Canyon – app. 450 acres • Dirty Devil – app. 75 acres • Farley Canyon – app. 275 acres • Hite Boat Ramp – app. 50 acres • Neskahi – app. 15 acres • Paiute Canyon – app. 100 acres • Red Canyon – app. 50 acres • Stanton Creek – app. 675 acres • Warm Creek – app. 50 acres • White Canyon – app. 325 acres 	Off-road use by conventional motor vehicles and street-legal ATVs on app. 7,170 acres at 12 existing areas plus Nokai Canyon (app. 275 acres) and Paiute Farms (app. 1,000 acres) would be authorized, only by off-road permit, subject to water-level closures. Eight areas (Blue Notch, Bullfrog North and South, Crosby Canyon, Dirty Devil, Farley Canyon, Red Canyon, Stanton Creek and White Canyon) would be closed to street-legal ATV use from November 1 through March 1. Off-road use at Warm Creek would be discontinued and the area restored to natural conditions. NPS would designate vehicle-free zones (~20 acres) at both Bullfrog North and South and Stanton Creek during seasons of highest use and would vary the size and location of these zones in relation to the fluctuating lake level.
GMP Roads	On-road use by conventional motor vehicles and street-legal ATVs occurs on app. 75 miles of paved roads and 228 miles of unpaved roads, with a prohibition on the use of all ATVs on the app. 85 miles of roads in the Orange Cliffs Unit. Speed limits are posted.	Same as Alternative A except: <ul style="list-style-type: none"> • Street-legal ATVs would be prohibited on seven miles of paved roads accessing the Lees Ferry developed area • On-road use of OHVs would be authorized on app. 228 miles of unpaved roads outside of the Orange Cliffs Unit • On-road use of OHVs and street-legal ATV would be authorized on app. eight miles of roads within the Orange Cliffs Unit which form a portion of the larger Poison Spring Loop on neighboring public lands
Ferry Swale and other ORV routes	Off-road use by conventional motor vehicles, OHVs, and street-legal ATVs occurs on app. 54 miles of user-created ORV routes.	Off-road use by conventional motor vehicles, OHVs, and street-legal ATVs would be authorized on app. 19 miles of designated ORV routes. App. 35 miles of existing user-created routes would be closed to vehicle use and restored to natural conditions. Speed limit would be 25 mph or as posted.

Figure 1. Current motor vehicle use at Glen Canyon National Recreation Area – Park-wide.

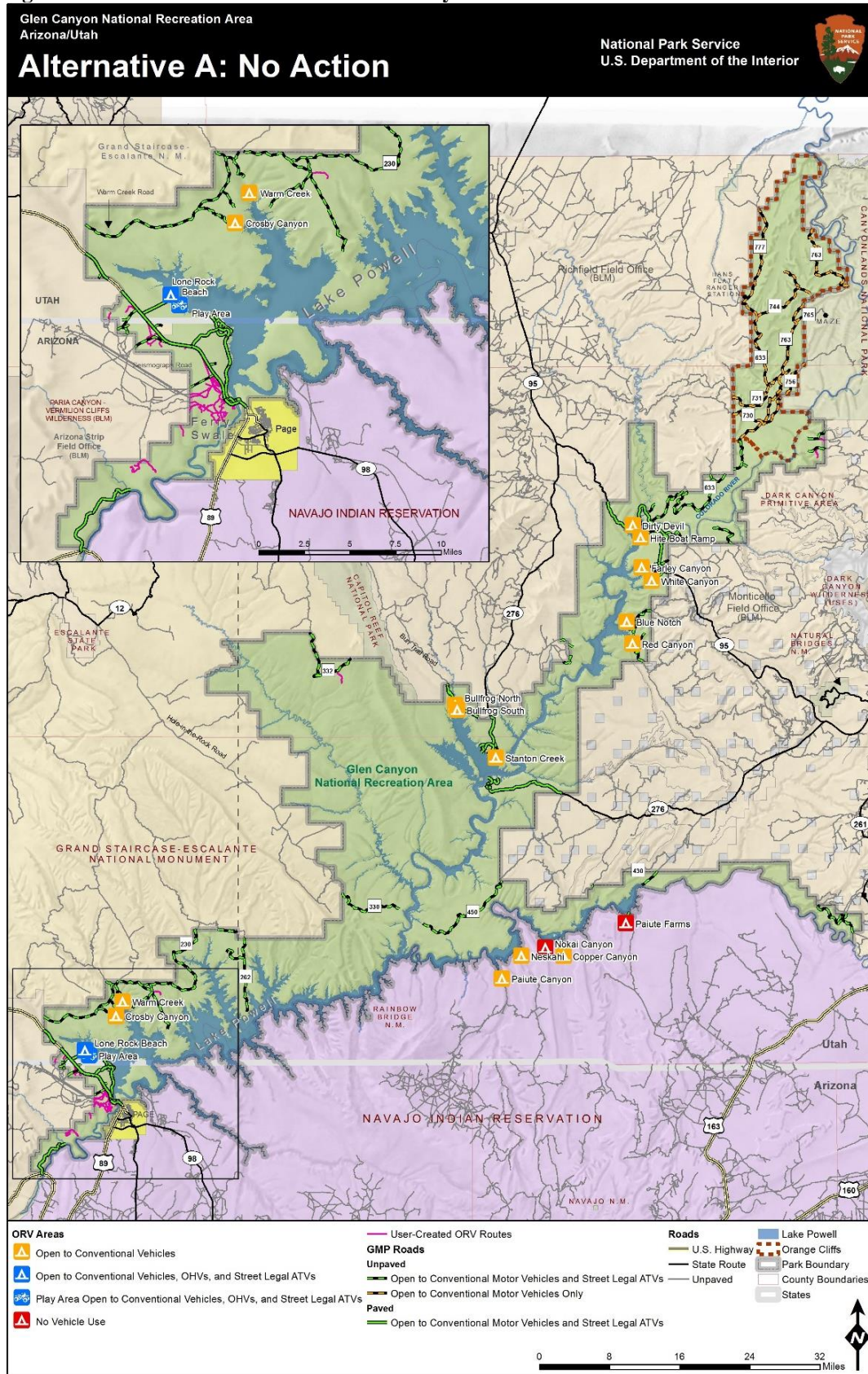


Figure 2. Current motor vehicle use at Glen Canyon National Recreation Area in Ferry Swale Area.

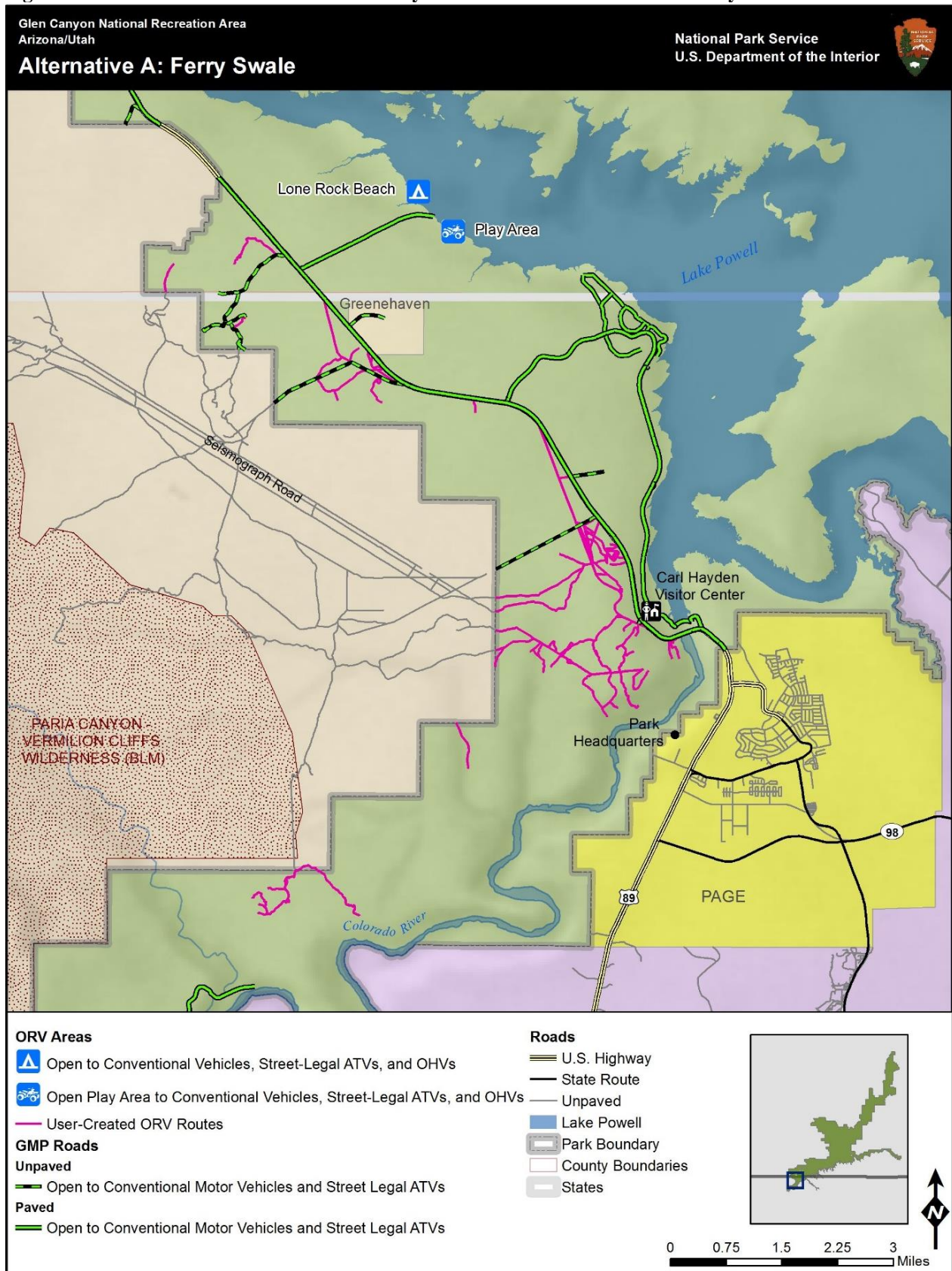


Figure 3. Current motor vehicle use at Glen Canyon National Recreation Area Uplake Canyons

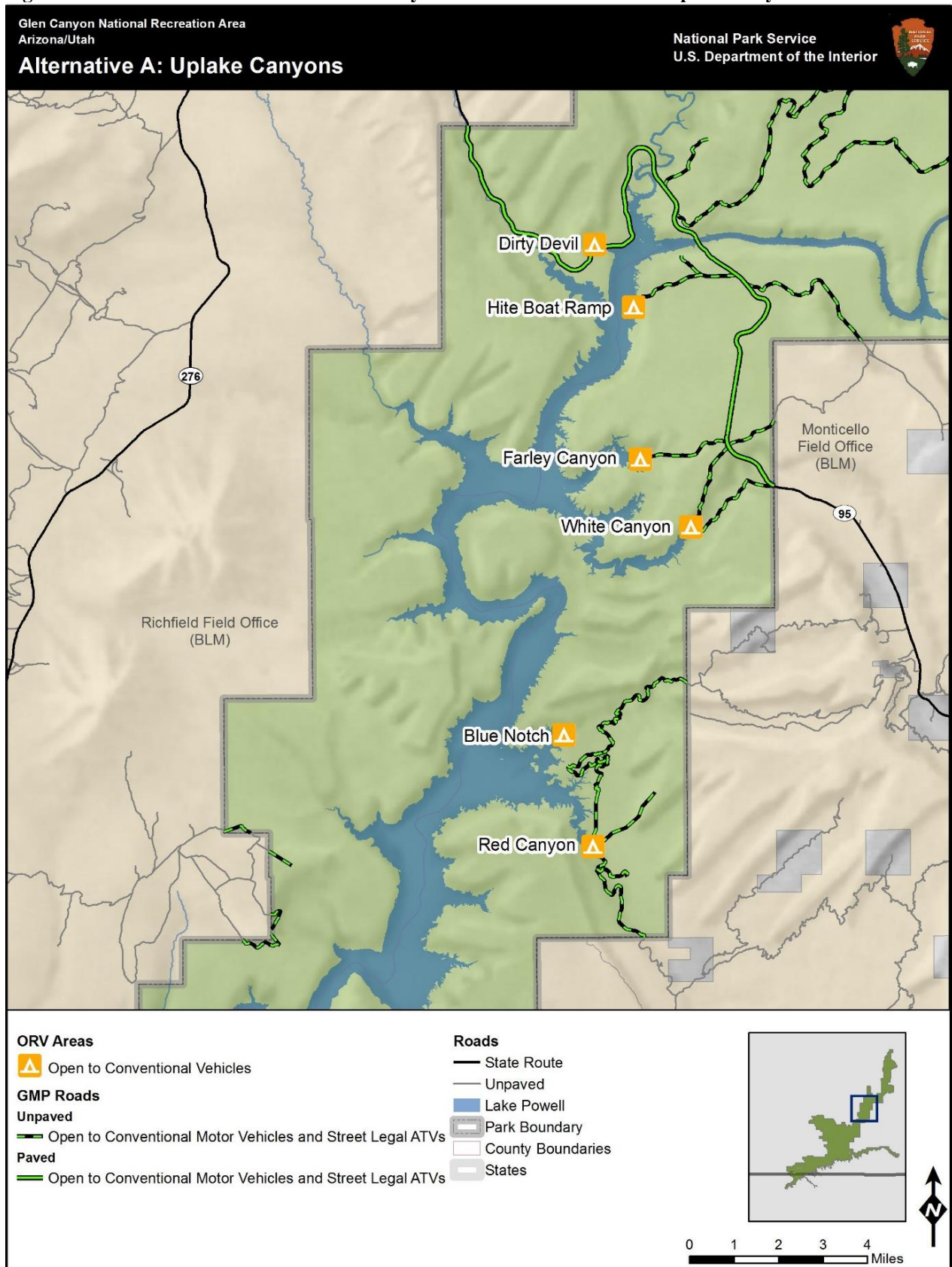


Figure 4. Current motor vehicle use at Bullfrog-Halls Crossing Area in Glen Canyon.

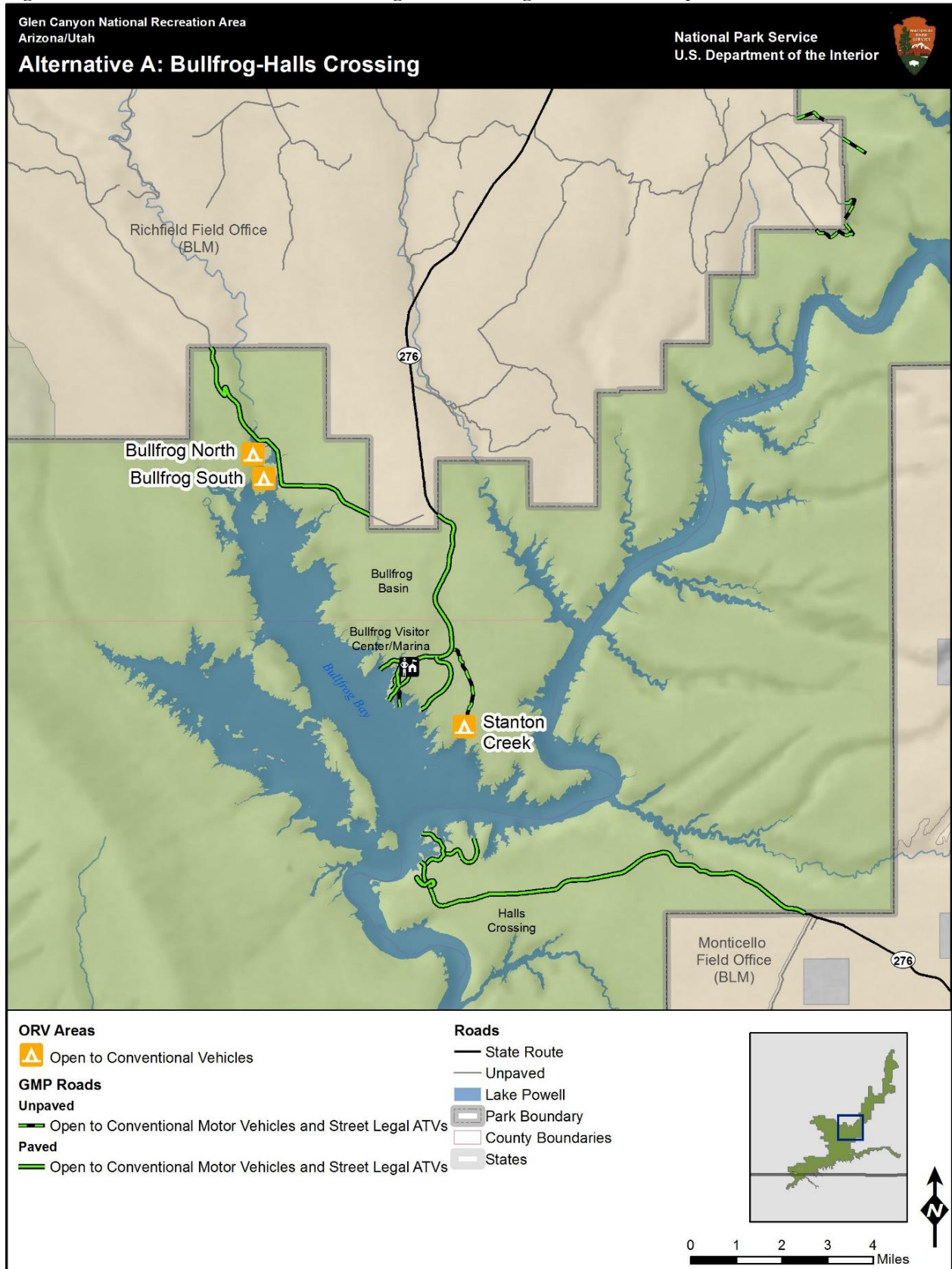


Figure 5. Proposed motor vehicle use at Glen Canyon National Recreation Area – Park-wide.

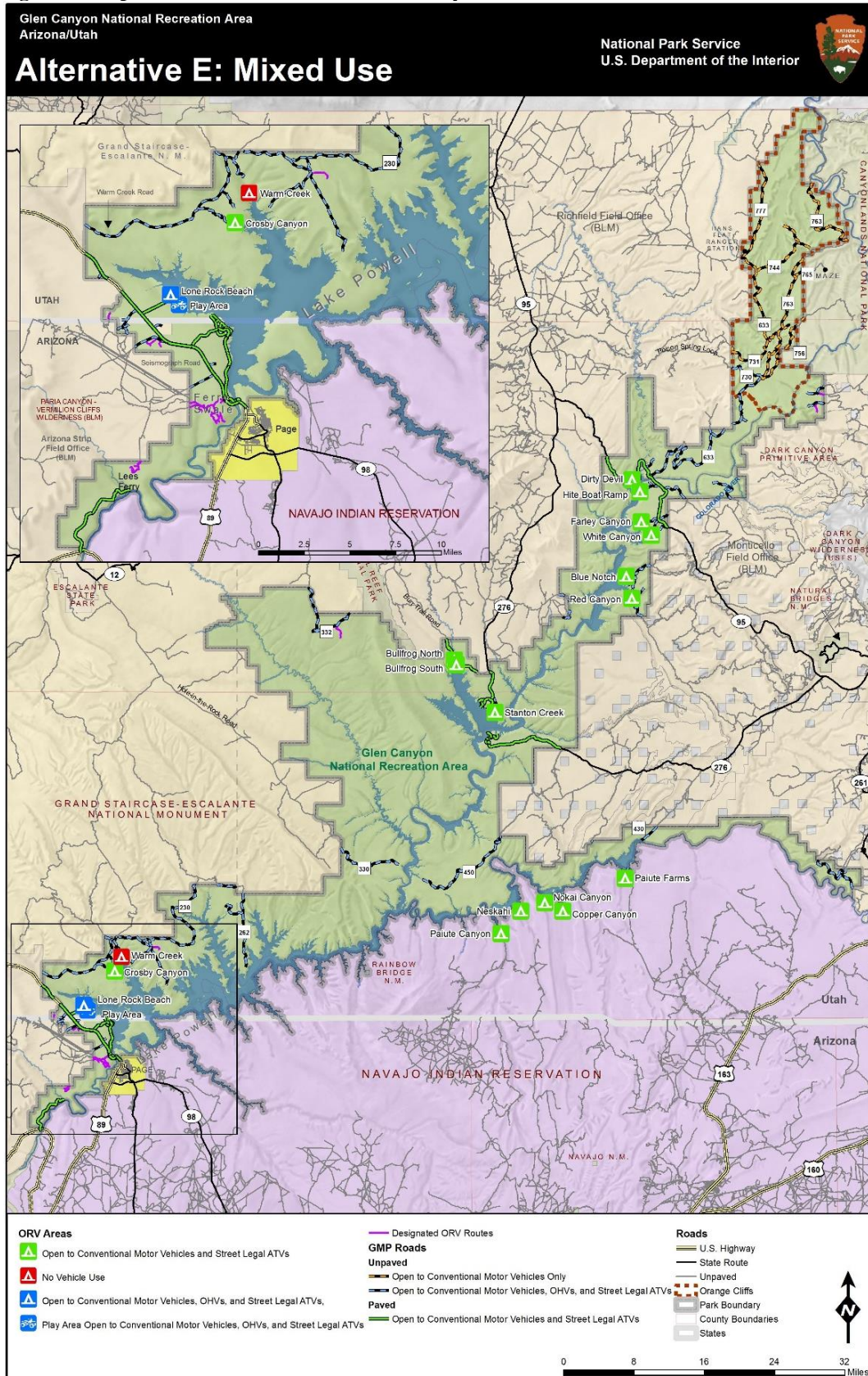


Figure 6. Proposed motor vehicle use at Glen Canyon National Recreation Area in Ferry Swale Area.

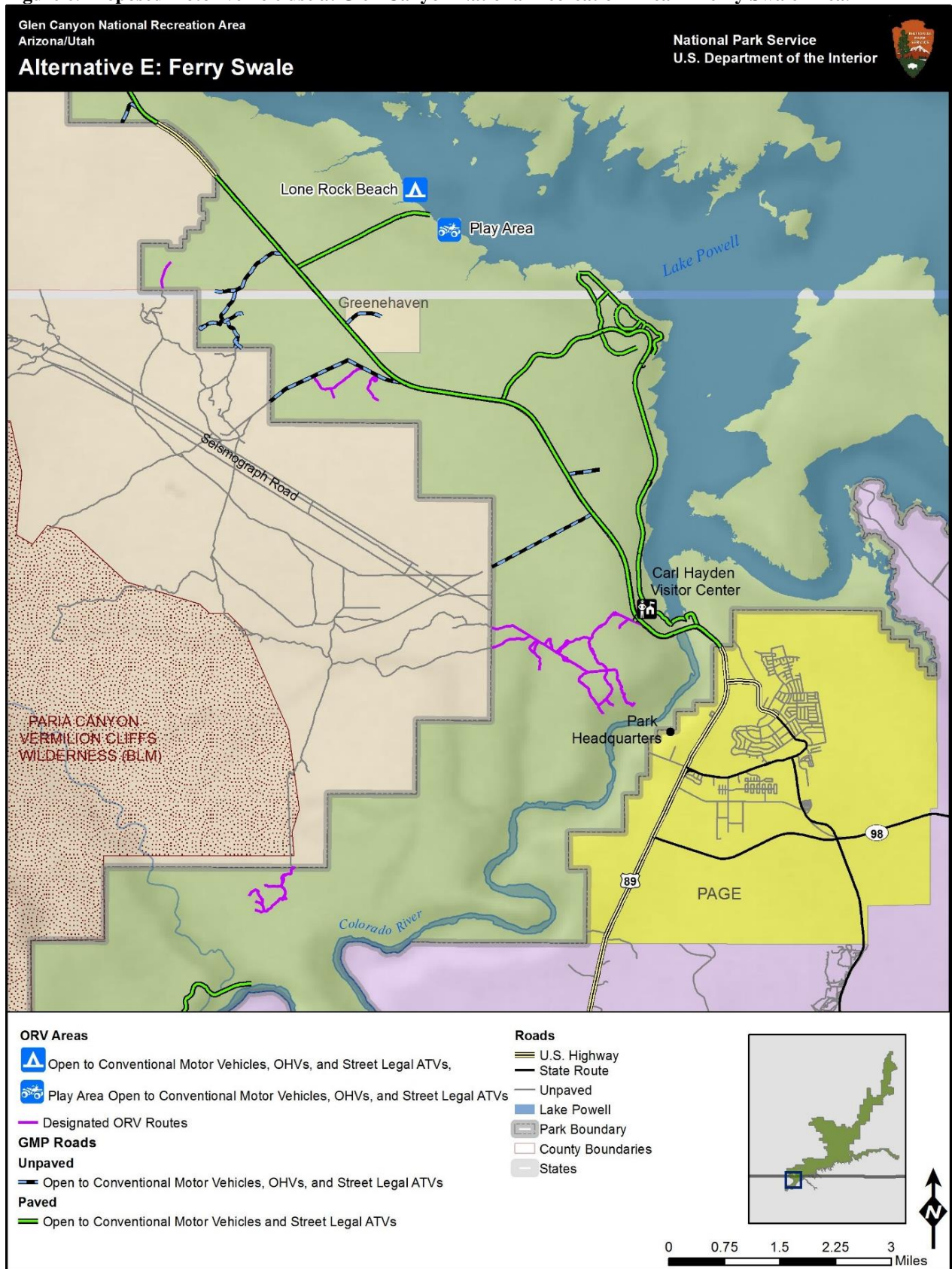


Figure 7. Proposed motor vehicle use at Glen Canyon National Recreation Area Uplake Canyons.

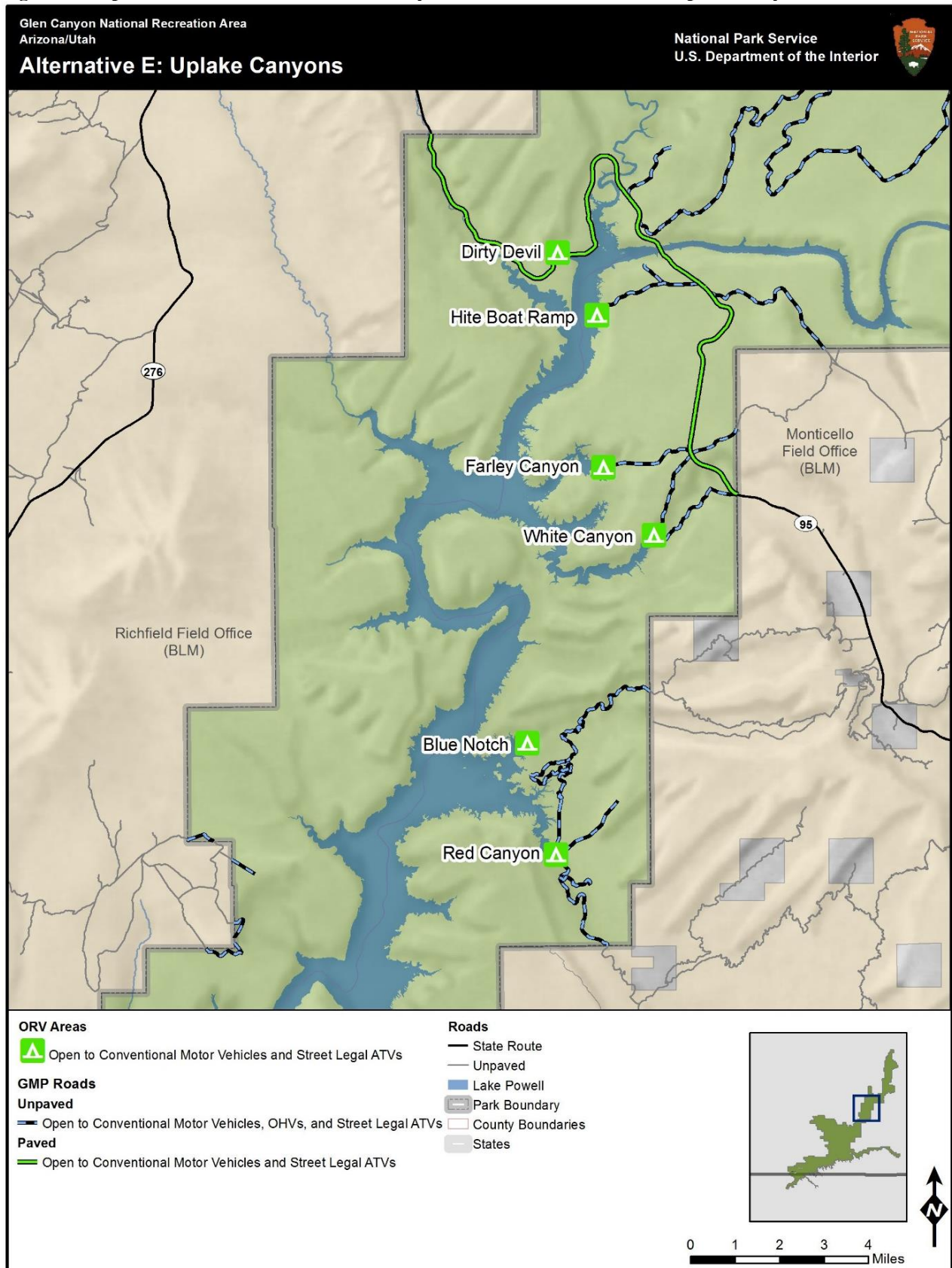


Figure 8. Proposed motor vehicle use for Bullfrog-Halls Crossing Area in Glen Canyon.

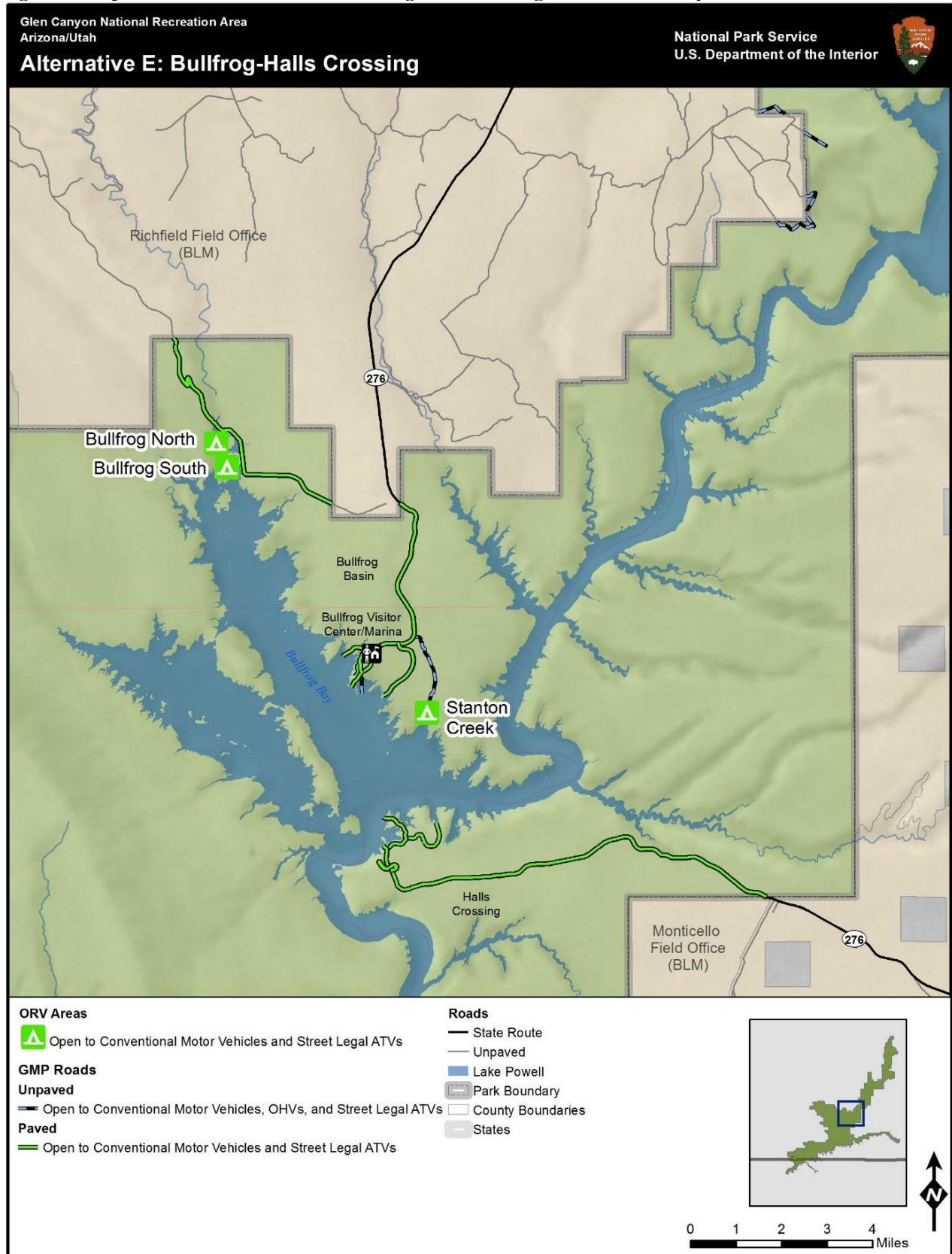
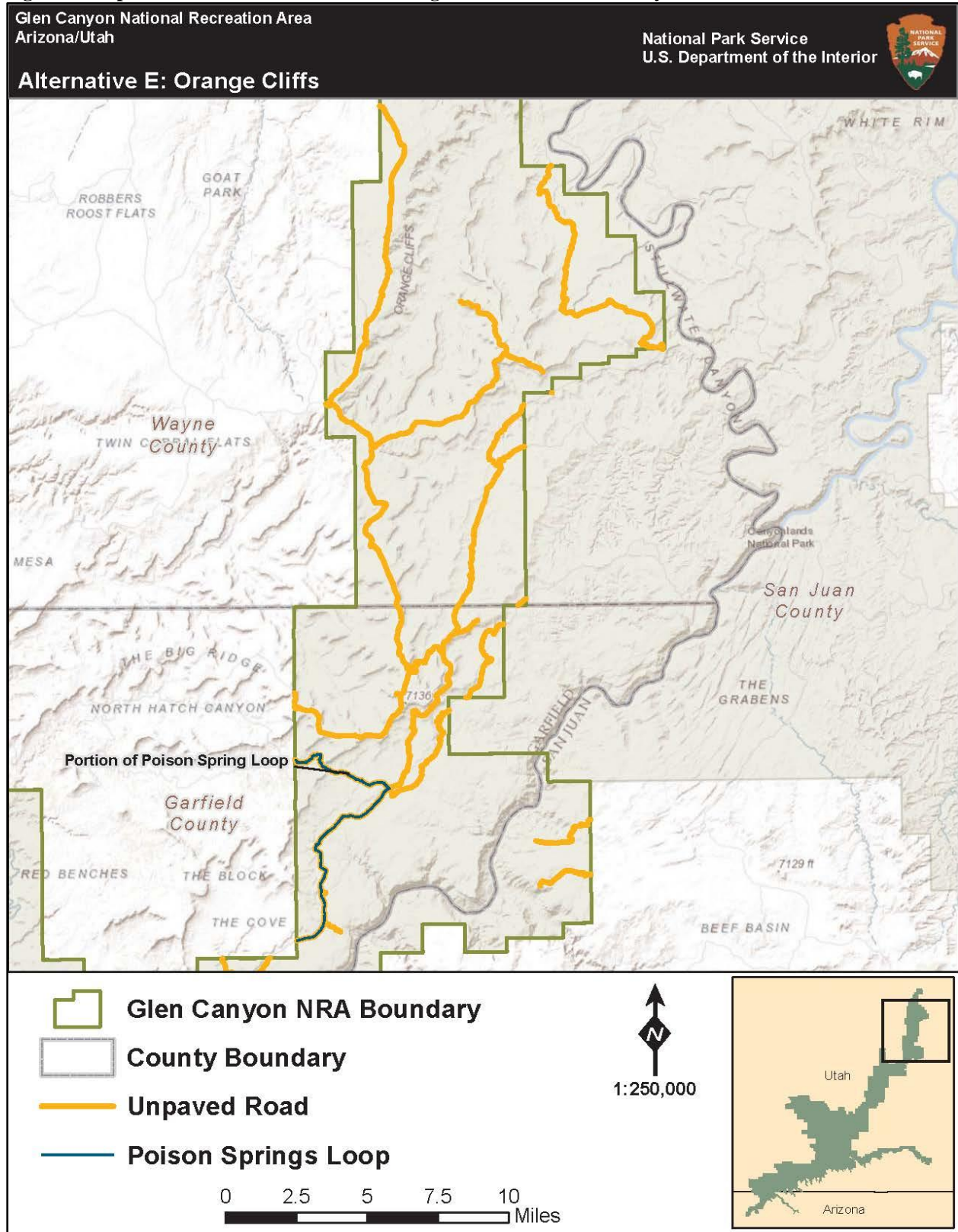


Figure 9. Proposed motor vehicle use for the Orange Cliffs Area in Glen Canyon.



3.2 General Conservation Measures

Monitoring

Monitoring procedures for the plan/EIS will be developed during implementation of the ORV Management Plan to identify resource impacts, assess and document the extent of disturbance, and mitigate impacts or restore areas affected by off-road use and disturbance. Glen Canyon staff will monitor indicators to determine when to take additional management actions as described in Table 2. Monitoring and subsequent management actions include both species populations and habitat connected to species-specific protection measures listed in this section.

Monitoring techniques will include staff observations and documentation of indicators, such as the presence of social routes (tracks outside ORV routes and areas and off of designated roads) and expansion of areas designated for off-road use, which will be monitored periodically by aerial photography. Glen Canyon staff will regularly monitor the number of motor vehicle accidents, vandalism, and other compliance issues resulting from off-road use and on-road use of OHVs and street-legal ATVs.

Management actions described in Table 2 will be implemented if monitoring indicates that off-road use or on-road use is impacting resources, or if trends are negative and resources are at risk. The decision to implement a specific management action will be based on feedback provided by the monitoring program, consultation with outside experts, the professional judgment of NPS staff and management, and the authorities available to the NPS.

Species-specific proposed conservation measures are listed under the species accounts for California condor, Mexican spotted owl, southwestern willow flycatcher, yellow-billed cuckoo, Jones cycladenia, Brady pincushion cactus, and Siler pincushion cactus.

Table 2. Indicators for Monitoring and Management Actions

RESOURCE OR VALUE	INDICATORS	WHAT DOES IT POTENTIALLY INDICATE / WHAT IS THE CAUSE FOR CONCERN?	MANAGEMENT ACTIONS
Soils	Tire tracks outside designated use areas or off-road	Areas designated for off-road use may be poorly defined and identified. Changes in soil structure due to crushing and shearing affect ecological processes and functions, cause erosion, crush burrows and impact ground-dwelling and burrowing animals, affect vegetation, and can lead to increases in invasive plants.	Improve signs and communication/education with partners and users; install physical barriers; enhance NPS presence; restore native plants; and implement closures.
RESOURCE OR VALUE	INDICATORS	WHAT DOES IT POTENTIALLY INDICATE / WHAT IS THE CAUSE FOR CONCERN?	MANAGEMENT ACTIONS
Vegetation (including threatened and endangered vegetation)	Crushing or other damage to native plants	Areas designated for off-road use may be poorly defined or identified. Impacts on plants can lead to losses in productivity, increases in impacts on soils, loss of habitat for wildlife, and increased susceptibility to invasive plants.	Improve signs and communication/education with partners and users; install physical barriers; enhance NPS presence; restore native plants; implement closures; and additional restrictions on vehicle type or other alterations to use.

RESOURCE OR VALUE	INDICATORS	WHAT DOES IT POTENTIALLY INDICATE / WHAT IS THE CAUSE FOR CONCERN?	MANAGEMENT ACTIONS
Recreation Resources and Visitor Experience	Litter / sanitation / vandalism / evidence of vehicle maintenance / evidence of hazardous materials	These indicate site degradation and ineffective communication of rules or problems with user behavior.	Improve signs and communication/education with partners and users and enhance NPS presence; and implement closures.
	Expansion of ORV areas and routes	The expansion of designated ORV routes and areas indicates inappropriate forms of use, poor site design, or problems with user behavior.	Improve signs and communication/education with partners and users; install physical barriers; enhanced NPS presence; restoration of native plants; and implement closures.
	Social routes	The creation of social routes indicates inappropriate user behavior, poor site design, ineffective enforcement, and degradation of resources.	Improve signs and communication/education with partners and users; install physical barriers; enhance NPS presence; restore native plants; and implement closures.
	Air quality and visual impacts	Impacts on air quality and visual resources could indicate increased dust at certain times of the year, such as spring and early summer.	Photographic monitoring using permanent photo points may require changes including closures at certain times of year or certain routes.
Invasive Plants	Increase in invasive plants	Increases in invasive plants may indicate disturbance to soils or native vegetation, changes in resource conditions, or transport of seeds by off-road use.	Improve signs and communication/education with partners and users; install physical barriers; enhance NPS presence, restore native plants; implement closures; and additional restrictions on vehicle type or other alterations to use.
Special-status Species	Declines in special-status species through evidence of direct mortality (animals) or declines in abundance (plants)	Declines of special-status species along roads may be linked to increased mortality (direct collisions, dust emissions, etc.), indicating disturbance and impacts caused by increased off-road use.	Develop and implement monitoring plans for species that survey data suggest may be affected; use education, physical barriers, enhanced NPS presence, or closures. Closure or seasonal closure for lambing areas for Desert Bighorn Sheep at Ferry Swale.
Compliance	Number of incidents	Poor compliance may be due to poor site design, selection, monitoring, and/or enforcement.	Improve signs and communication/education with partners and users; install physical barriers; enhance NPS presence; and implement closures.

Communication to the Public

During implementation of the plan/EIS, the NPS will provide information on federally listed species and their protection as part of the communication strategy for the plan/EIS. Glen Canyon will provide information about the ORV Management Plan on the internet, including detailed information regarding the authorized activities or prohibited use implemented the selected alternative. Online-based information will be included on the park website, social media and other sources. Glen Canyon will produce informational publications describing the ORV Management Plan and appropriate behavior. These will be provided to the public. Brochures, newspaper articles, trail guides, trailhead signs, videos, maps and other publications will be utilized. NPS interpretive and law enforcement staff will be informed and equipped to answer visitor questions and concerns regarding the ORV Management Plan. NPS will develop partnerships with Tread Lightly! off-roading groups, and other appropriate entities in the community to

improve communications, distribute information, and develop community awareness. These partnerships will enhance communications regarding on- and off-road ATV and OHV use on designated routes and within designated areas and the stewardship of Glen Canyon's resources and values.

ORV Permit System

A permit system will be implemented as a means to better manage the ORV plan. Requiring all operators desiring to travel off-road in Glen Canyon to obtain a permit will provide a means to monitor use as well as educate operators about designated routes and areas, rules and regulations, safety, and resource protection. Permit fees will be used to recover NPS costs for managing areas designated for off-road use. Costs include monitoring, signs, education programs, and partnerships, as well as the costs associated with administering the permits. Permits will be required for off-road use at accessible shoreline ORV areas, Lone Rock Beach ORV Area, and Lone Rock Beach Play Area ORV Area, and on designated ORV routes in Ferry Swale and other locations. Permits will be available for sale on-site at several locations within Glen Canyon and on-line via a web-based system. ORV permits will be issued per vehicle. The ORV permit will provide access for the permitted vehicle to all designated ORV routes and areas within Glen Canyon. A permit will be available for sale for a short-term visit or on an annual basis. The annual number of ORV permits that will be issued is not capped at this time. Permits could be revoked for violation of applicable regulations or terms and conditions of the permit.

3.3 Applicant Committed Conservation Measures

The NPS has designed a variety of conservation measures in the project to protect federally listed species and their habitats. The following design criteria are intended to avoid or minimize potential for adverse impacts. These measures will be carried out by trained Glen Canyon staff and project personnel using applicable U.S. Fish and Wildlife Service (USFWS) protocols. In addition, education will be an important component of these measures for all species (see Communication to the Public).

California Condor

- Glen Canyon staff will communicate and cooperate with the Peregrine Fund and state wildlife agencies as these organizations monitor condor locations and movements to determine the locations and status of condors in the plan area.
- Park staff and visitors are instructed to avoid interaction with condors and to immediately contact Glen Canyon Division of Resource Management staff at (928-608-6267) and the Peregrine Fund (208-362-3716) if and when condor(s) occur in the plan area.
- Permits issued for off-road vehicle use will include information about the condor and applicable restrictions.
- The speed limit on accessible shoreline ORV areas will be lowered to 25 mph or lower to decrease the possibility of collisions.
- If condors consistently occur in a portion of the plan area the NPS will consult with USFWS to determine if additional conservation measures are necessary. Glen Canyon staff will report condor occurrence in the plan area to the USFWS in a timely manner, and will facilitate implementation of any necessary management actions by Glen Canyon in consultation with the USFWS.
- Condor nesting in the vicinity of the action area is unlikely. However, if condor nesting activity occurs within 1.0 mile of the project area additional conservation measures may be necessary. Glen Canyon will report any such occurrences to the USFWS in a timely

manner, and will facilitate implementation of any necessary management actions by Glen Canyon in consultation with the USFWS. Temporary closures to recreational use of affected areas would be put in place if condor nesting activity occurs in the area.

- The NPS will provide visitor education via permit and other outreach efforts regarding proper and legal behaviors to protect natural and cultural resources when recreating on park roads, and on ORV routes and within ORV areas. This will include information about the importance of the area as habitat for a variety of sensitive species, including Mexican spotted owl, western yellow-billed cuckoo, southwestern willow flycatcher, the California condor, Jones cycladenia, and the Brady pincushion cactus.
- All trash related to park maintenance and visitor activities will be removed and be properly disposed of in a timely manner.

Mexican Spotted Owl

- The following measures apply to known nesting sites and activity centers within 0.5 mile of the action area during the MSO breeding season (1 Mar - 31 Aug):
 - During the MSO breeding season (1 Mar – 31 Aug), NPS will implement a 0.5 mile vehicle buffer around occupied activity centers, nest sites or occupied roost sites to provide adequate protection against disturbance of roosting or nesting owls.
 - Ensure that no construction of new facilities (e.g., fencing, signage) occurs during the breeding season in suitable or designated critical habitat.
 - When implementing activities related to maintenance of existing facilities pertaining to public health, safety, and routine maintenance, such as road repairs following storm events, use all measures possible to avoid potential effects to owls and their designated critical or suitable habitat (e.g., use least disruptive machinery, time activity to minimize disturbance, modify type of equipment used, conduct work in non-breeding season).
- Where designated critical habitat and modeled suitable nesting habitat overlaps the action area, and owl surveys are not current, NPS will implement seasonal closures (March 1 – August 31) of activities proposed in the Plan until survey data can be collected to determine use by Mexican spotted owl.
- NPS will institute additional USFWS protocol surveys for owls in 2017 for a minimum of three consecutive years through 2019 in modeled suitable nesting habitat. Areas of modeled suitable nesting habitat shall be prioritized for surveys based on a) overlap with the action area and a 0.5 mile buffer; and b) ground-truthing of modeled suitable nesting habitat;
- If new owl presence is detected, NPS will immediately modify ORV areas and routes in such a manner that off-road activity is restricted to areas >0.5 miles from known or suspected owl nesting sites. In the unlikely event that a temporary closure is not possible, the NPS will engage in additional consultation with USFWS to identify appropriate mitigation measures.
- NPS will report positive detections for MSO to the Utah Field Office of the USFWS within 3 days of detection.
- Annual reports of survey results shall be submitted to the Utah Field Office by September 30 of each year.
- NPS will develop a long-term monitoring strategy for Mexican spotted owl in coordination with USFWS to further guide implementation of the ORV Management Plan. This includes monitoring of suitable habitat in or near existing park roads, ORV areas and routes to inform subsequent management actions (e.g. change in size or

location of designated ORV areas, modification of park operations or visitor use activities).

- NPS will discontinue off-road use at the existing Warm Creek ORV area due to a range of management objectives. This closure will eliminate potential for disturbance from motorized vehicular access to adjacent suitable habitat for the Mexican spotted owl.
- The NPS will provide visitor education via permit and other outreach efforts regarding proper and legal behaviors to protect natural and cultural resources when recreating on park roads, and on ORV routes and within ORV areas. This will include information about the importance of the area as habitat for a variety of sensitive species, including Mexican spotted owl, western yellow-billed cuckoo, southwestern willow flycatcher, the California condor, Jones cycladenia, and the Brady pincushion cactus.
- NPS will lower the speed limit to 25 mph or less on unpaved park roads where street-legal ATVs and OHVs are permitted to decrease the possibility of collisions with wildlife, including sensitive species.
- Current accessible shorelines that are closed (Bullfrog North and South, White Canyon) due to low lake levels will remain closed until MSO surveys are completed.

Southwestern Willow Flycatcher

- Glen Canyon staff will survey using USFWS protocols along accessible shorelines and any associated riparian zones where riparian vegetation may occur that could be used during migration and breeding to determine the locations and status of flycatchers in the plan area. Evidence for southwestern willow flycatchers will consist of presence during three or more survey times between 15 May and 17 July, and will be conducted in consecutive years from 2017 through 2019, with periodic surveys afterwards using USFWS protocols.
- NPS will develop a long-term monitoring strategy in coordination with USFWS to further guide implementation of the plan. This includes monitoring of suitable habitat in or near existing park roads, ORV areas and routes to inform subsequent management actions (e.g. change in size or location of designated ORV areas, modification of park operations or visitor use activities).
- The speed limit on ORV routes and accessible shorelines ORV areas will be lowered to 25 mph or less to decrease the possibility of collisions.
- The NPS will provide visitor education via permit and other outreach efforts regarding proper and legal behaviors to protect natural and cultural resources when recreating on park roads, and on ORV routes and within ORV areas. This will include information about the importance of the area as habitat for a variety of sensitive species, including Mexican spotted owl, western yellow-billed cuckoo, southwestern willow flycatcher, the California condor, Jones cycladenia, and the Brady pincushion cactus.
- NPS will report consistent southwestern willow flycatcher occurrence in the plan area to the USFWS in a timely manner and will facilitate implementation of any necessary changes to management actions in consultation with the USFWS.
- Temporary closures to recreational use of affected areas will be put in place if activity occurs within 0.5 miles of nesting areas during the breeding season (May to August).
- When implementing activities related to modification or maintenance of existing

facilities pertaining to public health, safety, and routine maintenance, use all measures possible to avoid potential effects to flycatchers and their suitable habitat (e.g., use least disruptive machinery, time activity to minimize disturbance, modify type of equipment used, and conducting work in non-breeding season).

- Flycatcher nesting is extremely unlikely within the plan area due to the absence of high quality habitat within the plan area. However, if nesting activity occurs within 0.5 mile of the action area, most likely at or near accessible shoreline ORV areas, additional conservation measures will be implemented in consultation with USFWS. This includes temporary closures to recreational use within 0.5 miles of any active nest sites or regularly used foraging areas during the breeding season.
- NPS will develop a long-term monitoring strategy for southwestern willow flycatcher in coordination with USFWS to further guide implementation of the ORV Management Plan. This includes monitoring of suitable habitat in or near existing park roads, ORV areas and routes to inform subsequent management actions (e.g. change in size or location of designated ORV areas, modification of park operations or visitor use activities).

Yellow-Billed Cuckoo

- Prior to the implementation of this Plan, Glen Canyon staff will identify suitable nesting habitat for cuckoo within a 0.5 mile of the action area using the Service's 2015 Guidelines for the identification of suitable habitat for WYBCU in Utah.
- Protocol-level surveys for cuckoo will be conducted in consecutive years from 2017 to 2019, with periodic surveys in following years.
- Where suitable nesting habitat for cuckoo overlaps the action area, NPS will implement temporary closures (June 1 – August 31) to recreational use within 0.5 mile of that habitat. If protocol-level surveys determine absence of nesting cuckoo, temporary closures may cease.
- If protocol-level surveys indicate presence of nesting cuckoos, seasonal closures will be implemented for recreational use within 0.5 mile of the habitat patch where cuckoo activity has been documented and where nesting is likely.
- NPS will develop a long-term monitoring strategy in coordination with USFWS to further guide implementation of the plan. This includes monitoring of suitable and designated critical habitat in or near existing park roads, ORV areas and routes to inform subsequent management actions (e.g. change in size or location of designated ORV areas, modification of park operations or visitor use activities).
- The speed limit on unpaved roads and accessible shorelines where street-legal ATVs and OHVs are permitted will be lowered to 25 mph or lower to decrease the possibility of collisions.
- The NPS will provide visitor education via permit and other outreach efforts regarding proper and legal behaviors to protect natural and cultural resources when recreating on park roads, and on ORV routes and within ORV areas. This will include information about the importance of the area as habitat for a variety of sensitive species, including Mexican spotted owl, western yellow-billed cuckoo, southwestern willow flycatcher, the California condor, Jones cycladenia, and the Brady pincushion cactus.
- NPS will follow all USFWS reporting requirements if cuckoos are detected, including detections within 24 hours as well as annual reporting by September 30.
- When implementing activities related to modification or maintenance of existing

facilities pertaining to public health, safety, and routine maintenance, use all measures possible to avoid potential effects to cuckoos and their designated critical or suitable habitat (e.g., use least disruptive machinery, time activity to minimize disturbance, modify type of equipment used, and conducting work in non-breeding season).

- Yellow-billed cuckoo nesting in the vicinity of the plan area is unlikely due to the absence of high quality nesting habitat. However, if nesting activity occurs within 0.5 mile of the plan area, additional conservation measures will be implemented in consultation with USFWS. This includes temporary closures to recreational use within 0.5 miles of a habitat patch where cuckoos are nesting.

Jones' Cycladenia

- Glen Canyon staff will continue to survey suitable habitat at accessible shorelines for the species prior to project implementation using survey protocols recommended by the USFWS. If populations are found they will be protected by closures or barriers to prevent vehicle access. A 300-foot minimum buffer will be established using closures and barriers around located plants.
- Any plan activity that may cause adverse effect to located populations and plants will cease until qualified personnel can assess the situation and determine the correct course of action in consultation with the USFWS.
- The NPS will provide visitor education via permit and other outreach efforts regarding proper and legal behaviors to protect natural and cultural resources when recreating on park roads, and on ORV routes and within ORV areas. This will include information about the importance of the area as habitat for a variety of sensitive species, including Mexican spotted owl, western yellow-billed cuckoo, southwestern willow flycatcher, the California condor, Jones cycladenia, and the Brady pincushion cactus.

Brady pincushion cactus

- No plan activities or projects will be authorized in suitable or occupied habitat for this species
- NPS will develop a long-term monitoring strategy in coordination with USFWS to further guide implementation of the plan. This includes monitoring of suitable habitat in or near existing park roads, ORV areas and routes to inform subsequent management actions (e.g. change in size or location of designated ORV areas, modification of park operations or visitor use activities).
- Glen Canyon staff will monitor the Lees Ferry paved road regularly to prevent illegal off-road activity. This road and the Lees Ferry District will be closed to ORV activity.
- The NPS will provide visitor education via permit and other outreach efforts regarding proper and legal behaviors to protect natural and cultural resources when recreating on park roads, and on ORV routes and within ORV areas. This will include information about the importance of the area as habitat for a variety of sensitive species, including Mexican spotted owl, western yellow-billed cuckoo, southwestern willow flycatcher, the California condor, Jones cycladenia, and the Brady pincushion cactus.

Siler pincushion cactus

- Glen Canyon staff will continue to survey suitable habitat at accessible shorelines for the

species prior to project implementation. If populations are found they will be protected by closures or barriers to prevent vehicle access. A 300-foot minimum buffer will be established using closures and barriers around located plants.

- Any project activity that may cause adverse effects to located populations and plants will cease until qualified personnel can assess the situation and determine the correct course of action in consultation with the USFWS.

4.0 Action Area Description

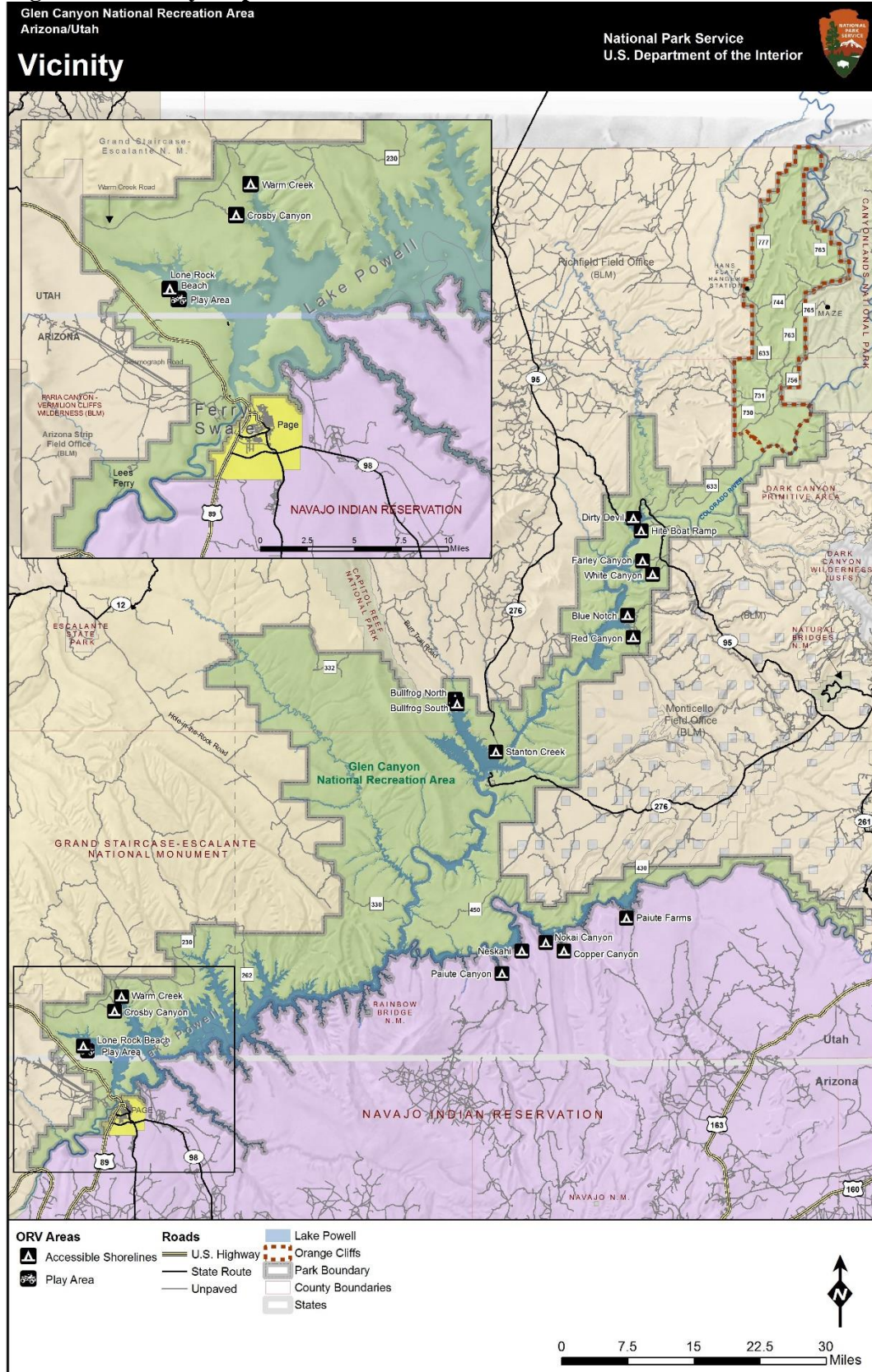
The plan/EIS affects all components of public motor vehicle use in Glen Canyon. The specific components of the plan/EIS described in Table 1 in Section 3.0 and in Appendix B were buffered by a larger area of potential impact in order to create the action area used for the purposes of this assessment. The action area thus defined consists of:

- 75 miles of paved road (estimated 66' width of roadway and roadsides) and buffer area one mile wide on both sides of the centerline
- 313 miles of unpaved road (estimated 24' width of roadway and roadsides) and buffer area one mile wide on both sides of the centerline
- 19 miles of ORV routes (estimated 24' width of roadway and roadsides) and buffer area one mile wide on both sides of the centerline
- 15 accessible shoreline areas of varying size totaling approximately 5,950 acres and buffer area one mile wide from all sides of the area
- One ORV area (Lone Rock Play Area) of 180 acres and buffer area one mile wide from all sides of the area.

The action area includes the land, water and air in the action area and the adjacent one mile buffer zone.

Glen Canyon, located in the Colorado Plateau physiographic province, extends more than 200 miles from the Green River in southern Utah to Lees Ferry in Arizona. It is a desert region of rock, arid shrublands, grasslands, and low-growing pinyon/juniper woodlands. As shown in the "Vicinity" map (Figure 10), Glen Canyon is bordered by Canyonlands National Park to the northeast; the Red Rock Plateau to the east; the Henry Mountains to the north; Grand Staircase–Escalante National Monument, Dixie National Forest, and Capitol Reef National Park to the northwest and west; and the Navajo Indian Reservation to the south.

Figure 10. Vicinity Map.



4.1 Description of Water in Action Area

Glen Canyon surrounds Lake Powell (Figure 11) which was formed by the inundation of the Colorado River following the construction of the Glen Canyon Dam between 1960 and 1963. The 186-mile-long Lake Powell formed along the courses of the Colorado River and three tributaries: the Escalante, San Juan, and Dirty Devil Rivers. Lake Powell is the second-largest reservoir by volume in North America, and the largest reservoir in North America by surface acreage, length, and shoreline length. The lake includes parts of Arizona and Utah.



Figure 11. View of Lake Powell towards Navajo Mountain.

The Bureau of Reclamation manages the Glen Canyon Dam. It was designed to accommodate lake levels ranging from 3,490 feet to 3,700 feet above sea level. As the water level changes, the surface of Lake Powell varies in area from 52,000 acres to 163,000 acres and the shoreline fluctuates from 990 miles to 1,960 miles in length. Usually, the lake surface is about 160,000 acres, which represents approximately 13% of Glen Canyon. Annual fluctuations in lake levels typically are about 25 vertical feet. The lake level rises in the spring as water from snowmelt runoff collects behind the dam. It then declines throughout the rest of the year, particularly during summer and early fall as water is released for electrical power generation and irrigation.

The remaining 87% of Glen Canyon consists of upland desert incised by deep canyons, dry washes, and steep cliffs, as well as talus, and clay or slickrock badlands. Much of the lake's shoreline consists of steep slopes and cliff walls. Elevations in Glen Canyon vary from approximately 3,600 feet (at low lake levels)

to over 7,500 feet above sea level.

Natural topographical features generally contain the accessible shoreline areas, and therefore these shoreline areas are limited in extent and easily described in terms of resource conditions. The designated road system (GMP roads [paved and unpaved]), however, encompasses nearly 400 miles of park roads that are situated across the vast expanses of Glen Canyon in areas of rock, arid shrublands, grasslands, and low-growing pinyon/juniper woodlands (Figure 12).



Figure 12. Overlook of Flint Trail in the Orange Cliffs.

4.2 Description of Air in Action Area

The EPA, the Arizona Department of Environmental Quality, and the Utah Department of Environmental Quality regulate air quality in Glen Canyon through the implementation of the Clean Air Act. The EPA has established primary and secondary National Ambient Air Quality Standards for six criteria pollutants: carbon monoxide, nitrogen dioxide, particulate matter, ozone, sulfur dioxide, and lead. In addition to the National Ambient Air Quality Standards, the Clean Air Act contains a “Prevention of Significant Deterioration” title (42 USC 7470–7492) to place ceilings on additional amounts of pollution over baseline levels based on the classification of an area. The program outlines three types of airshed classification areas: Class I, Class II, and Class III. Glen Canyon is classified as a Class II area. Currently, Glen Canyon is located in a designated EPA air quality attainment area, which means air quality standards are being met. Neighboring national park units, including Capitol Reef, Canyonlands, and

Grand Canyon National Park, are Class I areas. Off-road use can have an adverse impact on ambient air quality through its destabilizing effects on soils and through mobile source emissions. Additionally, impacts of fugitive dust due to off-road activity can be problematic.

4.3 Description of Geology in Action Area

The geology of Glen Canyon represents a spectacular example of exposed Colorado Plateau rocks (Sprinkle et al. 2000) and is characterized by relatively flat-lying Mesozoic and Paleozoic sedimentary rocks. This area of high-standing crustal blocks is largely pristine due to a lack of rock deformation over the last 300 million years. The area stands in stark contrast to the highly deformed Southern Rocky Mountains region to the northeast and the Basin and Range regions to the west and south.

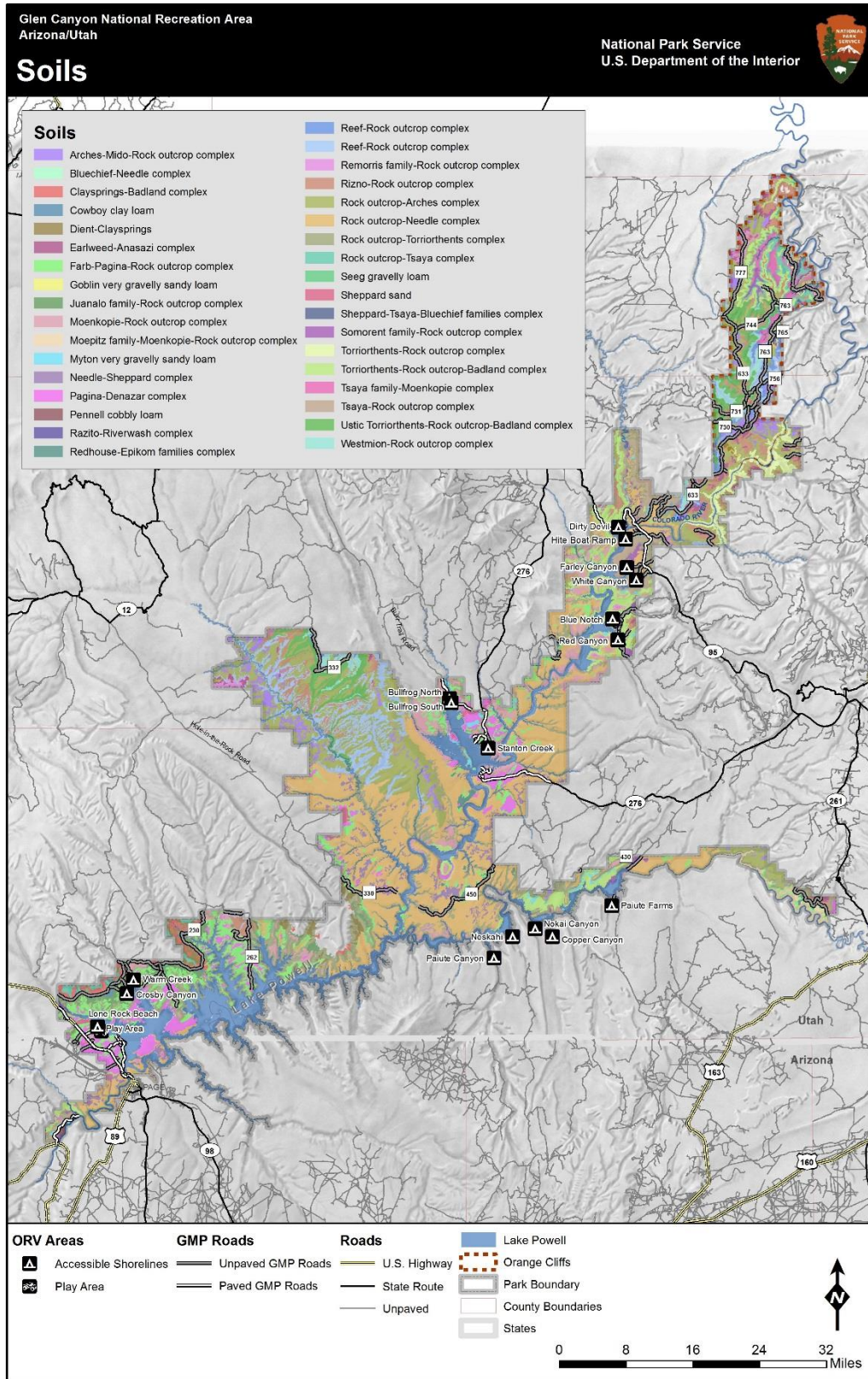
The bedrock units of Glen Canyon range in age from 300 million years (Late Pennsylvanian) to 85 million years (Late Cretaceous). Vigorous downcutting of the Colorado and San Juan River systems has exposed more than 8,500 feet of sedimentary rock strata. The strata contain a visible record of marine, marginal marine, coastal, and alluvial plain, vast desert, and small oasis conditions over a vast period. Glen Canyon consists primarily of sedimentary strata of the Triassic and Jurassic ages. The majority of Glen Canyon is of the Moenkopi and Chinle Formations of the Triassic, and the Glen Canyon Group of the Jurassic.

4.4 Description of Soils in Action Area

Approximately one-third (400,000 acres) of Glen Canyon is exposed bare rock and the disintegrated shale and sandstone that make up canyon walls and plateau edges (NRCS 2010). The weathering of rock in flat areas such as plateaus and mesas, along with introduced windblown sand, may create a thin, noncontinuous soil mantle over the rock. This thin cover often has pockets of deeper soils in indented or sheltered areas, which frequently shift due to wind and erosion. These thin, shifting, constantly disturbed soils cover most of the remaining area. Because much of the soil in Glen Canyon is transported by water and wind, most of the deeper soils are present in protected areas such as dry streambeds, alluvial zones, former and existing canyons, and cliff bases. Deeper, more established soils make up a fraction of Glen Canyon (1,850 acres) (NRCS 2010). Figure 13 provides a map of the soil types found in Glen Canyon.

Soils in Glen Canyon are generally sandy, with most upland areas containing variants of sandy loam, loamy sand, and sand. There are also areas of high clay content, known as clay barrens, and areas with high mineral concentrations (NRCS 2010). Clay and silt loams may be found in alluvial areas or the shoreline area of Lake Powell where soil deposits are left behind by retreating waters. In sections of the shoreline where soils are occasionally inundated, flooding creates anaerobic conditions and limits the development of biological crusts or vegetation. Shoreline areas and dry washes that are rarely covered in water may support increased vegetation because of deeper, more fertile alluvial or windborne soil deposits, protection from erosive forces, and/or increased moisture availability. Alluvial soil deposits and associated vegetation commonly occur at the edge of the high water line, especially in protected stream beds or canyons. Upland areas that contain sandy soils or sand mixed with clay and minerals may form either biological or physical crusts. Deeper, established soils are also found at the base of rock outcrops or cliffs (above the high water line and/or protected from water run-off). These areas may contain biological crusts and vegetation, and are subject to less wind and water erosion because these features fix the soil in place.

Figure 13. Map of Soils in Glen Canyon National Recreation Area.



Biological crusts (or biotic crusts) are a key component of the ecosystem formed on the thin soils of Glen Canyon and across the Colorado Plateau region, where up to 70% of living ground cover may consist of biological crusts (Belnap 1994). Biological crusts are composed of a community of specialized organisms including cyanobacteria, green algae, lichens, mosses, microfungi, and other bacteria, and appear as dark, sponge-like-textured pinnacles of soil (Belnap and Lange 2001). The soil is stabilized when filaments of cyanobacteria and microfungi extend into the upper few millimeters of soil and secrete a gel-like substance that binds the soil particles together to form a cohesive matrix (Belnap and Gardner 1993; Belnap 1993).

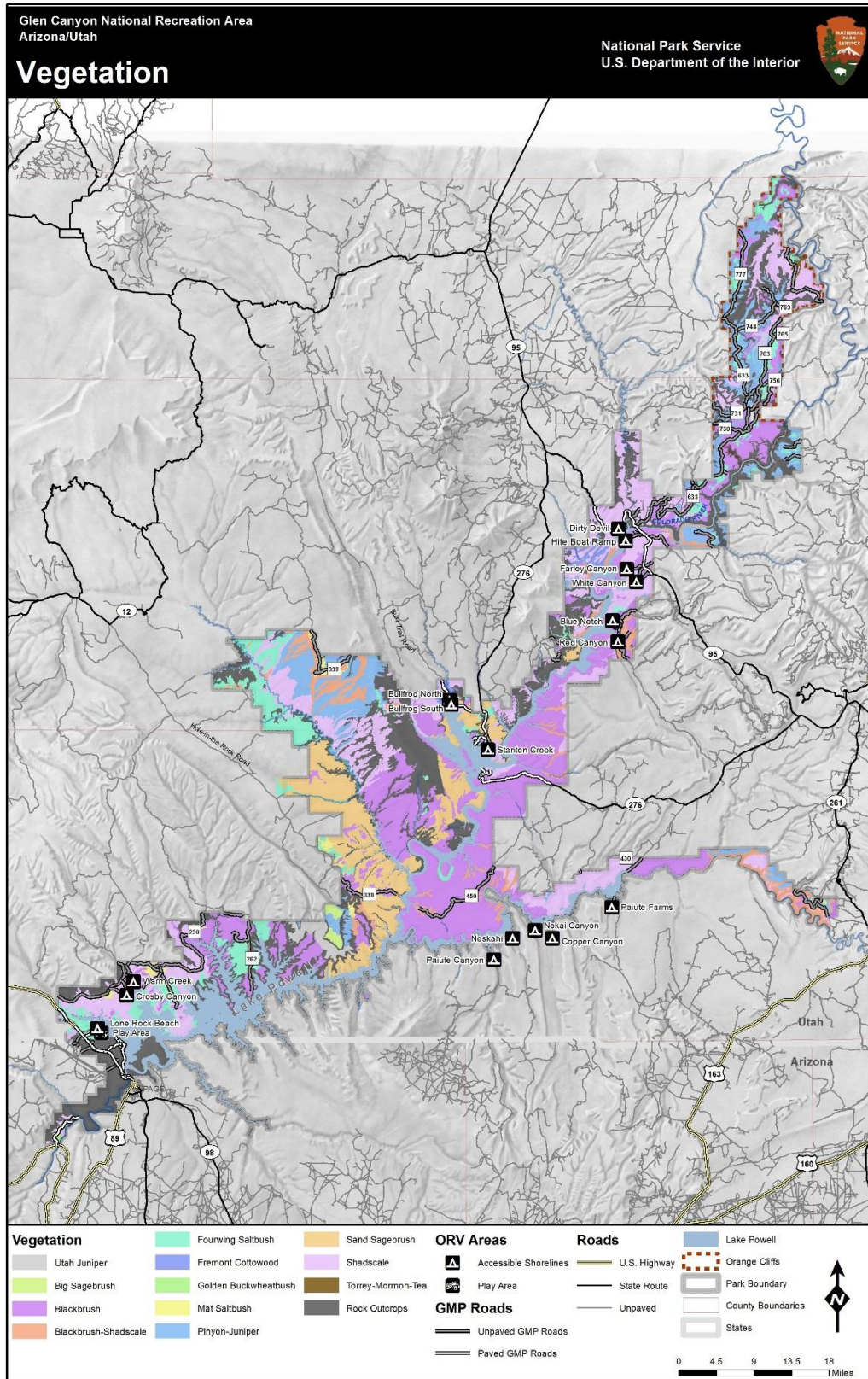
Soils in Glen Canyon may form biological crusts in areas free from historic or current nonnatural disturbance, with shallow soil and limited water and wind erosion. Biological crust cover generally increases in areas with low vascular plant cover, at lower elevation, and with more loosely embedded rocks, shallower soils, and fine soil texture (Belnap and Lange 2001). Biological crust formation is limited because over one-third of Glen Canyon consists of bare rock, and one-third has thin, shifting soils, with wide swathes containing high concentrations of minerals. Additionally, areas of Glen Canyon in the “bathtub ring” of Glen Canyon (the land around Lake Powell bleached by high water), or in dry streambeds and canyons, are subject to inundation during high water events. Flooded soils create anaerobic conditions, which inhibit the development of biological crusts due to the intolerance of lichen for low-oxygen or no-oxygen conditions (Winward 1980).

Nonbiotic crusts, known as physical crusts, also commonly occur in Glen Canyon. These crusts are primarily formed by raindrop impact, which breaks down the soil and fixes small-diameter silt and clay particles to the surface, creating strong, dense, soil layers ranging in thickness from one millimeter to three centimeters. The crusts have low infiltration rates, which limits drainage, resulting in increased water runoff and soil erosion, and in reduced germination and emergence rates of vascular plants (Belnap and Lange 2001). Aerial images of Glen Canyon show large areas of physical crusts, often indicated by white expanses of salts, lime, and silica, which are deposited at the surface during evaporation. Impermeable soils are also formed through trampling by livestock or through wheeled vehicle passage, which compact and shear the soil, resulting in more surface runoff along with the destruction of soil pores and structure (Adams et al. 1982; Payne et al. 1983).

4.5 Description of Vegetation in Action Area

Glen Canyon lies in the Colorado Plateau Floristic Region. This region is roughly centered on the “four corners” region of the southwestern United States, occupying Arizona, Colorado, New Mexico, and Utah. The vegetation of Glen Canyon is highly diverse and typical of the Colorado Plateau Region, consisting of a variety of arid and semiarid plant communities (Figure 14). The majority of Glen Canyon below 5,000 feet is considered shrubland and grasslands, with areas above 5,000 feet being recognized as woodlands.

Figure 14. Map of Vegetation in Glen Canyon National Recreation Area.



Generally, the majority of Glen Canyon below 5,000 feet above sea level is dominated by blackbrush shrubland on shallow rocky soils. Typically, surrounding these areas shadscale, a mixture of shadscale and blackbrush, sand sagebrush, and Cutler-Mormon-tea (*Ephedra cutleri*) can be found. Sandy soils support a mosaic of shrubland and grassland types. Clay barrens are common and generally vegetated by ephemeral annual forbs or dwarf shrubland that is dominated by species of saltbush (*Atriplex* spp.), including mat saltbush (*A. corrugata*) and four-wing saltbush. In areas along streams, Fremont cottonwood (*Populus fremontii*) can be frequently found. Areas above 5,000 feet above sea level are dominated by pinyon/juniper woodlands composed of stands of pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*), interspersed with meadows dominated by big sagebrush (*Artemisia tridentata*).

Shrubland areas include upland arid and semiarid, northern desert shrublands, upland dwarf shrublands, and riparian shrublands. In addition to shrublands, Glen Canyon is home to two woodland vegetation communities: upland and riparian. Additionally, Glen Canyon has springs and hanging gardens, a number of nonnative species, and relict plant communities.

The accessible shorelines of Lake Powell are typified by lower elevations and low to moderate sand slopes. Sand shrub communities typically include sand sagebrush, four-wing saltbush, Vanclevea (*Vanclevea stylosa*), Torrey-Mormon-tea, and plains beavertail (*Opuntia erinacea*). Grasses include Indian ricegrass (*Achnatherum hymenoides*) and dropseeds (*Sporobolus* spp.). A variety of forbs occur, including globemallow (*Sphaeralcea grossulariifolia*), bird's beak (*Cordylanthus wrightii*), pallid evening-primrose (*Oenothera pallida*), annual sunflower (*Helianthus petiolaris*), and numerous additional annual species. Biological soil crusts are typically common on sandy soils in these communities, especially under and around the shrubs.

Upland Shrubland

Upland arid and semiarid, northern desert shrublands and upland dwarf shrublands form the dominant vegetation in Glen Canyon. A variety of shrub species have adapted to the arid hot summer and cold winter climate of the region. Differences in species composition between shrublands are primarily related to soil characteristics, aspect, and elevation. Blackbrush is the dominant shrub species over extensive areas in upland shrublands.

Blackbrush grows on nonsaline, sandy or stony loams of old pediment slopes and terraces with caliche layers. Blackbrush sites with shallow soils are often found with well-developed biological soil crusts, which are highly susceptible to surface disturbance. Accessible shorelines where blackbrush is present include White Canyon, Blue Notch, Hite Boat Ramp, Red Canyon, and Warm Creek (Figure 15).

Shadscale is another relatively abundant evergreen shrub found throughout Glen Canyon. Shadscale stands often cover sites with finer-textured, relatively saline soils. This community covers less of Glen Canyon than blackbrush because the shale and siltstone formations that favor shadscale are less common in the area compared to the sandstone-derived soils that support blackbrush and sand shrub vegetation. Shadscale is often found in association with galleta and Indian ricegrass in shallow sandy clay loams, but where the clay content is high it coexists with mat saltbush. Accessible shorelines where



Figure 15. Vegetation at the Warm Creek Area.

shadscale is found include Dirty Devil, White Canyon, Farley Canyon, Bullfrog South, Stanton Creek, Crosby Canyon, and Warm Creek.

Riparian Shrublands

In Glen Canyon two types of riparian shrublands occur, one associated with permanent water or a shallow water table and the second associated with ephemeral or intermittent streams. Along permanent streams, coyote willow (*Salix exigua*) and seepwillow (*Baccharis salicina*) are dominant, with understories that typically include horsetail (*Equisetum hyemale*), wiregrass (*Juncus balticus*), or species of bulrush (*Scirpus* spp.). Along the original Colorado River corridor, stands of arrowweed (*Tessaria sericea*) are common, with some patches still found below Glen Canyon Dam and in side canyons off Lake Powell.



Figure 16. Vegetation at the Alstrom Point Area.

A facultative riparian species-rich shrubland can develop along intermittent or ephemeral stream channels. Dominant species include Apache plume (*Fallugia paradoxa*), cliffrose (*Purshia stansburiana*), and various species of rabbitbrush (*Chrysothamnus nauseosus* and *C. viscidiflorus*). The understory of these stands is typically composed of upland species found in the adjacent upland vegetation (Figure 16).

Many riparian shrublands in Glen Canyon have been invaded by nonnative species, primarily tamarisk (*Tamarix ramosissima*), Russian olive (*Elaeagnus angustifolia*), Ravenna grass (*Saccharum ravennae*), camelthorn (*Alhagi maurorum*), and Russian knapweed (*Acroptilon repens*). In many areas, tamarisk has become the dominant species. These areas then become susceptible to fire, which increases the dominance of the fire-adapted tamarisk.

Upland Woodlands

The pinyon/juniper alliance is the principal woodland community in Glen Canyon, consisting of the small pinyon pine and Utah juniper trees. These woodlands typically occur between 5 – 7,500 feet above sea level. They are highly variable depending on soil type, aspect, slope, and elevation. Many examples of the pinyon/juniper alliance are fairly open, with a sparse shrub understory. In a few areas, including the Orange Cliffs and Navajo Point, very dense stands of large old-growth pinyon/juniper exist. In these cases there is very little understory other than a few low shrubs and forbs (NPS 1993). In addition, the pinyon/juniper alliance has associated shrub species typically found in nearby meadows, including big sagebrush, Utah serviceberry (*Amelanchier utahensis*), mountain mahogany (*Cercocarpus intricatus*), blackbrush, singleleaf ash (*Fraxinus anomala*), and roundleaf buffaloberry (*Shepherdia rotundifolia*).

Grazing is the most prevalent disturbance in pinyon/juniper woodlands, but recreation, including off-road driving, can also impact these areas. Disturbed stands often have high concentrations of cheatgrass (*Bromus tectorum*) and other nonnative annuals in their understory, and markedly reduced species diversity.

Riparian Woodlands

Stands of Fremont cottonwood (Figure 17) occur throughout Glen Canyon along streams and sometimes in association with springs. There is typically a series of stands of this species of differing ages related to flooding, ranging from young dense congregations of saplings along recent stream channels to older, larger trees on high terraces. They are classified as woodlands rather than forests because most examples are rather open, with fairly low canopy cover. Fremont cottonwood is a critically important component in both breeding and migratory habitat for many bird species, with the majority found along the Escalante River. Stands of cottonwood also occur in alliance with Goodding willow (*Salix gooddingii*), or more rarely, box elder (*Acer negundo*).



Figure 17. Fremont Cottonwood.

On upper stream terraces and in somewhat drier sites, Fremont cottonwood is the sole tree species present, typically with a dense understory of upland shrubs, especially of rabbitbrush. Locations with cottonwood stands are attractive to recreationists because the trees provide cover and are associated with water. Heavy use of these areas can lead to soil compaction and erosion, the exposure of root systems, the trampling of understory vegetation, and direct damage to the trees from wood collection and other activities. Flooding is also a common disturbance in riparian woodlands stands.

A number of riparian woodlands in Glen Canyon have been invaded by nonnative species, primarily tamarisk (*Tamarix ramosissima*), sweet clover (*Melilotus* spp.), Russian olive, alfalfa (*Medicago sativa*), Russian thistle, rip gut brome (*Bromus diandrus*), Japanese brome (*Bromus japonicus*), and cheatgrass.

Springs and Hanging Gardens

Spring- and seep-supported plant communities (Figure 18) are rare in the Colorado Plateau physiographic province, but occur with enough frequency in Glen Canyon that explorer John Wesley Powell named the area Glen Canyon due to the abundance of these glens, or hanging gardens. There are approximately 50 acres of hanging gardens (spring-fed colonies of plants found clinging to vertical cliff walls) in Glen Canyon.



Figure 18. Spring Site near San Juan River.

The springs are derived from a local aquifer primarily supplied by winter precipitation. The water supply moves through a porous sandstone unit until it reaches a less permeable layer of rock, such as the Kayenta Formation. At this point, the water begins to flow laterally, seeping out of the stone and flowing over the cliff face. This water source provides suitable habitat for a rich array of plants to grow directly from the cliff face. Hanging gardens support a rich variety of water-loving plant species, such as ferns, lilies, sedges, and orchids. About 35 species of Colorado Plateau–endemic plants are associated with hanging gardens and related spring communities. These gardens are also hot spots of biodiversity, supporting many species of plants and associated terrestrial invertebrates, aquatic invertebrates, birds, mammals, and amphibians. Hanging gardens are very fragile and are easily damaged by cattle grazing, recreation, and

other impacts that can damage the vegetation or soils on which these gardens depend.

Many other types of springs also occur in Glen Canyon, including limnocrenes, slope springs, gushettes, wetland springs, and mound springs. Biodiversity varies across these spring types, but overall tends to be lower than in hanging gardens.

Nonnative Species

NPS has identified 83 nonnative plant species in Glen Canyon. Of these known nonnative species, nine are controlled because of the threat they pose to native plants and plant habitats: Russian knapweed, African mustard (*Brassica tournefortii*), Russian olive, camelthorn, tamarisk (salt cedar), giant reed (*Arundo donax*), Uruguayan pampas grass (*Cortaderia selloana*), perennial peppergrass (*Lepidium latifolium*), and Ravenna grass. The remaining nonnative plant species are not prone to being invasive and are not a threat, or they are too abundant and too difficult to control, such as Russian thistle and cheatgrass.

4.6 Description of Wildlife in Action Area

Glen Canyon supports a complex and fragile ecosystem, with plants and wildlife that have developed unique adaptations to the arid conditions of their environments. Typical of the Colorado Plateau, the highly diverse vegetation of Glen Canyon creates important habitat for a diverse range of vertebrate animals, including mammals, fish, reptiles and amphibians, and birds (NPS 2007c). Within the boundaries of Glen Canyon, approximately 438 vertebrate species have been documented, including 64 species of mammals (NPS 2007d), 25 species of fish (NPS n.d.a), 31 species of reptiles (Drost et al. 2008), 6 species of amphibians (NPS n.d.b), and 316 species of birds (Spence, LaRue, and Grahame 2011). The Glen Canyon Off-road Vehicle Management Draft Environmental Impact Statement (2014) contains additional information on many of these vertebrate animals. In addition, an unknown but potentially large number of arthropod species could be found in Glen Canyon.

4.7 Description of Project Area Regions in Action Area

GMP Road System

Planning for the Glen Canyon recreational road system began soon after Congress established Glen Canyon National Recreation Area in 1972. During the development of the 1979 Glen Canyon GMP, the issue of road access and circulation was thoroughly reviewed. As a result of the GMP planning effort, 86.3 miles of unpaved roads were closed, and 313 miles of unpaved roads and approximately 75 miles of paved roads remained open to allow for public use and circulation through Glen Canyon (NPS 1979). The open roads designated through the GMP are the only roads in Glen Canyon authorized for public travel (NPS 1989 memorandum). Most of the roads that were closed were primitive unimproved tracks associated with early mineral prospecting, sheep and cattle grazing, or social exploration and were not in public use at the time of GMP planning. A few roads were closed to protect proposed wilderness areas or to preserve the integrity of the natural zone of Glen Canyon.

Glen Canyon has undertaken several extensive road inventories since the development of the GMP. A road inventory was conducted in 1984 in response to the unauthorized expansion of Glen Canyon's designated road network. This inventory resulted in two actions. The first was a decision to physically close all unauthorized Glen Canyon roads, which was generally accomplished by placing orange Carsonite stakes on all unauthorized roads, or by placing obstructions such as boulders on the road. The second action was the development of a specific three-digit road numbering system for Glen Canyon.

This road numbering system remains in place today.

The desert landscape of Glen Canyon is a dynamic, ever-changing environment. Primitive and infrequently maintained roads tend to be unstable. Natural events may block or obliterate a road and the road is rapidly reclaimed by nature. County road crews may alter the road alignment around a new obstacle to make the road passable.

Accessible Shoreline Areas

The previously designated accessible shorelines areas in Glen Canyon are intended to provide public motor vehicle access to the Lake Powell shoreline for the purposes of recreational use in a primitive setting. The 1979 Glen Canyon GMP 32 identified shoreline sites where road access is permitted or can be considered (NPS 1979). The 1981 Environmental Assessment / Development Concept Plan for Lone Rock Beach (Lone Rock EA/DCP) provided management actions and visitor facilities for a more controlled and maintainable type of recreational use of the beach (NPS 1981). The Lone Rock EA/DCP also designated a distinct 180-acre ORV high-intensity use area that runs contiguous to the Lone Rock Beach shoreline. In 1988, a management plan for Glen Canyon was developed to provide intensive management actions and site improvements at high-use accessible shorelines areas while maintaining other selected areas with road access for low-to-moderate levels of visitor use (NPS 1988).

Regions

For the purposes of the plan/EIS, the project area has been divided into regions (Figure 19): Warm Creek–Grand Bench, Escalante, Wilson Mesa, San Juan, Hite, and Orange Cliffs and Ferry Swale–Vermilion Cliffs in Arizona. Each region offers unique recreational opportunities, ranging from boating and camping to hiking and sightseeing. Several areas allow off-road use.

Ferry Swale–Vermilion Cliffs Region

Located just west of Page, Arizona, is the Ferry Swale–Vermilion Cliffs region (Figure 20). The area extends west along U.S. Highway 89 to the top of the Vermilion Cliffs and is crossed by a network of primitive roads that are used for recreation, access to hiking areas, access to grazing leases, and the maintenance of utilities. The area is popular with local residents from Page and is easily accessed directly from U.S. Highway 89. Grazing occurs on an allotment that includes this region.

The region is recognizable by the 3,000-foot escarpment of the Vermilion Cliffs, which dominates the horizon to the west of Page, and is characterized by blows and deposits and shallow, undeveloped soils over Navajo Sandstone. Minimal biological or physical soil crusts and very little, if any, vascular vegetation cover exist in these portions of Ferry Swale due to the physical disturbance from tire passes. Soils in Ferry Swale include easily disturbed Farb-Pagina type soils. Other soil types include Juanalo, Needle-Sheppard, and Pagina-Denazar.

Vegetation in the Ferry Swale area is slightly different than vegetation throughout the remainder of Glen Canyon in that the majority of Ferry Swale is composed of rock outcrops. Rock outcrops dominate the landscape in the southwest and northwest portion of Ferry Swale. Some shadscale and golden buckwheat bush exist intermittently in the southwest portion, while the western, eastern, and central portion of Ferry Swale consists primarily of shadscale and fourwing saltbrush as well as some smaller areas of mat saltbrush.

Figure 19. Plan/EIS Regions in Glen Canyon National Recreation Area.

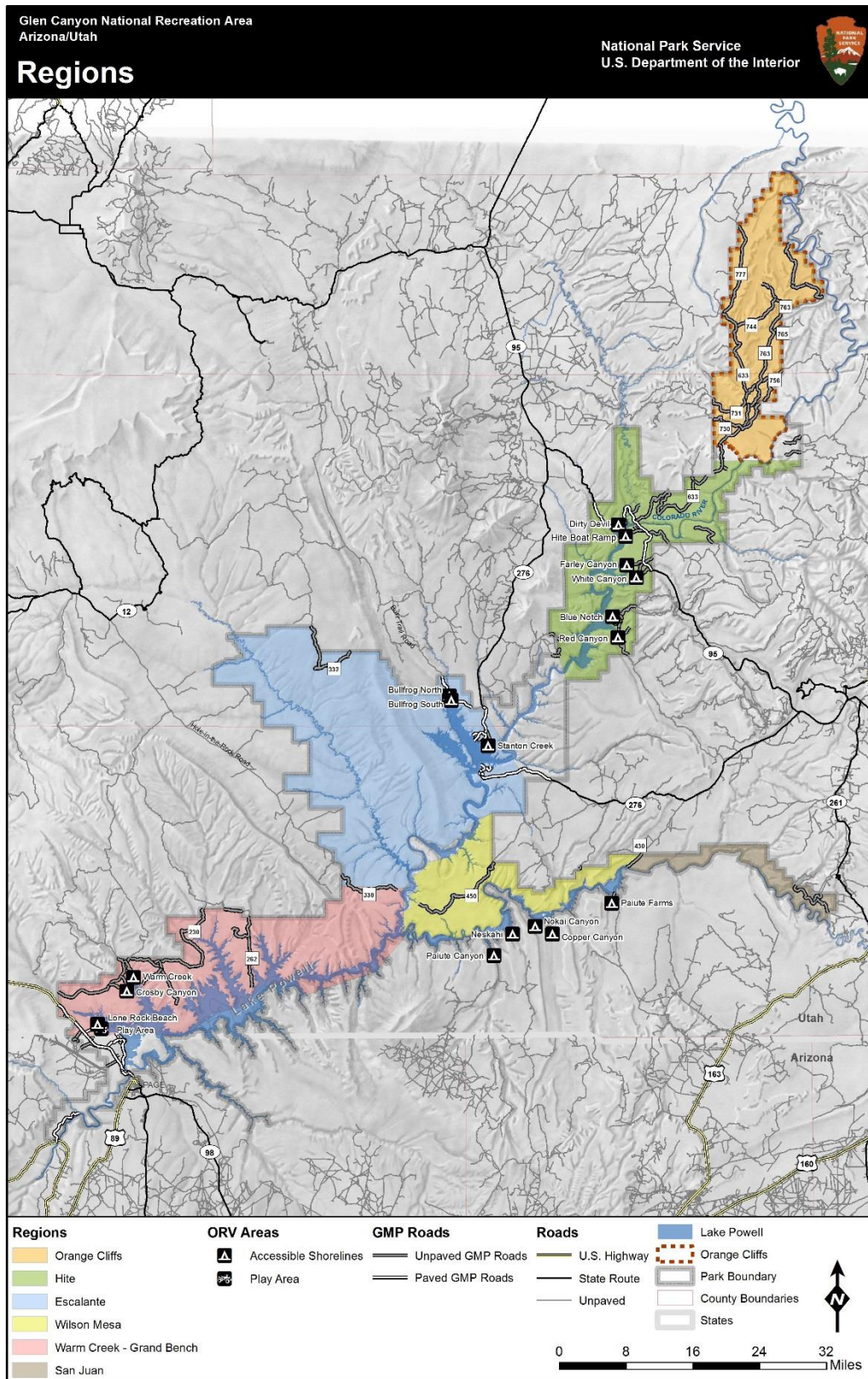
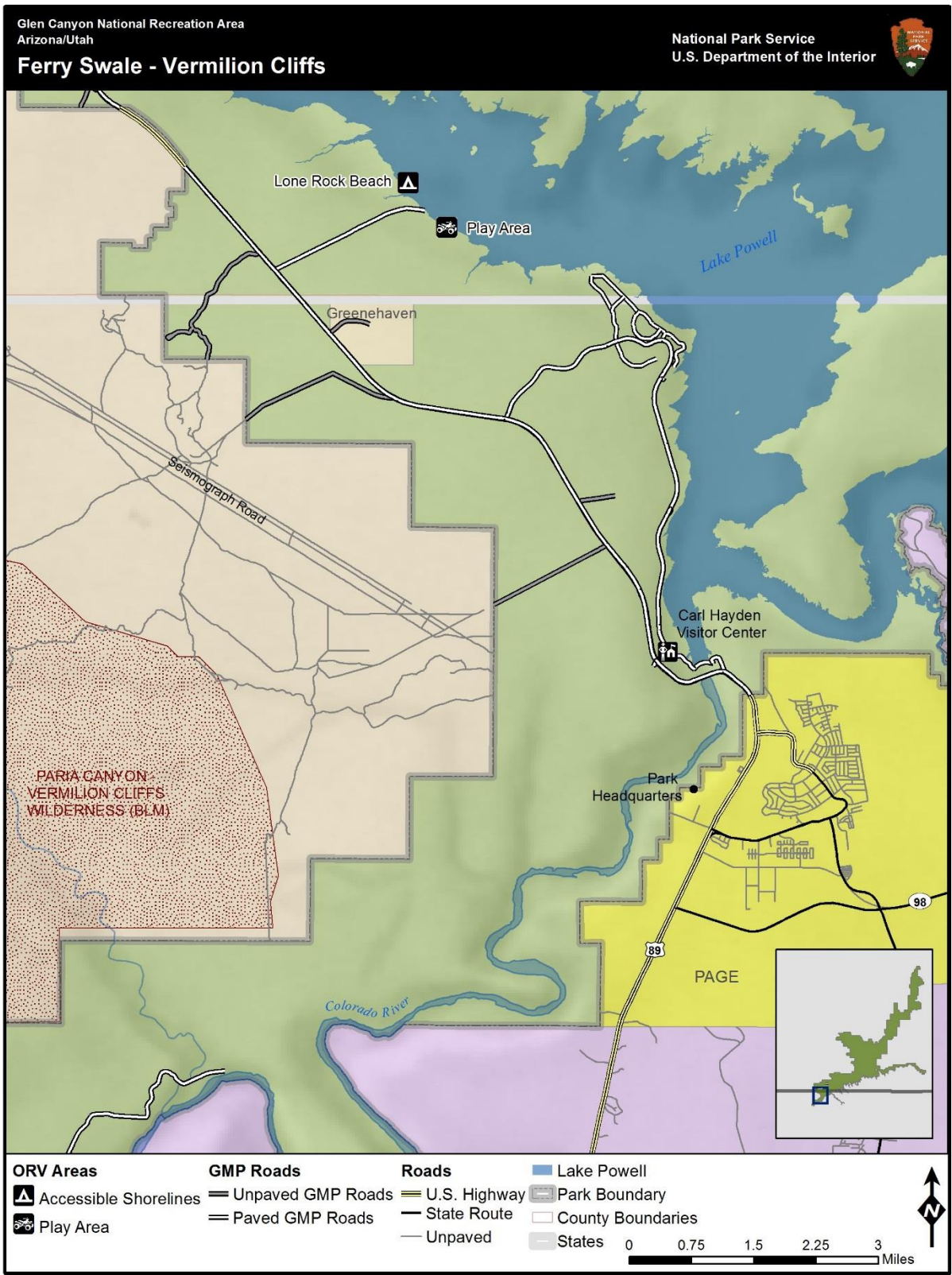


Figure 20. Ferry Swale – Vermilion Cliffs Region in Glen Canyon National Recreation Area



Four unpaved GMP roads enter the area from U.S. Highway 89; these roads connect Glen Canyon to BLM property in the Arizona Strip Field Office and Vermilion Cliffs National Monument (Figure 21). These roads have not been designated with NPS road numbers. These roads cross blackbrush-dominated areas of deep sand and slickrock. The roads are lightly traveled but remain popular with a subset of locals from Page. During the construction of the Glen Canyon Dam and associated road and facility maintenance facilities, additional informal access routes were established in this area. Over the years, new routes extending from existing GMP roads have been established by users. Some of these routes connect Glen Canyon to existing BLM routes and roads while others do not. A utility corridor has been established through this region and numerous powerlines and associated access roads cross NPS- and BLM-managed property in this region.



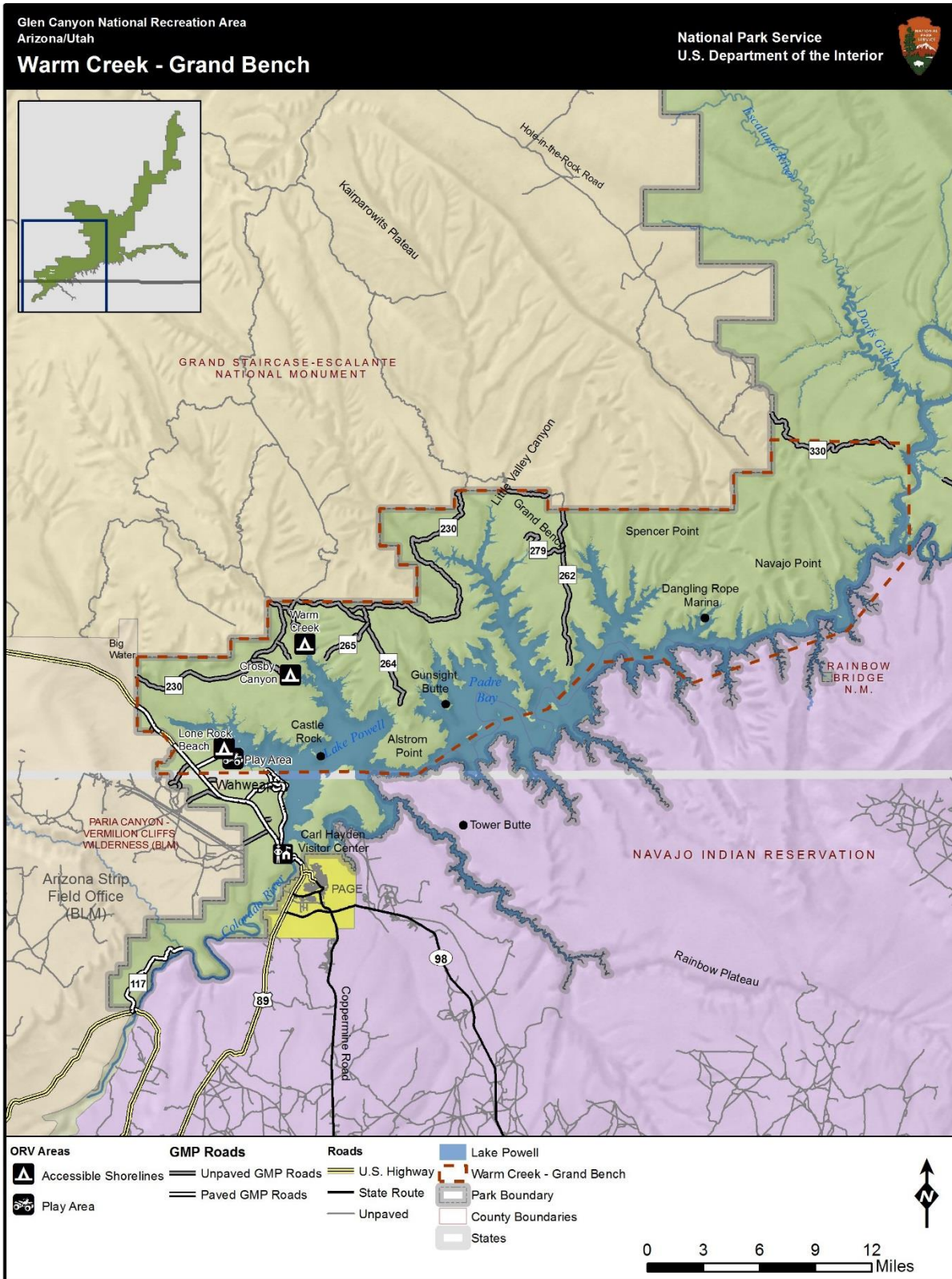
Figure 21. View from Seismograph Road.

Warm Creek to Grand Bench Region

This region is moderately used by recreationists and grazing occurs on several allotments that cover this region. The Warm Creek area (Figure 22) stretches from Big Water, Utah, along the southern tip of the Kaiparowits Plateau, and up to the Hole-in-the-Rock Road and the Escalante region to the north. The Wahweap area is the most easily accessible section of Glen Canyon and includes a marina, boat launches, and a restaurant/lodge. The Glen Canyon Dam area, located 5 miles south of Wahweap, includes the Carl Hayden Visitor Center.

Further upstream is the Padre Bay area, which offers extraordinary views of Lake Powell. Alstrom Point, accessed by NPS 264, is a high mesa (500 feet above Lake Powell) providing expansive views of Lake Powell and Padre Bay and formations including Gunsight Butte, Castle Rock, and Tower Butte. The area is a destination for day users, sightseers, photographers, and the occasional overnight camping party. The Grand Bench, accessed by NPS 262, is extremely remote and difficult to access due to the degraded roadbed crossing at Little Valley Canyon. Dangling Rope Marina, accessible only by water, is located north of Grand Bench.

Figure 22. Warm Creek – Grand Bench Region in Glen Canyon National Recreation Area



The viewshed of the Warm Creek area includes some of the most dramatic aesthetic features of Glen Canyon. The most visible feature in this region is the Kaiparowits Plateau, a giant upland rising abruptly from the Escalante and Colorado River drainages. With an elevation of approximately 7,500 feet, its southernmost tip at Navajo and Spencer Points provides a dramatic panorama of the entire canyon country and Lake Powell. Southwest of the plateau, the Warm Creek area is characterized by the sharply defined high cliff faces alternating with talus slopes and benches of shale and mudstone within Grand Staircase–Escalante. These forms give rise to numerous high mesas, plateaus, and buttes.

Warm Creek Road (NPS 230), an unpaved GMP road, connects with several roads that lead into Grand Staircase–Escalante and locations north, including the town of Escalante, Utah. These roads include Tibbett Canyon (BLM 325), Smoky Hollow (BLM 330) (Figure 23), Smoky Mountain (BLM 300), and Croton (BLM 340) roads. The proximity to Page, Arizona, makes the area popular with local ATV owners and tourists who are interested in the relatively easy access the Warm Creek Road provides to the Glen Canyon and Grand Staircase–Escalante backcountry. The Warm Creek Road is well maintained and passable by 2-wheel-drive vehicle during most of the year, although driving conditions can degrade rapidly following heavy rains.



Figure 23. Junction of Smoky Hollow and Smoky Mountain Roads

NPS has experienced some illegal off-road driving in this area, particularly along the section of Warm Creek Road that crosses flat areas of Tropic Shale just beyond Big Water. A section of state land between the Glen Canyon boundary and the town of Big Water is a hot spot for local off-road enthusiasts, and is crisscrossed with the tracks of ATVs and other vehicles. The impacts associated with this off-road activity have spilled into Glen Canyon via the Warm Creek Road.

Alstrom Point (Figure 24) is accessible via unpaved GMP road NPS 264. The area is a popular destination for day users, sightseers, photographers, and the occasional overnight camping party. The point provides panoramic and expansive views of Lake Powell and the surrounding region, and drivers have left the main roadway to seek the most advantageous view, resulting in a spiderweb of unauthorized roads and minor resource impacts.

Only one paved GMP road is located in this area: the upper portion of U.S. Highway 89 once it exits the Ferry Swale area. Additional unpaved GMP roads in this area include NPS 330, NPS 279, NPS 262, and NPS 265. The unpaved GMP road to Grand Bench (NPS 262) in particular is extremely difficult to traverse, as are often some of the roads diverging from Warm Creek and leading into Grand Staircase–Escalante.



Figure 24. View from Alstrom Point.

Lone Rock Beach (Figure 35), Glen Canyon’s principal ORV area, is located on the western shore of Lake Powell, 2 miles south of Big Water, Utah, and 12 miles north of Page, Arizona, at the Utah/Arizona border. Lone Rock Beach is the primary access to Lake Powell for the nonboating public and is approximately 250 acres, depending on lake levels. Accessible by U.S. Highway 89 and Lone Rock Road and approximately two miles northwest of Wahweap, Lone Rock Beach includes recreational activities such as swimming, fishing, boating, and camping. There is limited hard-surfaced road, with the majority of access to Lake Powell on sandy roads or beach. Beyond the entrance station is a recreation vehicle dump station, parking area, and rest area. Along the shoreline is a primitive camping area.

Lone Rock Beach is the most popular of the off-road use areas in Glen Canyon. According to NPS visitation statistics, in 2007 there were 12,445 overnight camping groups on the beach, and nearly 23,000 motor vehicles entering Lone Rock Beach. Entrance records indicate that a small percentage of visitors recreate using ATVs at Lone Rock. Since 2003, the number of ATVs recorded entering Lone Rock has ranged from 1,065 (2004) to 498 (2007).



Figure 25. Aerial View of Lone Rock Beach.

Further inland and to the south is the Lone Rock Beach Play Area, separated from the camping area by a post and cable fence. Restrooms and outdoor showers are available just outside the play area. The play area is the only location in Glen Canyon where off-highway vehicles (OHVs) and street-legal ATVs (in addition to conventional motor vehicles) are allowed to be operated off-road. It is a 180-acre fenced area intended as a location where motor vehicle operators can challenge themselves, develop riding skills, operate at high speeds, perform jumps and hill climbs, and so on.

Lone Rock Beach is located in a highly disturbed area with heavy impacts caused by visitors traveling off designated trails, ORV traffic, and camping. Vegetation is minimal and sparse and primarily consists of blackbrush and shadscale. In areas that are occasionally or seasonally inundated during high water levels, soil disturbance and compaction leads to increased erosion and runoff. Biological crusts are uncommon due to existing disturbance levels, and trails and associated compaction related to foot traffic and off-road use are omnipresent. Although some patches of vegetation, including four-wing saltbush (*Atriplex canescens*) and Russian thistle (*Salsola pestifer*), exist on older portions of the beach, soils are primarily thin and sandy with little vascular vegetation cover. Shoreline soils may contain deposits of fine clay or loam, with anaerobic conditions and occasional inundation, both of which limit plant growth.

Lone Rock Beach Play Area is highly disturbed by off-road use, leading to erosion and compaction. Minimal biological or physical soil crusts and very little, if any, vascular vegetation cover exist in this area due to the physical disturbance from tire passes. ORV traffic results in increased soil loss due to disturbance from these vehicles, which loosens and kicks up soil, and subsequent wind action, which transports it away from the area.

Crosby Canyon (Figure 26) and Warm Creek are two accessible shoreline areas that provide access to Warm Creek Bay. Both are located close to Page, Arizona, and offer a more primitive setting compared to

nearby Lone Rock Beach. Neither shoreline contains any facilities. Both sites have been closed since 2003, when lake elevations dropped drastically during a prolonged drought, to control illegal off-road driving beyond the designated areas. Crosby Canyon is approximately 450 acres; Warm Creek is 50 acres.



Figure 26. Crosby Canyon Accessible Shoreline ORV Area.

Access to Crosby Canyon is by NPS 231 off the Warm Creek Road (NPS 230). The Crosby Canyon Road is an infrequently graded, four-wheel-drive road that follows the drainage bottom. The area is subject to flash flooding. Warm Creek is accessed by an unmarked and active ephemeral desert wash channeling through the Dakota, Morrison, and Entrada Formations.

Crosby Canyon had received a moderate amount of use before closing in 2003. Originally there were two main camping areas along the road. Evidence of these sites exists in the form of old fire rings and trash. Currently, some illegal use occurs as individuals drive past a road closure sign and down along the lakeshore. A prominent vehicle track is visible and extends for miles below the high water mark and along the lakeshore. There is limited evidence of illegal off-road use beyond this track.

Warm Creek has always experienced minimal use, and therefore has been lightly impacted by activity. At higher lake elevations, a campsite was available on a small knoll surrounded by steep cliffs. Currently, two barbed-wire livestock fences across the wash bottom preclude access to the site and there is little evidence of recent visitor use of the area.

Vegetation at these accessible shorelines is minimal and sparse and primarily consists of blackbrush and shadscale. Soils found in both of these areas are of the Pagina–Farb–rock outcrop association and rock outcrop–Needle association, which are generally shallow, fine, and sandy soils derived from sandstone and deposited by the wind. Such soils are easily disturbed. There are also areas of exposed rock and sandy

deposits, indicating that wind is a strong shaping force in the soils in the vicinity, and many of the soils are therefore transient and shallow.

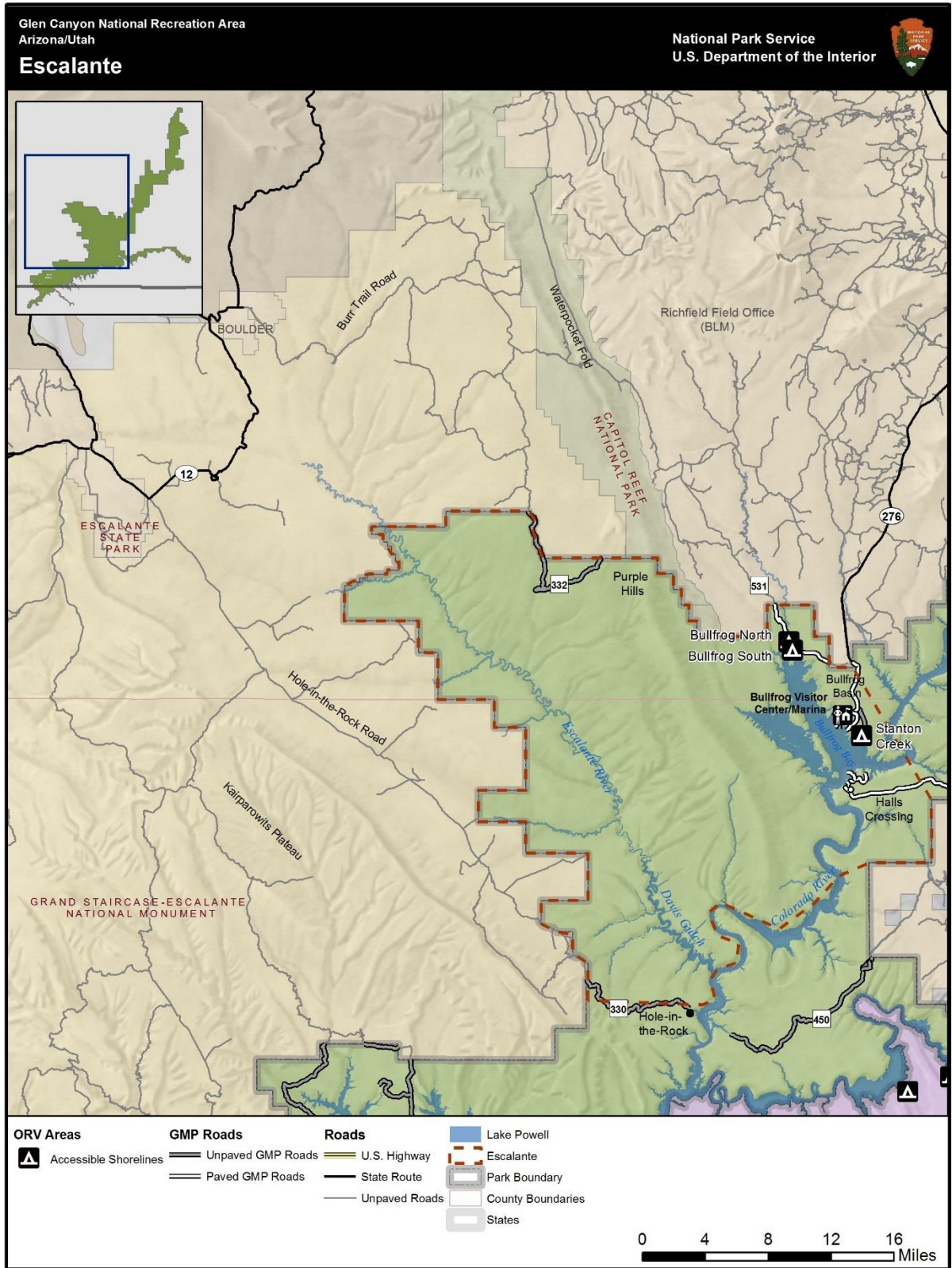
These areas contain a mixture of deeper, better-established, and loamy Pagina soils, and shallow, shifting, sandy Torriorthents–rock outcrop. As with many shoreline areas around Glen Canyon, rock outcroppings make up about a third of the surface area, with shallow soils prevalent and deeper soils occurring on flatter plateaus and structural benches. The deeper soils present in these areas are somewhat rare and may contain better established vegetation. In areas of shallow clay or loamy soil, biological crust formation is likely due to their ability to retain moisture for a longer period following a rainfall event. Biological crusts in these areas are susceptible to erosion due to physical disturbance (tire tracks, foot traffic), because a breakdown of the crust allows the underlying soil to be carried away by wind or water. Shallow, shifting Torriorthents soils are subject to frequent wind and water erosion, which would be accelerated by physical disturbances to these areas.

Escalante Region

Extending north from the Kaiparowits Plateau to the Purple Hills and the southern end of the Waterpocket Fold is the Escalante region (Figure 27). The Escalante River and its tributaries have incised, deep, narrow canyons in the apricot-hued sandstones. The region offers unparalleled hiking opportunities, and the canyons offer some of the most beautiful scenery in the southwest. High above the river, the windswept slickrock and sand benches offer grand vistas and unbroken solitude. Grazing occurs on allotments that cover a portion of this region.

Halls Crossing, located in the southeastern part of the Escalante region, includes a marina, campground, and boat launch. The John Atlantic Burr Ferry serves as a continuation of State Route 276 from Halls Crossing to Bullfrog Bay. The Bullfrog visitor center, which includes a medical clinic, is located on Utah State Route 276 just past the entrance station. Bullfrog also includes a restaurant/lodge, campsites, and marina.

Figure 27. Escalante Region in Glen Canyon National Recreation Area.



The unpaved Hole-in-the-Rock Road (NPS 330) is the primary artery into the Escalante region. The Hole-in-the-Rock Road is a popular scenic and historical driving route for local residents, tourists, and those hiking the Escalante River area. Listed on the National Register of Historic Places (National Register), Hole-in-the-Rock is the location where, in 1880, Latter-day Saints settlers used pickaxes, shovels, and blasting powder to work their way down to the Colorado River through the only known natural breach in the 2,000-foot vertical cliff. The road generally is increasingly difficult to drive as it approaches Glen Canyon. The road deteriorates for the last 5 miles past the Davis Gulch crossing and generally is passable to four-wheel-drive, high-clearance vehicles only from this point to the road terminus.

The Burr Trail is a 68-mile route winding through federally owned lands from the town of Boulder, Utah, down through Grand Staircase–Escalante into Capital Reef National Park and then across BLM administered land to the Bullfrog visitor use area in Glen Canyon. The road begins as a paved road in Boulder and transitions to a chip-sealed surface and graded dirt surface along its length. The road is paved on its upper end and graded dirt on the lower end. The condition of the graded section is subject to deterioration, and a high-clearance vehicle may be required. During inclement weather the Burr Trail may be impassable even to four-wheel-drive vehicles at the Bullfrog Creek crossing and other low spots. The 7.7-mile segment of the Burr Trail in Glen Canyon is designated as the Notom–Bullfrog Road (NPS 531) and is considered a paved GMP road except for the crossing at Bullfrog Creek, which is an unimproved dirt surface.

In the far northern section of the Escalante region is Moody Canyon Road (NPS 332), a 12-mile road located in the Purple Hills. The road enters Glen Canyon from the Burr Trail to the north and crosses 12 miles of natural soils before terminating at the Glen Canyon boundary. The road is isolated and seldom used but offers access to hunters and hikers and is categorized as an unpaved GMP road.

State Route 276 enters Glen Canyon in the Bullfrog area, continuing into Glen Canyon as a paved GMP road to the Bullfrog Visitor Center/Marina. Four small (approximately a quarter of a mile) unpaved GMP roads continue from the Visitor Center/Marina, continuing to the Stanton Creek accessible shoreline locations. State Route 276 enters Glen Canyon again west from Carl Black Memorial Airport where it becomes a 7-mile paved GMP road to the Hails Crossing section of Glen Canyon. Small unpaved roads stem from this unpaved GMP road, providing access to the water.

Three accessible shoreline areas in the Bullfrog developed area have been popular vehicle-accessible campsites in the past. Two of these are located at Bullfrog Creek and total approximately 2,250 acres, depending on lake levels. In 2002, 9,680 vehicles entered the Bullfrog North and South campsites (Figure 28). These areas have been closed since 2003 due to low lake levels. The gentle topography in this area has magnified the impact of low lake levels as vast areas of soft and deep sand are exposed, and the distance required to reach the lakeshore has been increased. This situation is noticeable particularly at the Bullfrog South site. Because of these conditions, public access, public use, and NPS operational duties (such as servicing toilets and conducting routine patrols) has become difficult, resulting in the closure of these areas.



Figure 28. Bullfrog South ORV Area

Stanton Creek is accessed from Utah State Route 276 close to Bullfrog Marina. Due to the closure of the Bullfrog North and South sites and the relatively easy access to Stanton Creek, Stanton Creek has become a popular accessible shoreline area. At Stanton Creek, vehicle counts ranged from 5,716 in 2002 to 3,953 in 2007. The area is managed for both day and overnight use for recreation opportunities of semi-isolation where shoreline campsites have been used as boat anchorage. Camping use zones exist in the western portion of the site. Toilets and trash containers are maintained in the area. Stanton Creek is approximately 675 acres, depending on lake levels.

Vegetation at these accessible shorelines is minimal and sparse and primarily consists of blackbrush and shadscale. The accessible shorelines at Bullfrog North and South contain a mixture of deeper, better-established, and loamy Pagina soils, and shallow, shifting, sandy Torriorthents–rock outcrop. As with many shoreline areas around Glen Canyon, rock outcroppings make up about a third of the surface area, with shallow soils prevalent and deeper soils occurring on flatter plateaus and structural benches. The deeper soils present in these areas are somewhat rare and may contain better established vegetation. In areas of shallow clay or loamy soil, biological crust formation is likely due to their ability to retain moisture for a longer period following a rainfall event. Torriorthents soils are sandy and gravelly talus derived from sandstone and shale, and are of variable depth. These soils are transported by wind or water and form a thin mantle over the rock. In areas of shallow slopes and sparse vegetation cover, these soils may form biological crusts. Shallow, shifting Torriorthents soils are subject to frequent wind and water erosion, which would be accelerated by physical disturbances to these areas.

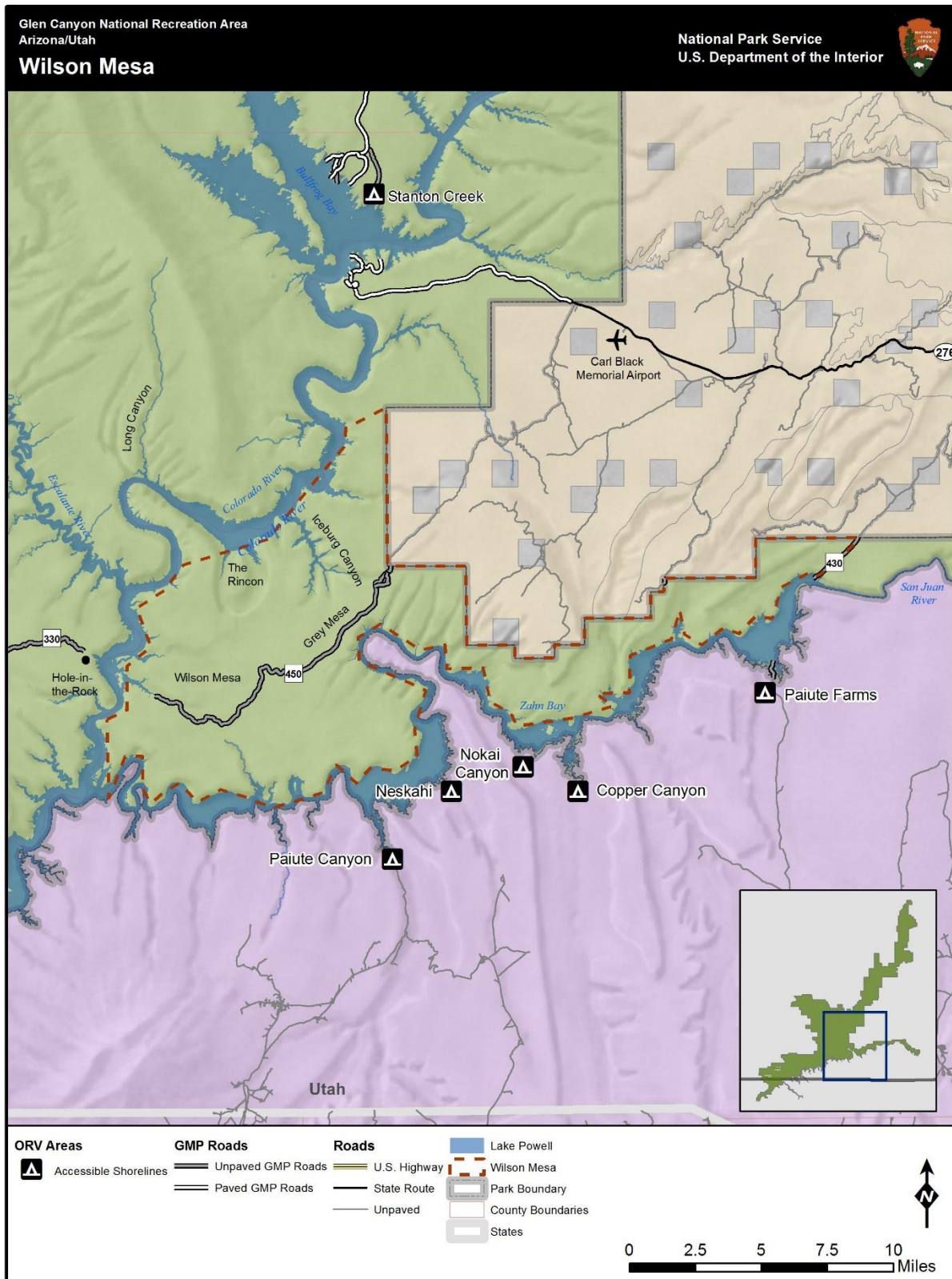
Soils in the Stanton Creek area are rock outcrop–Needle association. Soils are derived from windblown sandstone, and rock outcrops cover the majority of the area. Soils are shallow, with rare areas of deeper soils where they were deposited by water or are protected from scouring winds. The topography of the areas limits the formation of biological crusts to gently sloping or flat areas. In areas of rock outcrop, the potential for erosion is minimal. In areas with soil cover where there is no vegetation or biological crust to fix the soil in place, there is frequent erosion due to wind, and water, and soils shift frequently. In areas where biological crusts have formed, or sand sagebrush grows, fixing the soil in place, there is less potential for wind or water erosion.

Wilson Mesa Region

Wilson Mesa is a large, prominent topographic feature located on the south shore of Lake Powell opposite Hole-in-the-Rock and the Escalante River (Figure 29). The region is one of the most remote and least visited portions of Glen Canyon. Across its southern boundary with Lake Powell lies an equally remote section of the Navajo Nation. One large grazing allotment overlies this region.

The primary route on Wilson Mesa is the Hole-in-the-Rock Trail Road (NPS 450), also referred to as Cottonwood Canyon Road. Cottonwood Canyon Road (unpaved GMP road NPS 450) is the continuation of the Hole-in-the-Rock Road from the Escalante region. The road is accessed from State Route 276 at the Cal Black Memorial Airport, approximately 10 miles east of Halls Crossing and 75 miles west of Blanding, Utah. It can also be accessed farther west from State Route 276. The road travels southwest for a distance of approximately 30 miles from the Cal Black Memorial Airport to its terminus at Cottonwood Canyon. Only the last 11.8 road miles are in Glen Canyon; the remaining road miles cross BLM-administered lands. Cottonwood Canyon Road is the only road that traverses Wilson Mesa and it is isolated, is extremely difficult to negotiate the terrain, and requires a high-clearance, four-wheel-drive vehicle. There are numerous obstacles and steep ascents and descents in sections of the road, including the sections up Grey Mesa and Iceberg Canyon. Driving the road is popular with a small subset of four-wheel-drive enthusiasts, but the area remains infrequently visited due to its isolation and difficult driving conditions.

Figure 29. Wilson Mesa Region in Glen Canyon National Recreation Area.



Unpaved GMP road NPS 430 traverses Glen Canyon in this region for approximately 2.5 miles, continuing from BLM-administered land to the confluence of the San Juan River with Lake Powell. A prominent feature on Wilson Mesa is the Rincon. Located between Long and Iceberg Canyons, the Rincon is the remnant of a former channel of the Colorado River. Aleson Arch, a 100-foot-long span, is on the landform between Iceberg Canyon and the Rincon.

There are five accessible shoreline sites in this region, the largest of which is Paiute Farms, the site of an abandoned marina development on the Navajo Nation. The marina was developed by Utah Navajo Industries in the 1980s but all structures were removed after a severe flash flood damaged many of the facilities in 1989. Access to the area is provided by Paiute Farms Road which runs along the Paiute Farms Wash on the Navajo Nation. The marina site, approximately 1,000 acres, is still by residents of nearby communities and it is the access point to a prominent waterfall on the San Juan River just downstream from the Clay Hills Crossing raft take-out area. Many of the unpaved service roads on the marina site can be driven on.

The area is located primarily in Moenkopi and Chinle Formations and is extensively overgrown with tamarisk. Both formations are composed of thin-bed mudstone and siltstone, varying in color from purple to grey for the Chinle, and red to pale brown for the Moenkopi. Rapid erosion at Paiute Farms has created a relatively level surface shallowly dissected by gullies and washes that drain northward into the former San Juan River channel (Fairley 1985; NPS 1986).

Vegetation in Paiute Farms is typical of a desert shrub community, with the primary vegetation types being four-wing saltbush, Mormon tea (*Ephedra torreyana*), prickly-pear cacti (*Opuntia* spp.), rabbitbrush, and Russian thistle (NPS 1986). ORVs are also used in locations dominated by rock outcrops (Spence n.d.). Some slopes and heavily used accessible shorelines are completely denuded of vegetation, except for partial areas inhabited by sagebrush. Some species, such as snakeweed (*Gutierrezia microcephala*), dicoria (*Dicoria brandegeei*), and ragweed (*Ambrosia acanthicarpa*), that have taken advantage of ORV activity because they have adapted to various soil disturbances.

Nokai is an accessible shoreline located where the Nokai Wash intersects with Zahn Bay on the San Juan arm of Lake Powell. Copper Canyon is located just upstream on the San Juan Arm. Access to these areas is poor along primitive four-wheel-drive roads leading from State Route 163, making visitation low. No facilities are present at Copper Canyon or Nokai, which are approximately 30 acres and 275 acres, respectively, depending on lake level. Only a limited area is available for camping at each site and these areas are utilized primarily by local residents from nearby communities of the Ojeto Chapter on the Navajo Nation. Vegetation is minimal and sparse and primarily consists of blackbrush and shadscale. The areas are located primarily in the Moenkopi and Chinle Formations and can be described as canyon country with steep Wingate escarpments forming physical barriers around the areas. These steep sandstone cliffs limit vehicle access to four-wheel-drive vehicles. These accessible shorelines contain rock outcrop soil associations similar to those of other shorelines in the immediate vicinity.

Paiute Canyon and Neskahi are located downriver from Nokai on the San Juan Arm. The areas are similarly characterized by sparse vegetation and primarily by Moenkopi and Chinle Formations, and the Shinarump Formation at the Neskahi site, making the area relatively unstable. Sloughing occurs and is observable in the form of mounded peninsulas and islands that jut into the river. The area can be described as canyon country with steep Wingate escarpments forming physical barriers around the areas. These steep sandstone cliffs limit vehicle access to four-wheel-drive vehicles which travel on rugged roads across the Navajo Mountain Chapter of the Navajo Nation. Paiute Canyon (Figure 30), approximately 100 acres, is accessible via a five-mile, primitive, four-wheel-drive road off the Wetherill Trail, itself located approximately 50 road miles from State Route 98. Only a very small area is available for vehicle camping and the areas are used primarily by nearby residents. Although there is evidence of

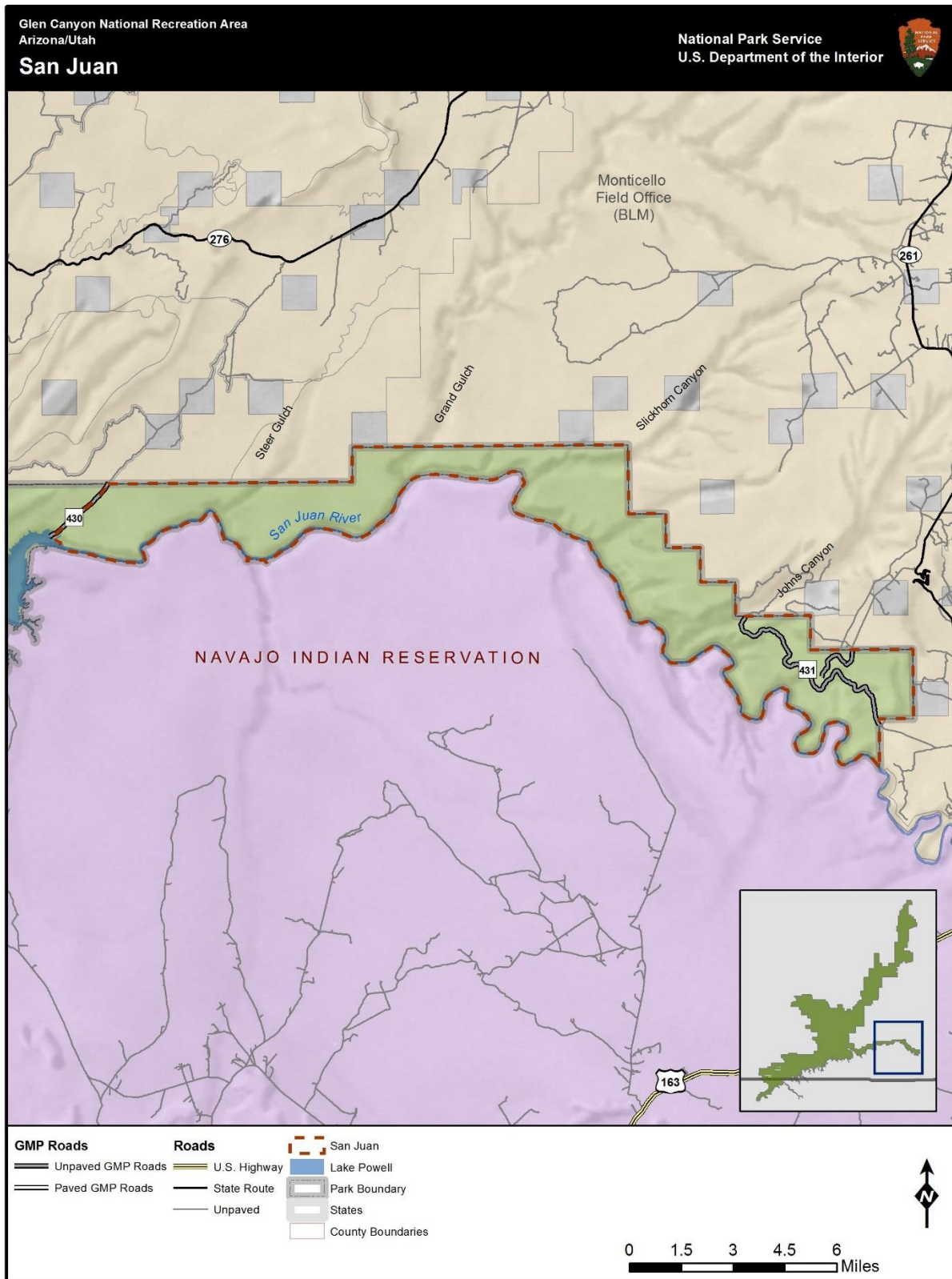
recent use, it appears that the use is extremely limited. The Neskahi site, approximately 15 acres, is not directly accessible by road and provides no opportunities for vehicle access. It appears the area is accessed by cross-country travel along the shoreline at low water levels.

These accessible shoreline areas all contain Torriorthents–rock outcrop association soils. This association consists of nearly half rock outcrops, with most of the remainder made up of Torriorthents or similar soils. Better-established, deeper Myton soils are found in drainages. Torriorthents soils are sandy and gravelly talus derived from sandstone and shale, and are of variable depth. These soils are transported by wind or water and form a thin mantle over the rock. In areas of shallow slopes and sparse vegetation cover, these soils may form biological crusts.



Figure 30. Paiute Canyon Access Road.

Figure 31. San Juan Region in Glen Canyon National Recreation Area.



San Juan Region

The San Juan Region (Figure 31) features the last segment of the San Juan River that is utilized by river rafters before the river joins with the fluctuating levels of Lake Powell in the vicinity of Clay Hills Crossing at the western edge of this region. The region is bordered by the Navajo Nation to the south and by BLM-managed lands to the north. Within the BLM-managed Cedar Mesa Special Recreation Management Area, the Grand Gulch Archeological District is famous for its Ancestral Puebloan architecture and rock art. The Grand Gulch Natural Area and the Grand Gulch ISA Complex Wilderness Study Area also abut Glen Canyon in this area. The large difference in elevation from the center of the Cedar Mesa plateau at 6,500 ft. and the surrounding area, typically near 4,200 feet in elevation, created the conditions for the formation of numerous cliffs, canyons, and other scenic features of differential erosion. Large canyons such as Slickhorn, John's and the combination of Grand Gulch and Bullet Canyons drain into the San Juan River in Glen Canyon. Excellent opportunities for hiking and backcountry camping exist on the plateaus and in the canyons of this mostly road-less and primitive area.



Figure 32. Muley Point Overlook of John's Canyon Road and San Juan River.

The prominent Red House Cliffs featuring the reddish-brown cliffs of the Moenkopi Formation form the western boundary of the region. Goosenecks State Park, offering spectacular views of the entrenched meanders of the San Juan River, is perched on the canyon rim to the east of the region, overlooking a 1,200 foot drop to the river below. Muley Point inside Glen Canyon (Figure 32) is a popular location for sightseeing and, more frequently, social events such as weddings, despite the rugged terrain and difficult driving conditions.

Private and commercial raft trips using the lower segment of the San Juan River normally end their trip at Clay Hills Crossing. The BLM Monticello Field Office administers the river permit system, which includes the requirement for the use of designated campsites along the river below Government Rapid within Glen Canyon. The BLM has nominated the segment of the San Juan River to the east of the park boundary as a Wild and Scenic River.

Vehicle access is limited to the raft take-out location at Clay Hills Crossing and two roads that enter from the east, one above and one below the steep walls of the San Juan River canyon. At the western end of the region, the unpaved GMP road NPS 430 (known as Whirlwind Crossing or Clay Hills Road) traverses Glen Canyon in this region for approximately 2.5 miles, continuing from BLM-administered land to the Clay Hills Crossing river take-out at the confluence of the San Juan River with Lake Powell. The unpaved GMP road NPS 431 (Muley Point Road) begins at State Route 261 near Mexican Hat, UT and travels through BLM-administered land to terminate at a scenic overlook that juts into the main river canyon. Approximately 1.75 miles of this road can be found in Glen Canyon. John's Canyon Road, another unpaved GMP road that exits from State Route 261, enters Glen Canyon and follows a bench along the base of the towering Cedar Mesa Sandstone-Halgaito Formation cliffs for approximately 7.5 miles where it exits onto BLM-administered lands in John's Canyon.

Hite Region

The uplake area around Hite, Utah, begins on the east side of Lake Powell, extending roughly from Good Hope Bay north to the Orange Cliffs boundary at Clearwater Canyon. The Hite region is located at the northernmost part of Lake Powell. The region is best accessed by State Route 95, from both the north and south. The State Route 95 steel arch bridge (Figure 33) provides the only road crossing of the Colorado River for 300 miles between the Glen Canyon Dam west of Page, Arizona (139 miles away by boat), and U.S. Highway 191 at Moab, Utah. State Route 95 also crosses the Dirty Devil River at the northern tip of Lake Powell.



Figure 33. State Route 95 Bridge over Colorado River.

The Hite Region (Figure 34) offers a stunning example of the geologic record that is a signature feature of southern Utah's canyon country. The views from the Hite overlook off State Route 95 are particularly dramatic, with distant views of the towers and buttes of the Orange Cliffs Special Management Unit (Orange Cliffs Unit) and sweeping views of the white, undulating Cedar Mesa Sandstone and its contact with the deep red, multilayered Organ Rock Formation. Looking north, Hite is characterized by an impressive, white Cedar Mesa Sandstone bench that outcrops at lake level and extends upriver past the mouth of the Dirty Devil River, the steel arch bridge across State Route 95, and up the inner gorge of the Colorado River. Looking southeast across the river from the overlook offers a fine example of the Organ Rock cliffs and talus slopes with views of the Hite developed area, which includes launch facilities, primitive camping, a small store, and a ranger station. Looking southwest from the State Route 95 entrance to the Hite developed area, the deep red rock layer of the Organ Rock Formation frames a dramatic view of the Henry Mountains and a row of massive Navajo Sandstone fins perched atop the Kayenta Formation and sheer, deep-orange-colored Wingate cliffs. Heading east toward Natural Bridges National Monument, the Cedar Mesa Sandstone and the White Canyon complex is the dominant feature at road grade, whereas towering on the southwest side of State Route 95 is the Red Rock Plateau.

Figure 34. Hite Region in Glen Canyon National Recreation Area.

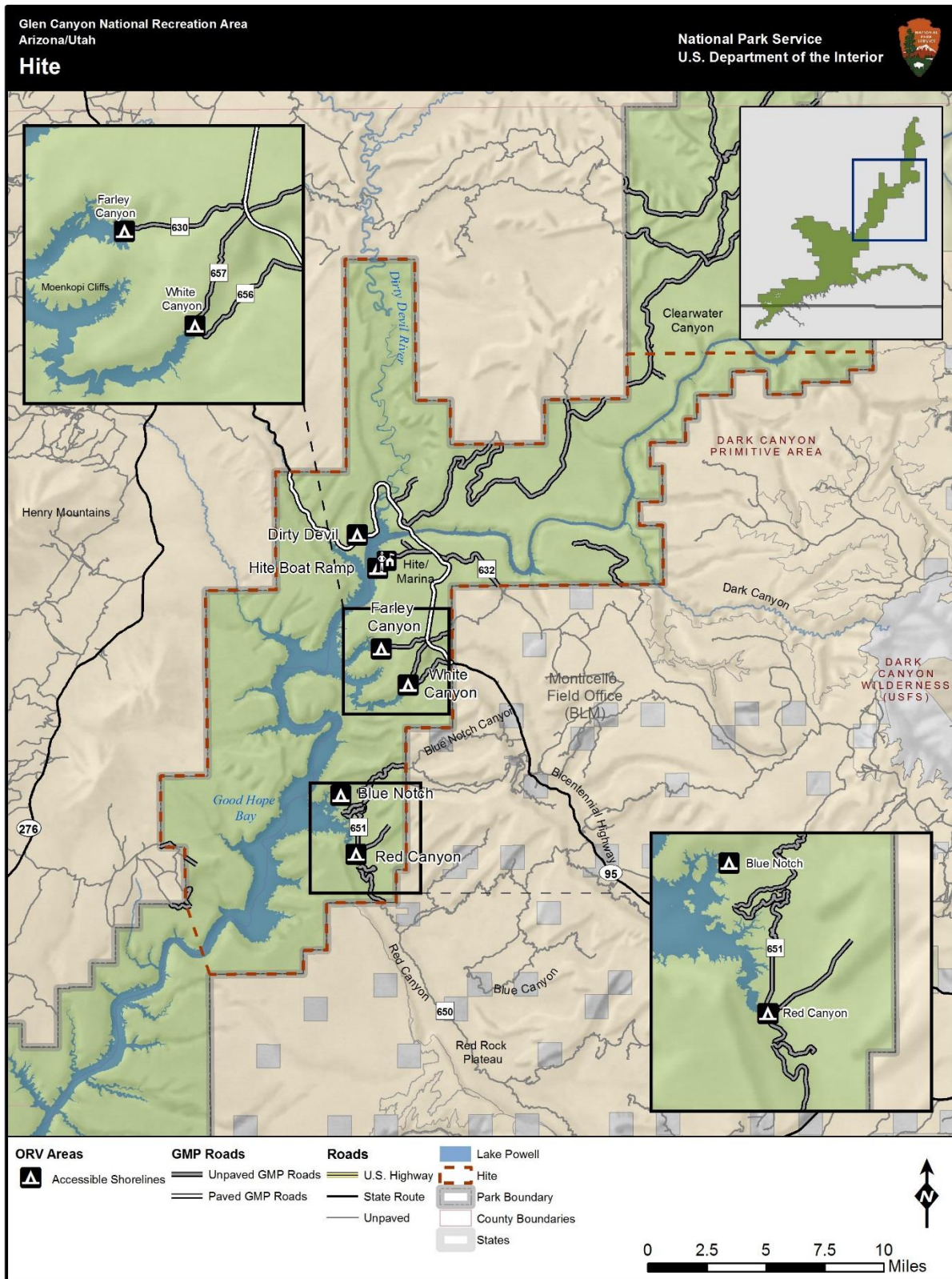




Figure 35. Entrance to Red Canyon Road.

Red Canyon (Figure 35) and Blue Notch Roads lead to small, accessible shoreline areas on Good Hope Bay. Red Canyon Road (NPS 650) begins at State Route 276 and heads northwest across BLM-administered lands into Glen Canyon. The road travels approximately 22 miles across BLM lands before entering Glen Canyon. The segment of the road in Glen Canyon is known to be subject to flash flooding and the road is in extremely poor condition.

Blue Notch Road (NPS 651) travels from Utah State Route 95 west to Good Hope Bay. The road crosses BLM lands for approximately ten miles before entering Glen Canyon. Blue Notch is an intermittently maintained, four-wheel-drive road that can range from poor to fair condition. The road traverses slopes composed of clay

soils and can be extremely hazardous when wet. Travel becomes increasingly difficult once the road enters Glen Canyon due to the numerous wash crossings. Good Hope Bay is one of the largest bays in Lake Powell, featuring fishing and plenty of room for water sports.

Three short roads lead to White and Farley Canyons, two accessible shoreline areas; all three are unpaved GMP roads. The Farley Canyon Road (NPS 630) is a maintained gravel road in fair condition. Farley Canyon is one of the few accessible shoreline areas that is used for boat launching, and is a three mile drive from Utah State Route 95. Two roads lead into White Canyon, NPS 656 and 657. Both roads travel approximately 3.25 miles over natural surfaces and are in fair condition. Travel can become difficult below the high water mark at 3,700 feet elevation due to dense stands of tamarisk and deep silt. Currently there is no access to Lake Powell from the White Canyon roads. The White Canyon accessible shoreline area lies at the base of the steep Moenkopi Cliffs along the Lake Powell shoreline and is a colorful, two-level canyon that lends itself to exceptional hiking adventures.

Brown's Rim Road (NPS 632) off Utah State Route 95 runs east from Hite toward the Dark Canyon area. The road can be traveled east across BLM and U.S. Forest Service lands, or back in a loop to a junction with State Route 95. This unpaved road travel is approximately 5 miles long, is in fair condition, and is occasionally maintained by the county. NPS 633 connects State Route 95 to Clearwater Canyon. One additional unpaved GMP road enters Glen Canyon from the southern boundary, in the Dark Canyon area.

One paved GMP road, State Route 95, enters Glen Canyon just north of White Canyon. The road leads across NPS 632 near the Hite Marina and continues up and across the Dirty Devil River, passes the Dirty Devil accessible shoreline area, and north out of the Glen Canyon boundary into BLM administered lands. The road is approximately 15 to 20 miles long.

The Hite Marina is located at the uppermost part of the lake, 139 miles upstream from the Glen Canyon Dam. The paved launch ramp can be used at higher lake levels and there are no on-water services; all marina facilities were moved down lake during the extended drought period in the early 2000s. When the lake is at or above 3,606 feet, smaller boats can launch from an old road bed just down lake from the paved launch ramp. Hite also has a campground, overnight lodging, and a gas station / convenience store.

There are six accessible shorelines in this region. As with all of the other shoreline areas, vegetation is minimal and sparse and primarily consists of blackbrush and shadscale. The Dirty Devil accessible

shoreline area is a small area (approximately 75 acres) between Utah State Route 95 and the lakeshore on the Dirty Devil arm near the Hite developed area. The area provides a dispersed primitive camping experience with visitor facilities, including toilets and trash containers, to protect resources and provide for appropriate visitor experience. The site includes three isolated areas divided by canyons formerly filled with the waters of Lake Powell. The Dirty Devil shoreline was a popular camping location when Lake Powell was at full pool and included a swimming beach and boat ramp. Due to low water levels, the Dirty Devil area no longer provides access to Lake Powell but remains open to camping.

The Dirty Devil area is located at the base of steep cliffs, capped by the Wingate formation and underlain by exposed strata of the Chinle, Moenkopi, and White Rim Formations. The shoreline area consists of broad exposures, ridges, and low hills of exposed Cedar Mesa slickrock overlain in the northern portion by limited aeolian gravel-bearing caps. The southern portion is characterized by the weathered colluvial covering from the steep cliffs above, where these deposits have filled the Cedar Mesa canyons.

The Hite Boat Ramp accessible shoreline is a remote area adjacent to the confluence of the Colorado and the Dirty Devil Rivers, 8 miles from State Highway 632. The Hite developed area includes a small ranger station, gas station, boat storage, sanitary dump/potable water station, fish clearing station, and primitive RV and shoreline camping. Boat launching is available at north and south boat ramps, which are currently open, however four-wheel drive vehicles are recommended. The north ramp is concrete and the south ramp is gravel (NPS n.d.c). In 2005, there were 59,405 visitors to the Hite region (NPS 2008). The accessible shoreline area between these ramps is approximately 50 acres, depending on lake levels. Similar to Dirty Devil, Hite Boat Ramp was a popular visitation location when Lake Powell was at full pool, however Hite Boat Ramp continues to provide access to the lake.

Although the Hite Boat Ramp area itself is located upon rock outcropping, soils in the Hite area include those from the Moenkopi series. The Moenkopi series consists of very shallow and shallow, well-drained, moderately to rapidly permeable soils that formed in alluvium and residuum from sandstone and shale. Moenkopi soils occur on mesas, hill slopes on structural benches, and plateaus. Soils are loamy sand. Slopes are 1% to 30%. Soil depths are typically 9 to 12 inches, but can range from 4 to 20 inches. Soils in this series are typically used for livestock grazing and wildlife habitat.

Blue Notch and Red Canyon are located in San Juan County along Good Hope Bay, off Lake Powell. Blue Notch (Figure 36) is located approximately 10 miles west of State Highway 95 on NPS 651, and is accessible by an intermittently maintained, primitive, four-wheel-drive road. Red Canyon is approximately 20 miles from State Highway 276 on NPS 650, a seldom-maintained, primitive road located along a canyon bottom that is subject to flash flooding.



Figure 36. Blue Notch Canyon.

Blue Notch and Red Canyon are approximately 325 acres and 50 acres, respectively, depending on lake levels. Because of their isolation and difficult access routes, visitation to both areas has remained low. A limited number of Glen Canyon visitors use the Blue Notch area because access to this site is more practical than to Red Canyon. Blue Notch can be used during low water. No facilities are available at either shoreline area.

These areas contain mostly Torriorthents–rock outcrop association soils, which are shallow, sandy soils generally located on slopes, with almost half consisting of rock outcrops. Because of the steeper topography generally found in these areas, biological crust formation would be less likely, except in areas of gentle slopes. The slopes on which these soils are found may be too steep for any ORV. Increased vehicle use is possible in those limited areas that do contain deeper, better established soils, because most access roads run through canyons, where protection from the wind and shallow slopes may allow for soil collection and subsequent vegetation stabilization. Physical disturbance to these better established soils, especially disruption to stabilizing biological crusts or to the root system of vegetation (blackbrush and shadscale) may increase erosion. Canyon areas are prone to flash floods or periods of fast moving water, and loose soil in the path of this water would be carried away.

Farley Canyon is accessed off State Highway 95 by NPS 630, a maintained gravel road. A large, gravel-surface parking lot with two vault toilets and a wayside panel are located along the road just above the 3,700-foot lake elevation. Farley Canyon remains a popular camping and fishing location. There is evidence of moderate levels of ongoing use of the area, including unauthorized off-road use. Visitation records from the late 1980s report up to 250 vehicles present on a Memorial Day weekend. At lower lake elevations, the topography confines the size of the use area and a smaller number of users can be present at one time. The accessible shoreline area is approximately 275 acres, depending on lake levels.

Farley Canyon contains Torriorthents–rock outcrop association soils. This association consists of nearly half rock outcrops, with most of the remainder made up of Torriorthents or similar soils. Better-established, deeper Myton soils are found in drainages. Torriorthents soils are sandy and gravelly talus derived from sandstone and shale, and are of variable depth. These soils are transported by wind or water and form a thin mantle over the rock. In areas of shallow slopes and sparse vegetation cover, these soils may form biological crusts.

Access to White Canyon is by NPS 656 and 657 off Utah State Route 95. Due to the level, open terrain in the eastern portion of the White Canyon area, the 1988 Accessible Shoreline EA/DCP (NPS 1988) closed roads to vehicular travel to protect resources. The White Canyon drainage cuts through the deep-red Moenkopi and banded Cutter Formations. The accessible shoreline area lies at the base of the steep Moenkopi Cliffs along the Lake Powell shoreline. White Canyon proper is a narrow drainage that is cut into the Cedar Mesa portion of the Cutter Formation. The canyon walls are steep (up to 300 feet) within a few miles of the Lake Powell shoreline. At lake elevations below 3,650 feet, there is no access to Lake Powell. The high water area from 3,650 feet to 3,700 feet in elevation is dominated by a dense stand of tamarisk and deep silt, requiring a four-wheel-drive vehicle for passage. The accessible shoreline area is approximately 325 acres, depending on lake levels. There are no facilities at the site.

The soils in White Canyon are shallow, sandy, and shifting soils found in rock-outcrop-Needle association and Torriorthents–rock outcrop association. Nearly half of the area consists of exposed rock outcroppings. Soils are shallow with rare areas of deeper soils where they were deposited by water or are protected from scouring winds. The topography of the areas limits the formation of biological crusts to gently sloping or flat areas. In areas of rock outcrop, the potential for erosion is minimal. In areas with soil cover where there is no vegetation or biological crust to fix the soil in place, there is frequent erosion due to wind and water, and soils shift frequently. In areas where biological crusts have formed or with vegetation cover fixing the soil in place, there is less potential for wind or water erosion.

Orange Cliffs Region

The Orange Cliffs Unit extends from Clearwater Canyon to the northernmost boundary of Glen Canyon. The Colorado River is located in the southern part of the region and includes the famous Cataract Canyon rapids. The Green River is located east of the region, just outside Glen Canyon. These rivers offer a variety of water sport opportunities: rafting, motorized boating, etc. East of Cataract Canyon, bordering Glen Canyon, is the BLM Dark Canyon Primitive Area.

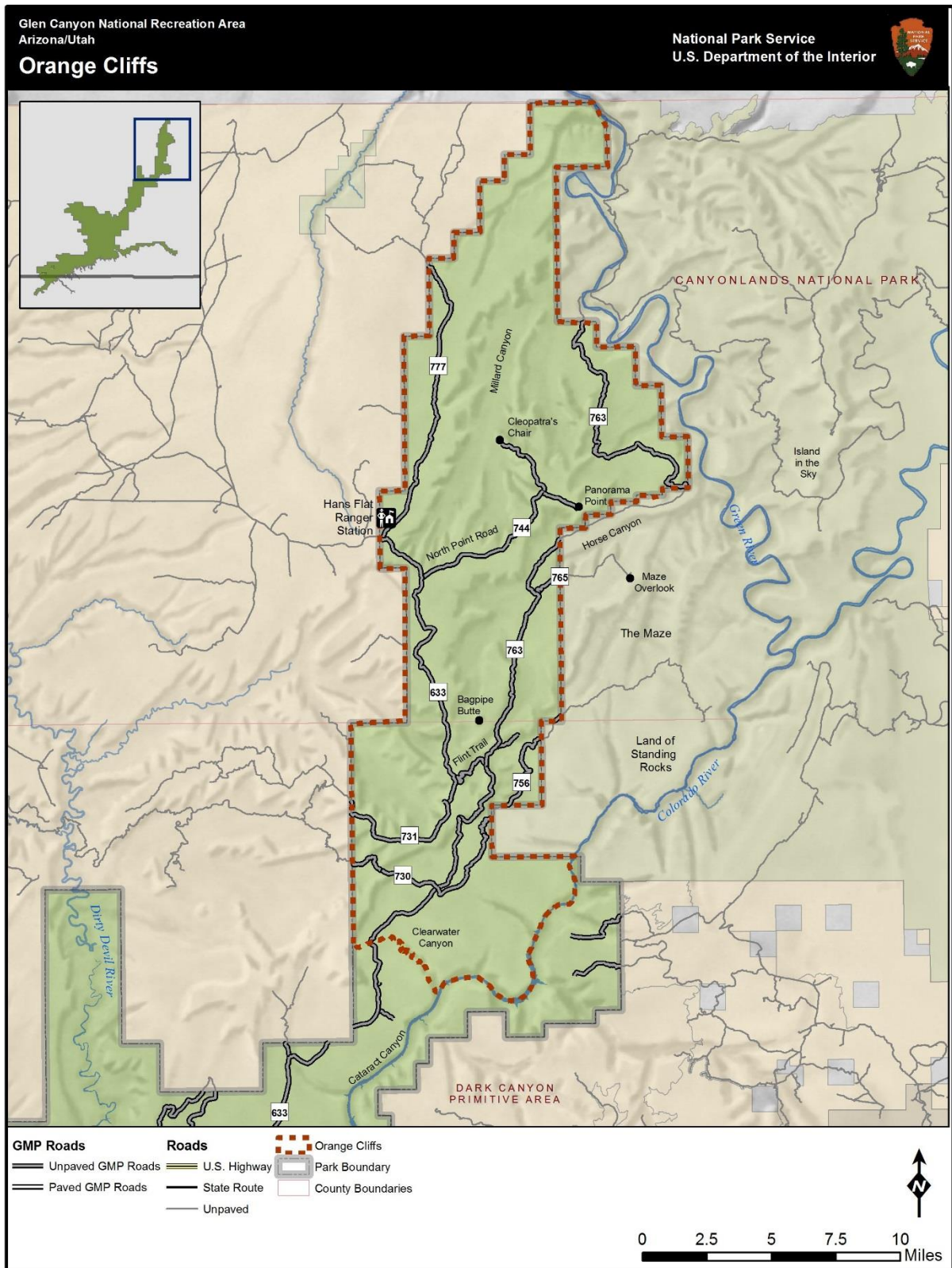
The Orange Cliffs contains a scenic row of Wingate Sandstone cliffs (Figure 37), from the top of which one can view the vast and spectacular panoramas of Canyonlands National Park. The canyon of the Green and Colorado Rivers, the Maze, Horse Canyon, the Land of Standing Rocks, the Needles, Island in the Sky, and the cliffs far to the east of the Colorado River are visible. The foreground view of Millard Canyon is stunning, with the sandstone cliff face plunging abruptly downward over 1,000 feet and the canyon receding from sight to the north for 7 miles in a nearly straight line. This region also affords scenic views of various landforms, including Cleopatra's Chair, Bagpipe Butte, and the Chocolate Drops.



Figure 37. Wingate Sandstone forms the Orange Cliffs.

For the visitor, the beauty of the landscape is complemented by the area's isolation and solitude. The Orange Cliffs Region (Figure 38) is one of the least-visited areas in Glen Canyon; approximately 2,500 visitors pass through the Hans Flat Ranger Station in a year. Access to the area is provided by two main roads, the Flint Trail and the North Point Road. The Flint Trail (NPS 633) extends from Utah State Route 95 at Hite to the Hans Flat Ranger Station, located on the west side of the Orange Cliffs region. Hans Flat and the Orange Cliffs also can be accessed from the west by a 46-mile drive down a graded dirt road from State Route 24. Just east of Hans Flat is the North Point Road (NPS 744), which leads to two scenic views: Cleopatra's Chair and Panorama Point.

Figure 38. Orange Cliffs Region in Glen Canyon National Recreation Area.



Numerous unpaved GMP roads in the Orange Cliffs lead to scenic viewpoints and designated camping locations. The majority of the roads are in poor condition, and only the Flint Trail may be maintained more than once a year. Many of the roads are unimproved and subject to washouts, cross natural soils and bare slickrock, and require high-clearance, four-wheel-drive vehicles for safe passage. Speed of travel is limited by natural conditions at the time of the visit, and may be no more than 5 to 10 miles per hour (mph) for extensive periods of travel time. The roads are often difficult to negotiate and can be even more difficult to follow as the movement of desert sands and rockslides obscure or even block routes.

The Flint Trail is the most commonly used road in the Orange Cliffs, and is sometimes signed as the “Orange Cliffs Road” (Figure 38). This 55-mile-long road is the easiest road to negotiate. The road receives occasional grading and has some good sections. The road traverses slopes of clay soils that can be extremely hazardous when wet. The most well-known section of the Flint Trail is the drop off, the section of steep road and hairpin turns that leads from Gordon Flats down to the Maze area. The Flint Trail can be closed in winter months due to adverse driving conditions.

5.0 Pre-field Review

A list of federally listed and proposed species and designated/proposed critical habitat in the action area was obtained from the USFWS on October 19, 2015 (Appendix B). Using this list, we determined which of those species/critical habitat had a potential to occur within the action area (shown in Table 3 below). Species not known or with no potential of occurring in the action area are documented with rationale in Table 3 and will not be discussed further in this document. Excluded species have been dropped from further analysis by meeting one or more of the following conditions:

1. Occurs in habitats that are not present; and/or is
2. Outside of the geographical or elevational range of the species, and/or
3. Surveys have failed to document the species in its habitat in park.

In addition, Table 3 below also gives a very brief summary of federally listed/proposed species, designated/proposed critical habitat, species’ habitat requirements, and known occurrence information of species that are known or may occur in the action area.

There is proposed or designated critical habitat for some of the federally listed species addressed in this assessment within the analysis area. Critical habitat is be addressed in Section 9.0 of this assessment.

6.0 Species Considered and Evaluated

The following table indicates whether the species from the USFWS official species list are known or expected to occur within the action area, suitable habitat is present, or if not why they are excluded from further analysis (with rationale).

Table 3. Threatened, endangered, candidate/proposed species with the potential to occur within the action area and critical habitat. The U.S. Fish and Wildlife Service species list (USFWS 2015) was obtained (October 19, 2015) and reviewed and species/critical habitat not having the potential to occur were excluded from further review with a no effect determination.

¹ **Status Codes:** E=federally listed endangered; T=federally listed threatened; P= federally proposed for listing; C= federal candidate for listing

² **Exclusion Rationale Codes:** ODR=outside known distributional range of the species; HAB= no habitat present in action area; ELE= outside of elevational range of species; and SEA=species not expected to occur during the season of use/impact

Species Common and Scientific Name	Status ¹	Potential to Occur	Critical Habitat	Rationale for Exclusion ²	Habitat Description and Range in action Area
INVERTEBRATES					
Kanab Ambersnail (<i>Oxytoma haydeni kanabensis</i>)	E	No	No	ODR	Surveys have failed to find the species; one population of the Niobrara Ambersnail is known from the Colorado River corridor below Glen Canyon Dam, at River Mile -8.8L.
BIRDS					
California condor (<i>Gymnogyps californianus</i>)	Experimental population, Non-Essential; NPS T	YES	No		California condors have been re-introduced in nearby Vermilion Cliffs National Monument. Condors prefer mountains, gorges, and hillsides, which create updrafts. The species prefers to nest in protected caves on cliffs. There is no suitable nesting or roosting habitat within 1 mile of the action area.
Gunnison sage-grouse (<i>Centrocercus minimus</i>)	T	No	No	ELE	Only occurs in southeastern Utah near Monticello and in western Colorado.
Mexican spotted owl (<i>Strix occidentalis lucida</i>)	T	YES	Final designated		Breeding and roosting owls have been detected in association with two types of habitats, stands of Douglas fir (<i>Pseudotsuga menziesii</i>) in shaded alcoves, and less commonly in narrow deep canyons without large conifers; there is no suitable nesting habitat within 0.5 miles of the action area.
Southwestern Willow flycatcher (<i>Empidonax traillii extimus</i>)	E	YES	Final Designated		Breeds in relatively dense riparian tree and shrub communities associated with rivers, swamps, and other wetlands including lakes and reservoirs. Has not been documented as breeding in the Glen Canyon reach in the last 50 years. Small numbers migrate through the area in late spring, especially along the San Juan River (Spence et al. 2011). There is no suitable nesting habitat within 0.5 miles of the action area
Yellow-Billed Cuckoo (<i>Coccyzus americanus</i>)	T	YES	Proposed		Prefers large blocks of multi-layered riparian woodlands (cottonwood, willow, or tamarisk galleries). Cuckoos are found nesting statewide below 8,500 ft. in central, western, and southeastern Arizona, as well as eastern portions of Utah.
FISHES					
Bonytail chub (<i>Gila elegans</i>)	E	No	Final Designated	HAB	Currently extirpated from park
Colorado pikeminnow (<i>Ptychocheilus lucius</i>)	E	No	Final Designated	HAB	Small populations within Lake Powell, San Juan River, Green River and Colorado River outside project boundaries
Greenback Cutthroat trout (<i>Oncorhynchus clarkii stomias</i>)	T	No	No	ODR	High elevation cold streams well outside park boundaries
Humpback chub (<i>Gila cypha</i>)	E	No	Final Designated	HAB	Extirpated from park; known only from Colorado River and tributaries in Grand Canyon NP

Razorback sucker (<i>Xyrauchen texanus</i>)	<i>E</i>	<i>No</i>	Final Designated	<i>HAB</i>	Small populations within Lake Powell, San Juan River, Green River and Colorado River outside project boundaries
Virgin River Chub (<i>Gila seminuda</i> [= <i>robusta</i>])	<i>E</i>	<i>No</i>	Final Designated	<i>ODR</i>	Virgin River species
Woundfin (<i>Plagopterus argenteus</i>)	<i>E</i>	<i>No</i>	Final Designated	<i>ODR</i>	Virgin River species
FLOWERING PLANTS					
Autumn Buttercup (<i>Ranunculus aestivalis</i> [<i>acrisiformis</i>])	<i>E</i>	<i>No</i>	<i>No</i>	<i>ODR</i>	Occurs on wet meadow habitats along the Sevier River north of Panguitch, >75 miles to the NW of the park
Barneby reed-mustard (<i>Schoenocrambe barnebyi</i>)	<i>E</i>	<i>No</i>	<i>No</i>	<i>ODR</i>	Found on Chinle deposits in the central and northern Waterpocket Fold in Capitol Reef NP; repeated floristic surveys have not found it in the park.
Brady's footcactus (<i>Pediocactus bradyi</i>)	<i>E</i>	YES	<i>No</i>		Occurs in the action area
Jones Cycladenia (<i>Cycladenia humilis</i> var. <i>jonesii</i>)	<i>T</i>	YES	<i>No</i>		Occurs between 4,390 to 6,000 feet elevation in plant communities of mixed desert scrub, juniper, or wild buckwheat Mormon tea. It is found on gypsiferous, saline soils of Cutler, Summerville, and Chinle Formations; may occur within action area.
Kodachrome bladderpos (<i>Lesquerella tumulosa</i>)	<i>E</i>	<i>No</i>	<i>No</i>	<i>HAB</i>	Found on Windsor Member white shale barrens of the Carmel Formation in and around Kodachrome Basin State Park; particular member does not outcrop in the park.
Last Chance townsendsia (<i>Townsendia aprica</i>)	<i>T</i>	<i>No</i>	<i>No</i>	<i>ODR</i>	Occurs on the Arapain and Mancos Shale Formations of central Utah; formations and habitat do not occur in park; closest known populations >40 miles to north of park.
Navajo sedge (<i>Carex specuicola</i>)	<i>T</i>	<i>No</i>	Final Designated	<i>HAB</i>	Occurs in hanging gardens within riparian zones on the Navajo Nation. The seep-spring pockets along the Cedar Mesa and Navajo Sandstone Formations bedrock provide this habitat. One occurrence in Glen Canyon in Slickhorn Canyon. This population is in a narrow inaccessible canyon off the San Juan River, with no roads within two miles; not in action area.
San Rafael cactus (<i>Pediocactus despainii</i>)	<i>E</i>	<i>No</i>	<i>No</i>	<i>ODRHAB</i>	Found on Mancos Shale in northern Capitol Reef NP and adjacent BLM lands >50 miles to north of park.
Siler Pincushion cactus (<i>Pediocactus</i> [= <i>echinocactus</i> , = <i>utahia</i>] <i>sileri</i>)	<i>T</i>	YES	<i>No</i>		Found on primarily on the Red Member of the Moenkopi on gypsiferous soils in House Rock Valley and SW Utah >30 miles to west of park boundary. Surveys in park have not found the species. Specific Moenkopi layers where species occurs are not present in action area, but species is rarely found on Kaibab and Chinle Formations.
Ute ladies'-tresses (<i>Spiranthes diluvialis</i>)	<i>T</i>	<i>No</i>	<i>No</i>	<i>HAB</i>	Occurs in Grand Staircase-Escalante NM and Capitol Reef NP in wet meadows along Deer Creek and the Fremont River; repeated surveys have not found the species in GLCA. Suitable habitat does not occur in the action area.
Welsh's milkweed (<i>Asclepias weshii</i>)	<i>T</i>	<i>No</i>	Final Designated	<i>HAB/ ELE</i>	Prefers shifting sands and active dunes adjacent to sagebrush, juniper, and ponderosa pine communities between 5,600 to 6,200 feet in elevation in southern Utah and northern Arizona. Surveys in the Wahweap area in 1992-1993 and again in 2005 by trained botanists in its preferred substrates (sand dunes or other mobilized sand deposits) did not find the species, and the elevation is well below its typical elevation range. Suitable habitat does not occur in the action area.

Winkler cactus (<i>Pediocactus winkleri</i>)	<i>T</i>	<i>No</i>	<i>No</i>	<i>ODR</i>	Found on various substrates, primarily Mancos Shale, north of the Fremont River in Capitol Reef NP and adjacent BLM lands >50 miles to the north of the park. No Mancos Shale outcrops in action area.
Wright Fishhook cactus (<i>Sclerocactus wrightiae</i>)	<i>E</i>	<i>No</i>	<i>No</i>	<i>ODR</i>	Found on Mancos Shale, north of the Fremont River in Capitol Reef NP and adjacent BLM lands >50 miles to the north of the park. No Mancos Shale outcrops in action area.
MAMMALS					
Utah prairie dog (<i>Cynomys parvidens</i>)	<i>T</i>	<i>No</i>	<i>No</i>	<i>ODR/ HAB/ ELE</i>	Found in SW Utah at high elevations in and near Bryce Canyon NP; suitable habitat does not exist in park.

As indicated in the above table, there are seven federally listed threatened or endangered, candidate/proposed species - California condor (*Gymnogyps californianus*), Mexican spotted owl (*Strix occidentalis lucida*), Southwestern Willow flycatcher (*Empidonax traillii extimus*), Yellow-Billed Cuckoo (*Coccyzus americanus*), Jones Cycladenia (*Cycladenia humilis* var. *jonesii*), Brady's pincushion cactus (footcactus); *Pediocactus bradyi*, and Siler's pincushion cactus (*Pediocactus sileri*) with the potential to occur (i.e., habitat is present) within the park and within the plan area. Therefore, only these species will be addressed hereafter in this assessment (evaluated species). The remaining species shown above without a potential to occur will not be analyzed further based on the rationale provided. The proposed action will have no effect on any of these other species or critical habitat.

7.0 Evaluated Species Information

7.1 Field reconnaissance

Below the specific survey and monitoring efforts and protocols are documented for each species retained in the effects analysis, excluding California condor, for which standardized survey efforts have not been developed, and also because each individual of the species is currently monitored by other agencies including Utah and Arizona states and the Peregrine Fund.

Mexican Spotted Owl

Formal surveys were initiated in 1996 in GLCA (Willey 2000; Spence et al. 2011). Breeding pairs or suspected pairs were located in Miller Canyon of the Waterpocket Fold, Stevens Canyon and Scorpion Gulch on the Escalante River, and in Millard Canyon and French Spring Fork of Happy Canyon near Hans Flat. Other sightings have been documented as well, including recent sightings along Cataract Canyon and near Alstrom Point. Anecdotal records along the Escalante River have also been reported. Of these, two recent sightings occur within the action area (see below, Sections 7.2, 9.0), while the others all occur more than 0.5 miles from the action area. No formal monitoring has occurred since 1998. Prior to Glen Canyon Dam, birds were heard at various locations along the Colorado River that are now under Lake Powell. Surveys will be initiated again in 2017 using USFWS formal survey protocols.

Southwestern Willow Flycatcher:

USFWS and USGS personnel conducted formal SWIFL surveys as part of the critical habitat designation in the early 2000's (USFWS 2005), including surveys associated with accessible shorelines and the San Juan River corridor. Surveys were concentrated along the San Juan River upstream of Clay Hills Crossing, as these were the only areas likely to have SWIFL preferred habitat. No breeding was detected, although migrating individuals were documented. A pair was recorded in 1997 along the Escalante River

in an area where breeding may have occurred that year (Spence et al. 2011). Follow-up avian surveys along the Escalante River in 1999-2000, conducted in June, did not document any individuals. More recently, surveys were conducted in Hansen Creek near Bullfrog in 2013 after an individual was reported by visitors, but no birds were found and the habitat did not appear suitable for the species, consisting of scattered low growing tamarisk. No other surveys have been conducted in the park in the previous five years. Based on USFWS surveys (USFWS 2005) and habitat requirements in Sogge et al. (2010) there is no suitable nesting habitat within 0.5 miles of the action area. Limited migratory and foraging habitat exists within the action area.

Yellow-Billed Cuckoo

No formal USFWS protocol surveys have been conducted in the park for the species. Individuals have been detected during other avian surveys at Clay Hills Crossing and on the Colorado River below Glen Canyon Dam (Spence et al. 2011). Proposed critical habitat at the upper San Juan Arm and river delta has not yet been surveyed. This is the only area in the park in the action area where critical habitat has been proposed.

Jones Cycladenia

Surveys have been conducted for this species since 1986 by various botanists, focusing on the only substrate it occurs on in the region, the Church Rock and Owl Creek members of the Chinle Formation. Surveys were done in May and June when the species is in flower. To date, the species has been located in the park only within the Escalante River District, with ca. 20 known populations associated with the Silver Falls, Escalante River, Moody and Middle Moody Canyons drainages on steep slopes. In 2008, the park botanist did limited surveys at Blue Notch accessible shoreline, but failed to find the species. Other accessible shorelines where Chinle deposits occur include those along the San Juan Arm and River. These areas have been surveyed by Navajo Nation botanists without finding the species. However, additional surveys at those accessible shorelines with Chinle deposits are warranted and will be conducted in 2017, using guidelines developed by the USFWS (2011c).

Brady pincushion cactus

Surveys for this species were initiated by NPS botanists in the 1970's and have continued through 2015. The species has extremely specific habitat requirements, white Kaibab Limestone cobble over Moenkopi clays. Surveys for the species in Glen Canyon were completed in 2015, with all available habitat surveyed. The species occurs along the Colorado River rims in Kaibab Limestone south of Lees Ferry on both sides of the river, and does not occur outside this specialized habitat. Nor does it occur on the west side of the Lees Ferry paved road on Moenkopi substrates.

Siler's pincushion cactus

Floristic surveys in GLCA between the 1970's and 2005 failed to locate this species, including by multiple teams of botanical experts. The cactus occurs on primarily the Red Member of the Moenkopi Formation to the west of the park, on rolling "badlands" of gypsiferous clays. These specific formations and habitats do not occur in GLCA. However, the species has also been rarely found on Kaibab Limestone and Chinle Formation clays, which do outcrop in the park. Additional surveys at those accessible shorelines with Chinle deposits are warranted and will be conducted in 2017, using guidelines developed by the USFWS (2011c).

7.2 Species Status and Biology

California Condor (Experimental population, non-essential (10j)).

The current status, general biology and recovery efforts for the California condor (*Gymnogyps californianus*) can be found in Snyder and Snyder (2000) and Snyder and Schmitt (2002). The condor was introduced into northern Arizona in 1996 as a *non-essential experimental population (10j) as defined under ESA*, but is classified as threatened on NPS lands. Individual birds have been known to wander several hundred miles from the release area in House Rock Valley, and there have been numerous flyover sightings of birds from Navajo Bridge (Highway 89A) up through Glen Canyon to the Dam and near the city of Page, including sightings from Horseshoe Bend parking lot and overlook as well as the Page Golf Course. As recently as 2015 a bird landed at the Horseshoe Bend overlook next to several visitors. In the late 1990s, several birds roosted on cliffs just south of the overlook (Colorado River Mile -9.0L to -10.0L) on the east side of the canyon. None of these areas are within 1 mile of the action area. Condors are seen more regularly from the vicinity of the Highway 89A Bridge and adjacent Navajo Bridge at Marble Canyon to the south of Lees Ferry, within 1 mile of the action area but where the proposed action is permanent closure to ORV activities. However, condors are wide ranging and curious birds, and are often attracted to human activities. Thus there remains a possibility for individuals to wander over and land in or near the proposed action area, or to visit and roost on surrounding cliffs and rims.

Recent breeding attempts have been documented from caves and ledges in Grand Canyon, primarily in the Redwall Limestone. Recently, the species has also expanded into the Zion National Park area of southwestern Utah ca. 100 miles to the west of the action area. The species prefers to nest in protected caves on cliffs. The Navajo Sandstone cliffs of Glen Canyon do not typically produce caves; instead, weathering generally produces sheer cliffs interrupted by narrow and often sloping ledges. In 2012, condors 273M and 302F established the first nest in Glen Canyon near Colorado River Mile -5.0R on the west side of the canyon in an area called the Death Pockets. The nest failed, likely due to a lack of appropriate nesting structure such as caves which do not occur in Navajo Sandstone. This site is more than 2 miles from the action area boundaries. There have been no subsequent nest attempts in Glen Canyon. Birds are likely to occasionally forage throughout the Wahweap- Colorado River area, and cliffs along the Colorado River may provide suitable roosting habitat. These cliffs are more than 1.0 mile from the closest part of the action area near Ferry Swale.

Mexican Spotted Owl (Threatened)

The Mexican spotted owl (*Strix occidentalis lucida*) was listed as threatened in 1993 (USFWS 2012c). It is found in canyon country on the Colorado Plateau, usually in association with large forest trees and relatively dense canopy near cliffs generally in narrow rocky canyons. Elsewhere, it has been found in adjacent areas of New Mexico and Colorado, the mountains of southeastern Arizona, and well south into south-central Mexico. It is at best a local to sparse breeder throughout this large range (see Gutiérrez et al. 1995 for general biology; see Willey 2000 and Spence et al. 2011 for Glen Canyon records). Work in northern Arizona revealed that the species preferentially selects sites for breeding with forest trees, large logs, and is often associated with adjacent cliffs (Ganey and Balda 1994). Mexican spotted owls tend to be relatively unwary around hikers when roosting, with flush distances typically less than 25 meters (Swarthout and Steidl 2001), who suggest that 55-meter buffers are generally considered adequate to prevent disturbance of roosting birds.

Owl foraging habitat includes a wide variety of forests, canyon bottoms, cliff faces, tops of canyon rims, and riparian areas, where they feed on small mammals, particularly mice, voles, and woodrats. Mexican spotted owls will also eat birds, bats, reptiles and arthropods. The Mexican spotted owl uses a "perch and

pounce" strategy to capture prey, using elevated perches to find prey items using sight and sound. They can take prey on the wing, particularly birds. Most hunting is at night (USFWS 2014a).

Juvenile owls disperse into a variety of habitats ranging from high-elevation forests to pinyon-juniper woodlands and riparian areas surrounded by desert grasslands. Dispersal from the nest area usually occurs from mid-September to early October and while they are capable of moving long distances, many successfully establish themselves nearby. Observations of long-distance dispersal by juveniles provide evidence that they use widely spaced islands of suitable habitat which are connected at lower elevations by pinyon-juniper and riparian forests. Some juveniles will travel through a variety of vegetation communities until they settle down (USFWS2014a).

Mated pairs are territorial and defend a breeding territory at least during the nesting season (March through August). The breeding season activity centers tend to be smaller than the non-breeding season activity centers, with considerable overlap between the two. Mexican spotted owls breed sporadically, and not all birds nest every year. Local conditions, particularly for the prey base, may govern nesting success. Adults may or may not leave the territory during the winter. Most adults remain on the same territory year after year (USFWS 2014a).

There are 18 Mexican spotted owl observations and records in Glen Canyon from Utah, and none from Arizona (Table 4, Figures 39-51). Only four are likely to be breeding territories (but none have been assigned as protected activity centers, or PACs) based on survey work in the late 1990's. One other record in the French Spring Fork of Happy Canyon is a possible breeding pair. Most other records are unconfirmed, and many are pre-1980. In particular, old records from Bullfrog-Hall's Creek Bays Divide, Farley Canyon and elsewhere may be misidentifications, or perhaps records of dispersing individuals. Most of these older sightings are not associated with appropriate habitat, and in some cases are in exposed settings in desert shrub communities. Only two of these records occur within 0.5 miles of the action area (see below).

In Glen Canyon, breeding and most roosting Mexican spotted owls have been detected in association with two types of habitats: stands of Douglas fir (*Pseudotsuga menziesii*) in shaded alcoves and, less commonly, in narrow deep canyons without large conifers (Spence et al. 2011; Willey 2000). Breeding and most individual observation records are primarily associated with the Waterpocket Fold near Bullfrog, Cataract Canyon, and the Orange Cliffs near Canyonlands National Park, all in Utah. Three of an estimated four to five breeding pairs were associated with Douglas fir in north-facing alcoves with springs (see Table 4). There are substantiated as well as unconfirmed reports of Mexican spotted owls from the rims of Cataract Canyon near Hite, Utah. Other sightings that may indicate the presence of breeding include the Escalante River corridor, Scorpion Gulch and Stevens Canyon. Currently, all but two of these observations are located more than 0.5 miles from the action area including unpaved park roads (all park unpaved roads except most of those in the Orange Cliffs District are in the action area – see description of the action area above in Section 4.0).

There are two records in the action area from the Alstrom Point-Grand Bench area: an unsubstantiated record from Grand Bench of an owl in Cave Spring in 2008, and an individual flying along the east rim of Alstrom Point on September 23, 2014, both in Utah. These are the only known records in the action area, as Cave Spring is located adjacent to an unpaved road on Grand Bench, and there is an unpaved road on Alstrom Point. Repeat visits to the Cave Spring site have not revealed any additional owls between 2005 and 2008, thus this may have been a dispersing individual.

The closest known occurrences of the species to the Ferry Swale area are >25 miles to the northwest (Grand Bench) and northeast (Grand Staircase-Escalante National Monument), and >50 miles to the south in Marble Canyon (Grand Canyon NP).

Table 4. Records of Mexican spotted owl survey locations and incidental sightings in Glen Canyon National Recreation Area.

NUMBER	LOCATION	COMMENTS
1	East Moody Canyon	Pair in single year, likely nest site, not revisited
2	Stevens Canyon	Pair in single year, likely nest site, not revisited
3	“Scorpion Tongue”	Single; location very approximate-canyon name unknown but may be part of Scorpion Gulch on Escalante River
4	Easter Pasture Canyon	Single
5	French Spring Fork of Happy Canyon	Single in more than one year in Douglas fir stand;
6	Millard Canyon	Pair in Douglas fir stand
7	“French Spring Canyon”	Single; location approximate, no French Spring Canyon; may be the east fork of Millard Canyon?
8	Miller’s Canyon	Pair in Douglas fir stand
9	North of Neon Canyon – Escalante River	Single – very approximate location; three miles above Neon Canyon in granary
10	Grand Bench Cave Spring	Single – in cave
11	Bullfrog-Hall’s Creek Bays Divide	Not in GLCA database - odd location on island in bay; seems unlikely
12	Forgotten Canyon	Single; Not in GLCA database
13	NE edge of Mancos Mesa	Single; Not in GLCA database
14	Flats near Farley Canyon	Single; Not in GLCA database
15	Side canyon (lake arm) off Long Canyon	Single; Not in GLCA database
16	Upper Horse Pasture Canyon near Dangling Rope	Single; Not in GLCA database
7	Clearwater Canyon	Location not specified; anecdotal observations of heard birds in two or more years in upper canyon
18	Alstrom Point	Single; flying near canyon rim

Notes: Mexican Spotted Owl survey locations in Glen Canyon. Data is primarily from 1993-1998, except for the Neon and Grand Bench sightings (both undocumented), and some older (<1990) sightings that may be unreliable (#11-16). The Millard Canyon, Miller’s Canyon and French Spring Fork birds were all associated with relict Douglas fir stands in north-facing alcoves, where pairs were observed over 2 or more years. The 1998 data and 2000 report did not provide exact locations for most observations, plus it used names not available on 7.5 minute topo maps, such as “Scorpion Tongue.”

The Glen Canyon reach below Glen Canyon Dam in Arizona provides limited canyon roosting habitat. All known breeding attempts in northern Arizona and adjacent Utah have been at elevations substantially higher than the Glen Canyon reach, typically above 5,000 feet (Willey 2000; Wise-Gervais 2005). There are no records of spotted owls in the Glen Canyon reach (Spence et al. 2011). However, only limited night surveys were done in the 1990s, when great horned owls were detected (Spence et al. 2011). No work has been done in the canyon since these early surveys, nor was any done by contractors (Willey 2000). Thus it is possible that individual spotted owls, most likely dispersing individuals, may have remained undetected and occasionally roost in the canyon during fall and winter months. However, the presence of at least two great horned owl territories suggests that Mexican spotted owls are unlikely to use the Glen Canyon reach on a regular basis. NPS biologists have determined the potential habitat for this species only occurs in several side or tributary canyons; Waterholes Canyon (200 feet across top, 20 feet across bottom) (Colorado River Mile -4.0L) which is located on the Navajo Indian Reservation, and Nine Mile Draw, which is located about one mile east of the Petroglyph Trail site (Colorado River Mile - 10.5L) and is 600 feet at the top of the canyon and 60 feet at the bottom of the canyon. While neither of these sites has been surveyed for the presence of owls, they could potentially be narrow enough to provide the cool canyon habitat required by this species on the Colorado Plateau. The closest action area where

Figure 39. Overview map of Mexican Spotted Owl suitable and critical habitats and occurrences in Glen Canyon National Recreation Area.

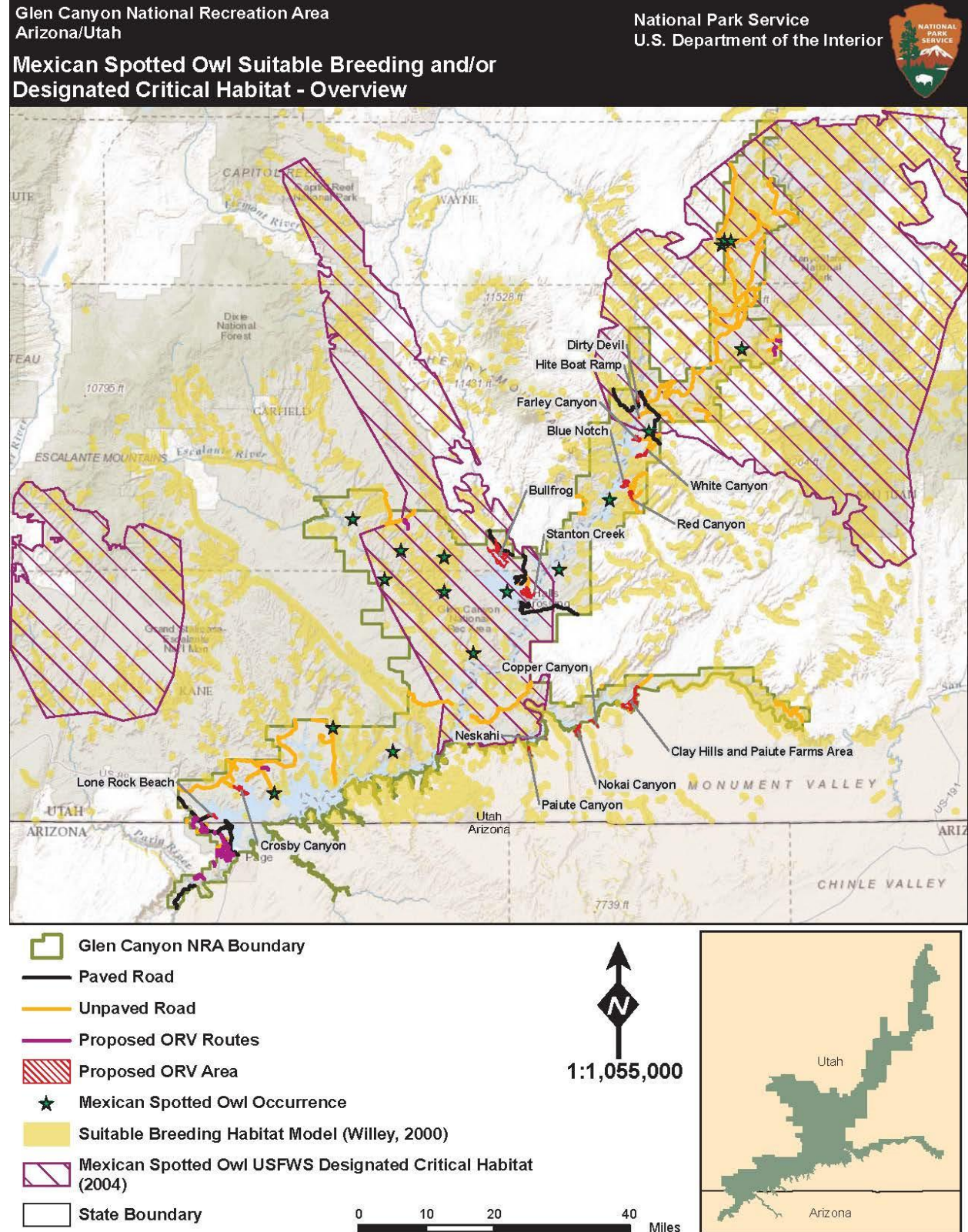


Figure 40. Mexican Spotted Owl suitable breeding habitat in Arizona. There is no area overlap between the plan area roads and routes and suitable breeding habitat.

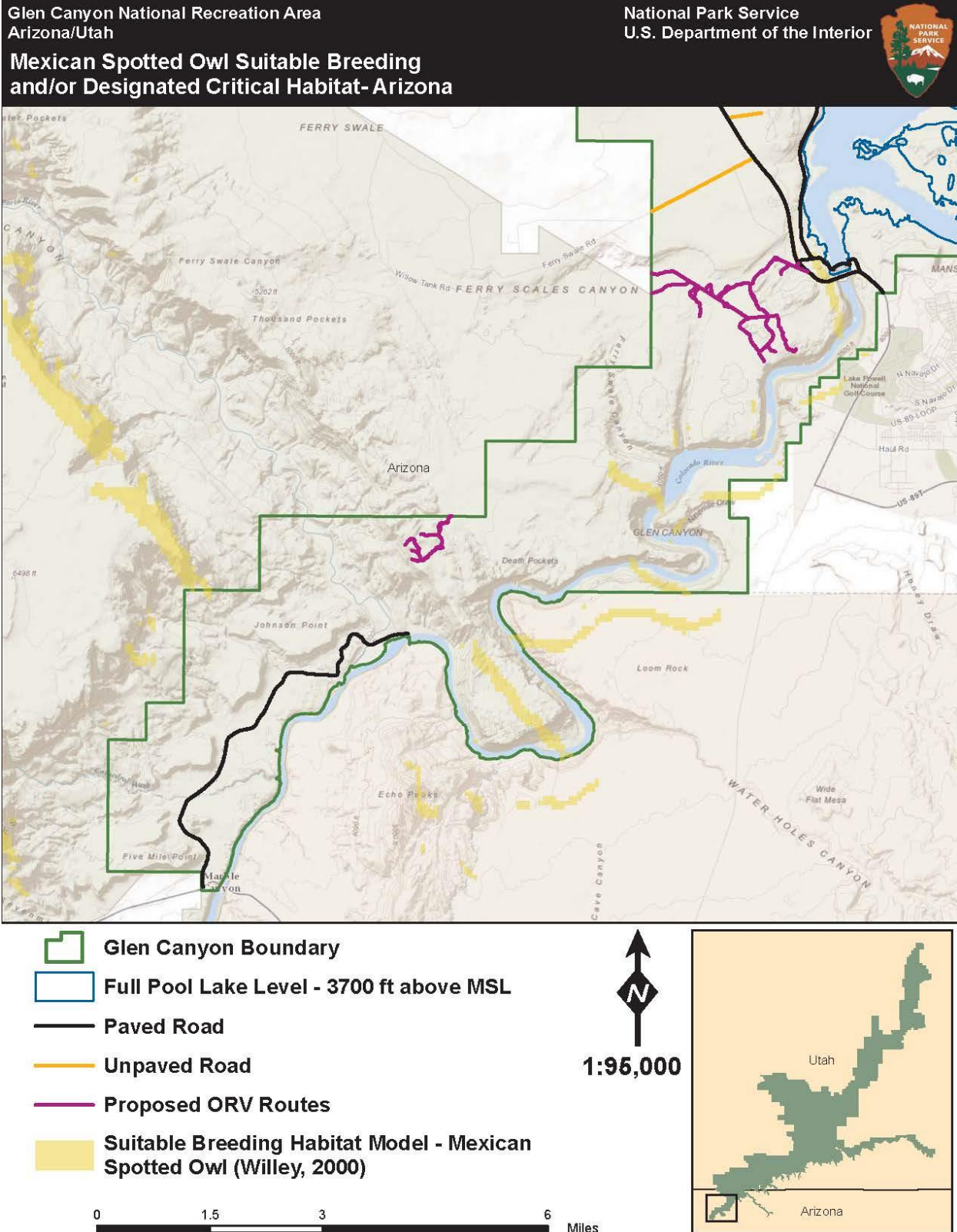


Figure 41. Mexican Spotted Owl suitable breeding habitat in the Lone Rock and Warm Creek areas. There is no area overlap between the plan area roads, ORV routes or ORV Areas and suitable breeding habitat.

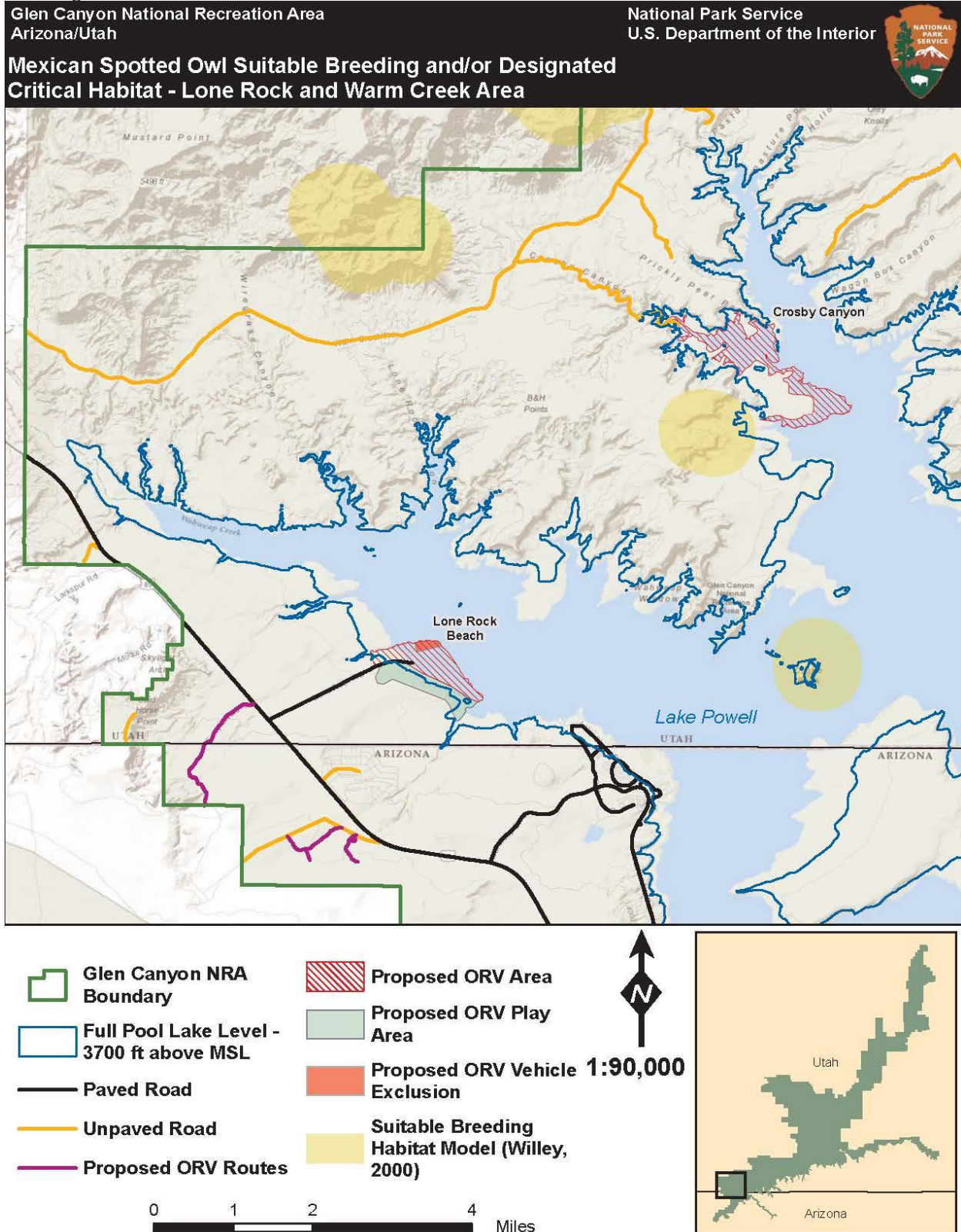


Figure 42. Mexican Spotted Owl suitable breeding habitat overlap with plan area roads and ORV routes in the Alstrom Point area.

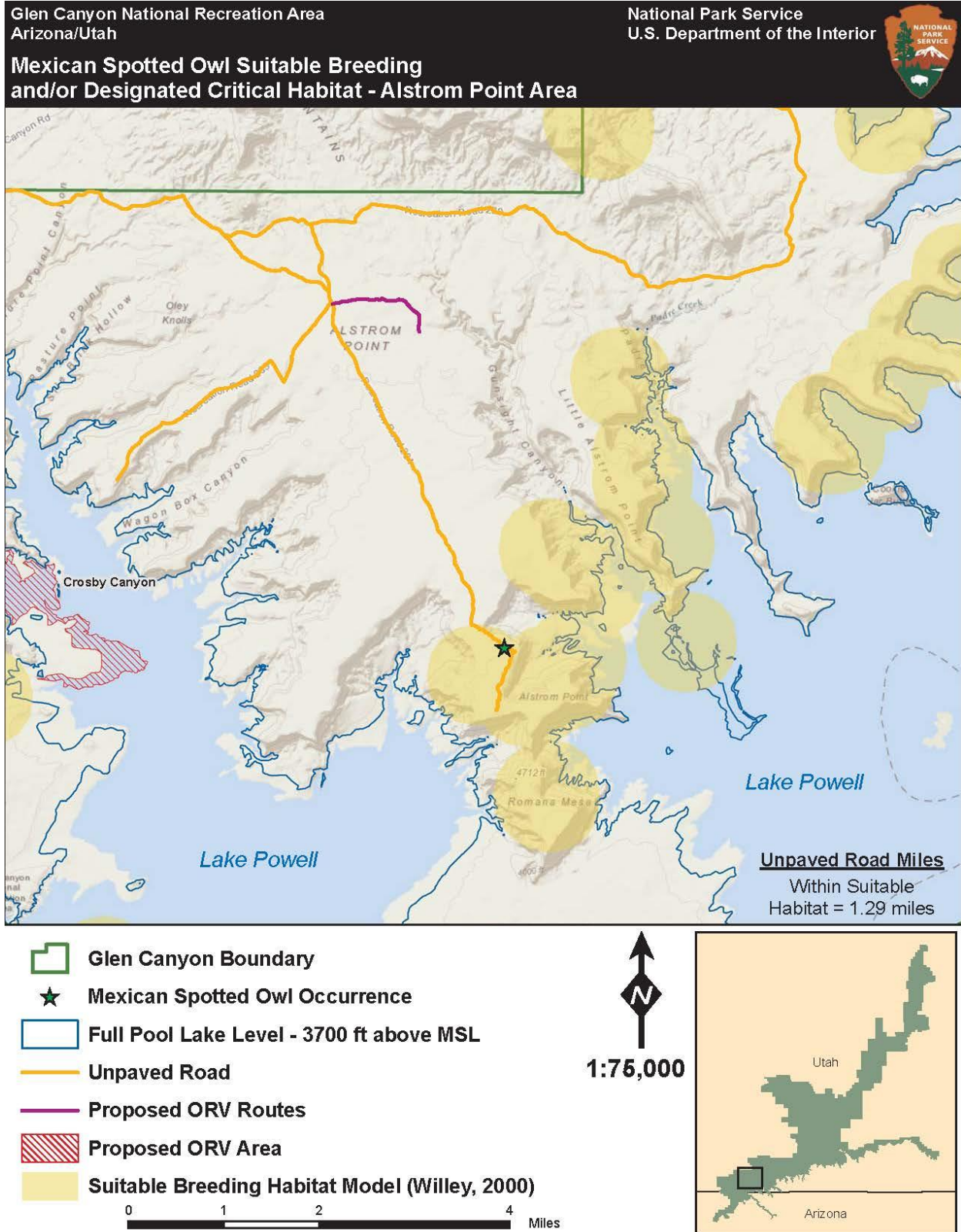


Figure 43. Mexican Spotted Owl occurrences and suitable breeding habitat overlap with plan area roads in the Rock Creek area.

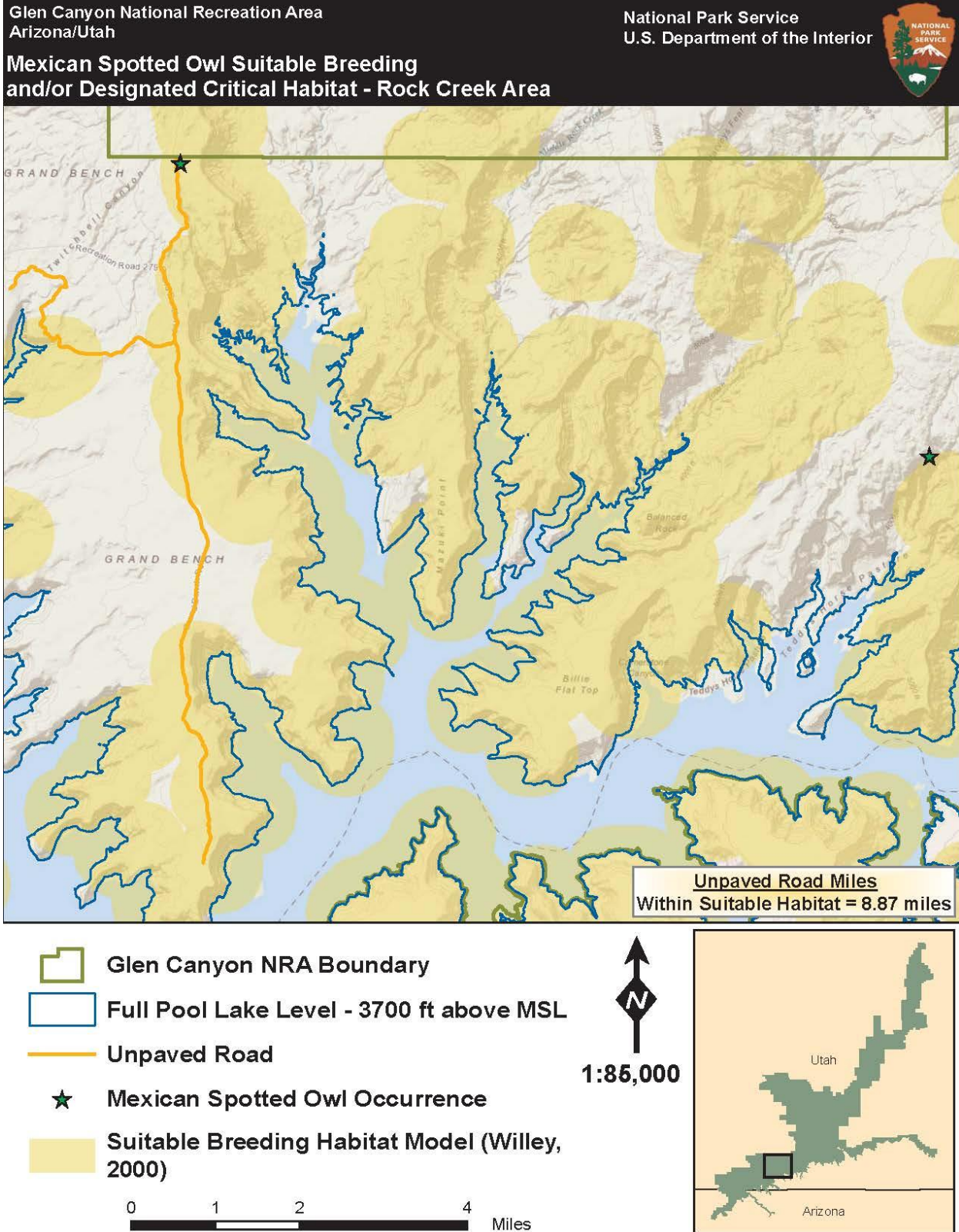


Figure 44. Mexican Spotted Owl designated critical and suitable breeding habitat overlap with plan area roads and proposed ORV Areas in the San Juan area.

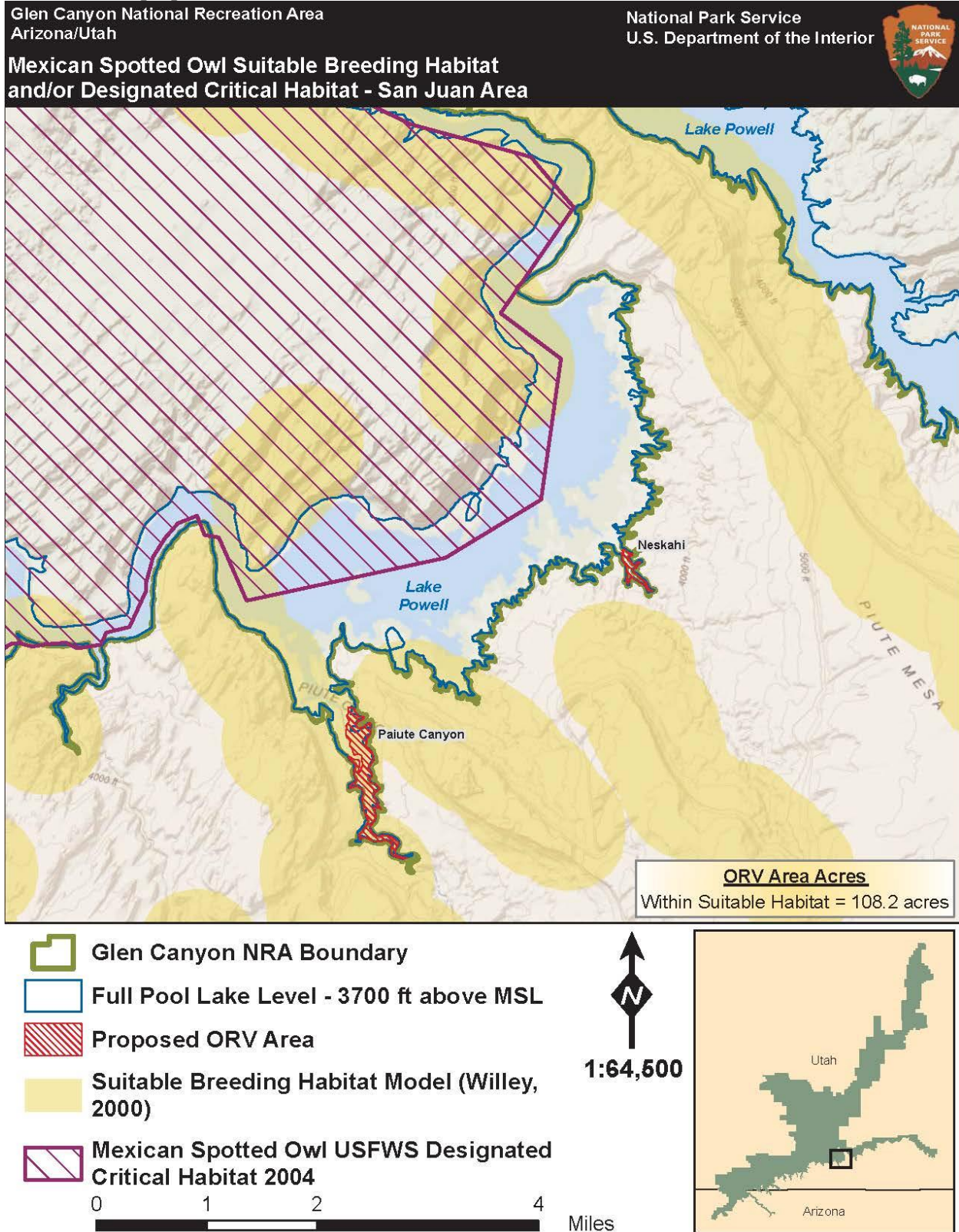


Figure 45. Mexican Spotted Owl suitable breeding habitat overlap with plan area roads and proposed ORV Areas in the San Juan/ Clay Hills Crossing area.

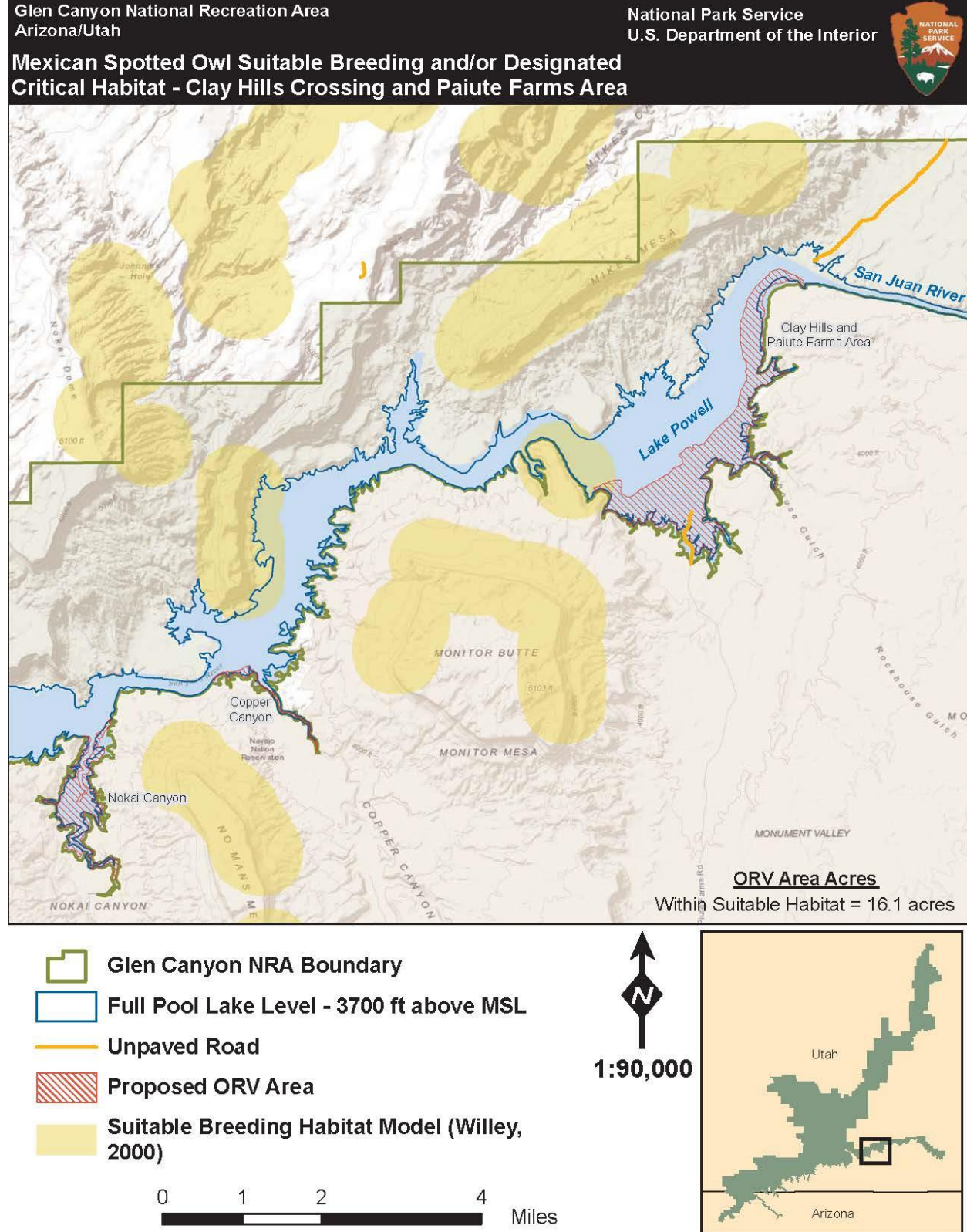


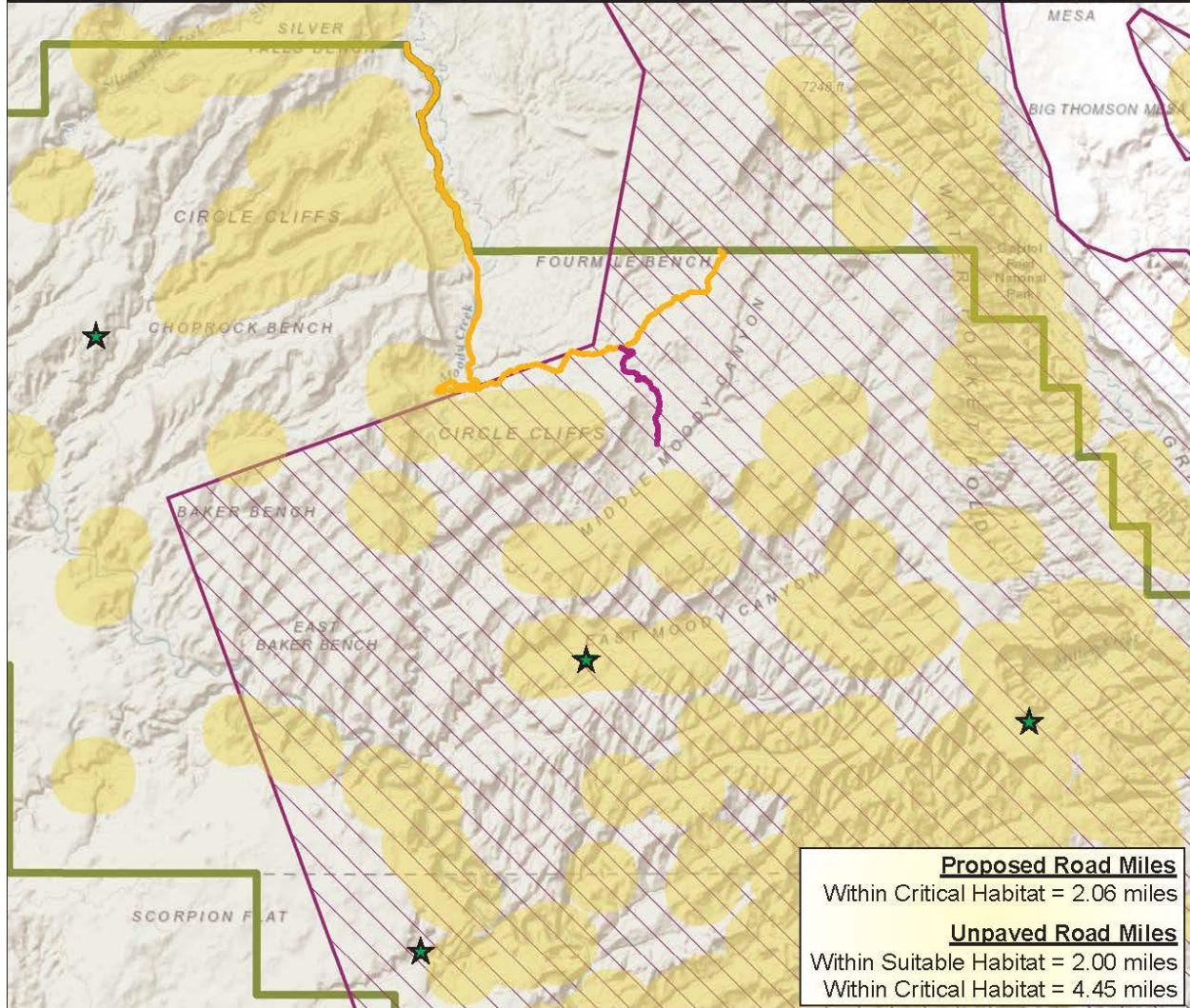
Figure 46. Mexican Spotted Owl occurrences, designated critical, and suitable breeding habitat overlap with plan area roads and proposed ORV routes in the Escalante/ Big Bowns Bench area.

Glen Canyon National Recreation Area
Arizona/Utah

National Park Service
U.S. Department of the Interior



**Mexican Spotted Owl Suitable Breeding and/or
Designated Critical Habitat - Escalante/Big Bowns Bench Area**



- Glen Canyon NRA Boundary
- Unpaved Road
- Proposed ORV Routes
- Mexican Spotted Owl Occurrence
- Suitable Breeding Habitat Model (Willey, 2000)
- Mexican Spotted Owl USFWS Designated Critical Habitat (2004)

1:128,000

0 1.5 3 6 Miles

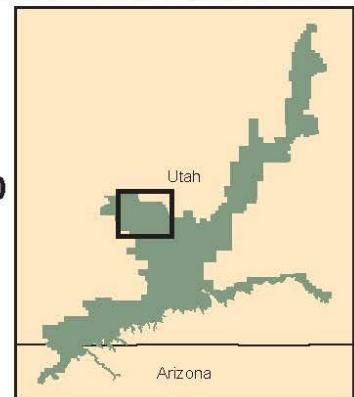


Figure 47. Mexican Spotted Owl occurrences, designated critical, and suitable breeding habitat overlap with plan area roads and proposed ORV Routes and Areas in the Bullfrog area.

Glen Canyon National Recreation Area
Arizona/Utah

National Park Service
U.S. Department of the Interior



**Mexican Spotted Owl Suitable Breeding
and/or Designated Critical Habitat - Bullfrog Area**

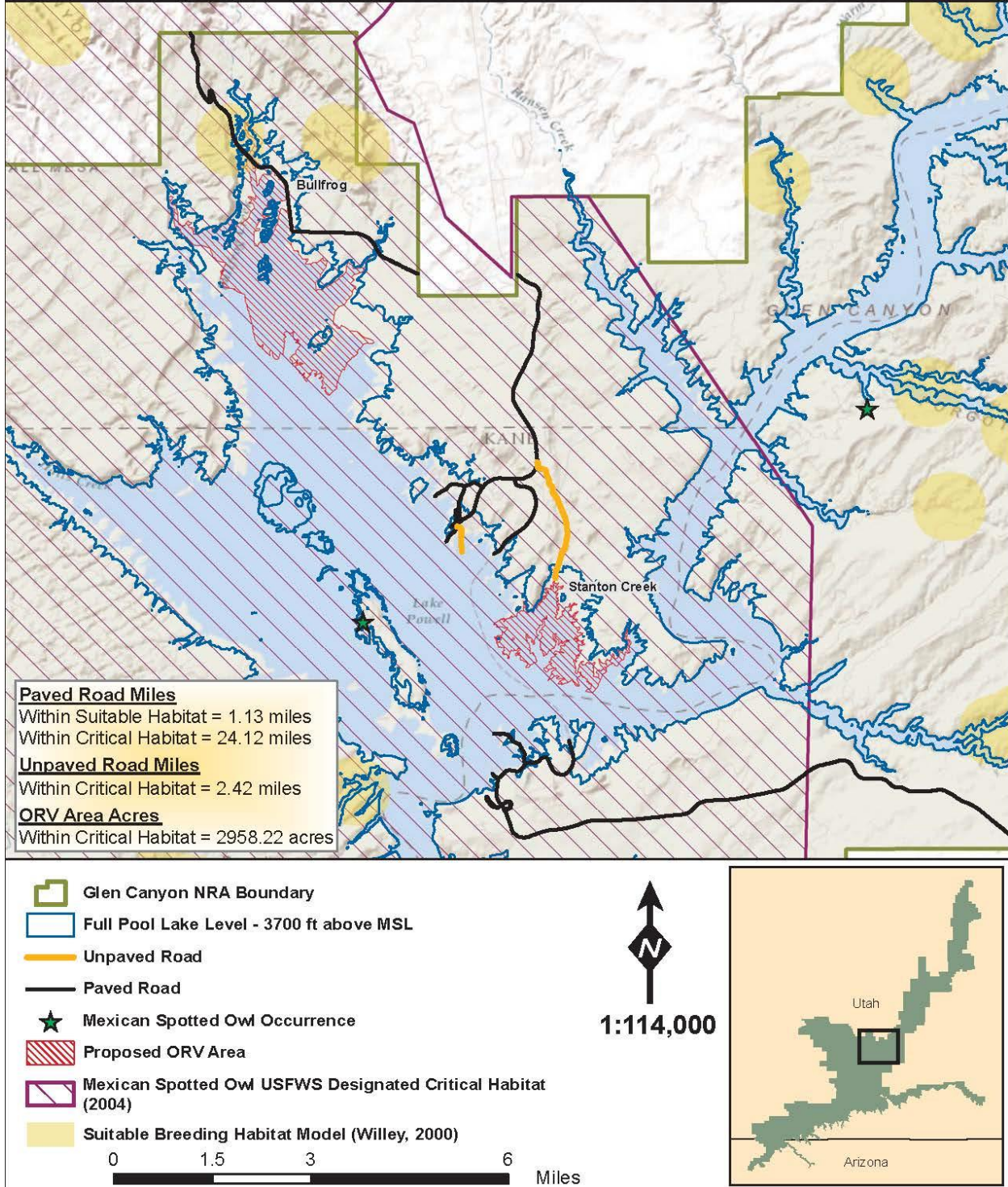


Figure 48. Mexican Spotted Owl occurrences and suitable breeding habitat overlap with plan area roads and proposed ORV Areas in the Blue Notch Canyon area.

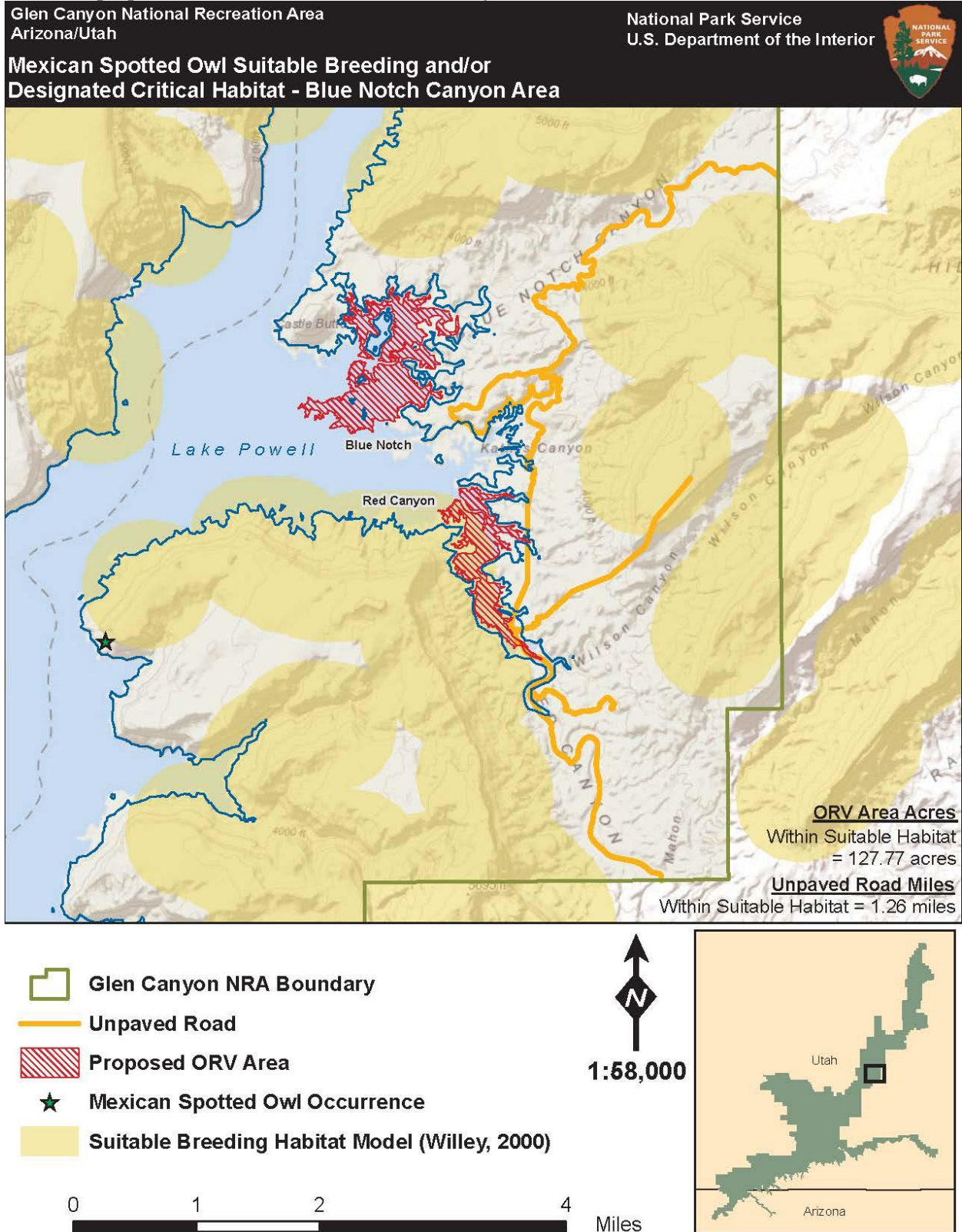


Figure 49. Mexican Spotted Owl occurrences, designated critical, and suitable breeding habitat overlap with plan area roads and proposed ORV Areas in the Hite and Dirty Devil area.

Glen Canyon National Recreation Area
Arizona/Utah

National Park Service
U.S. Department of the Interior



**Mexican Spotted Owl Suitable Breeding and/or
Designated Critical Habitat - Hite and Dirty Devil Area**

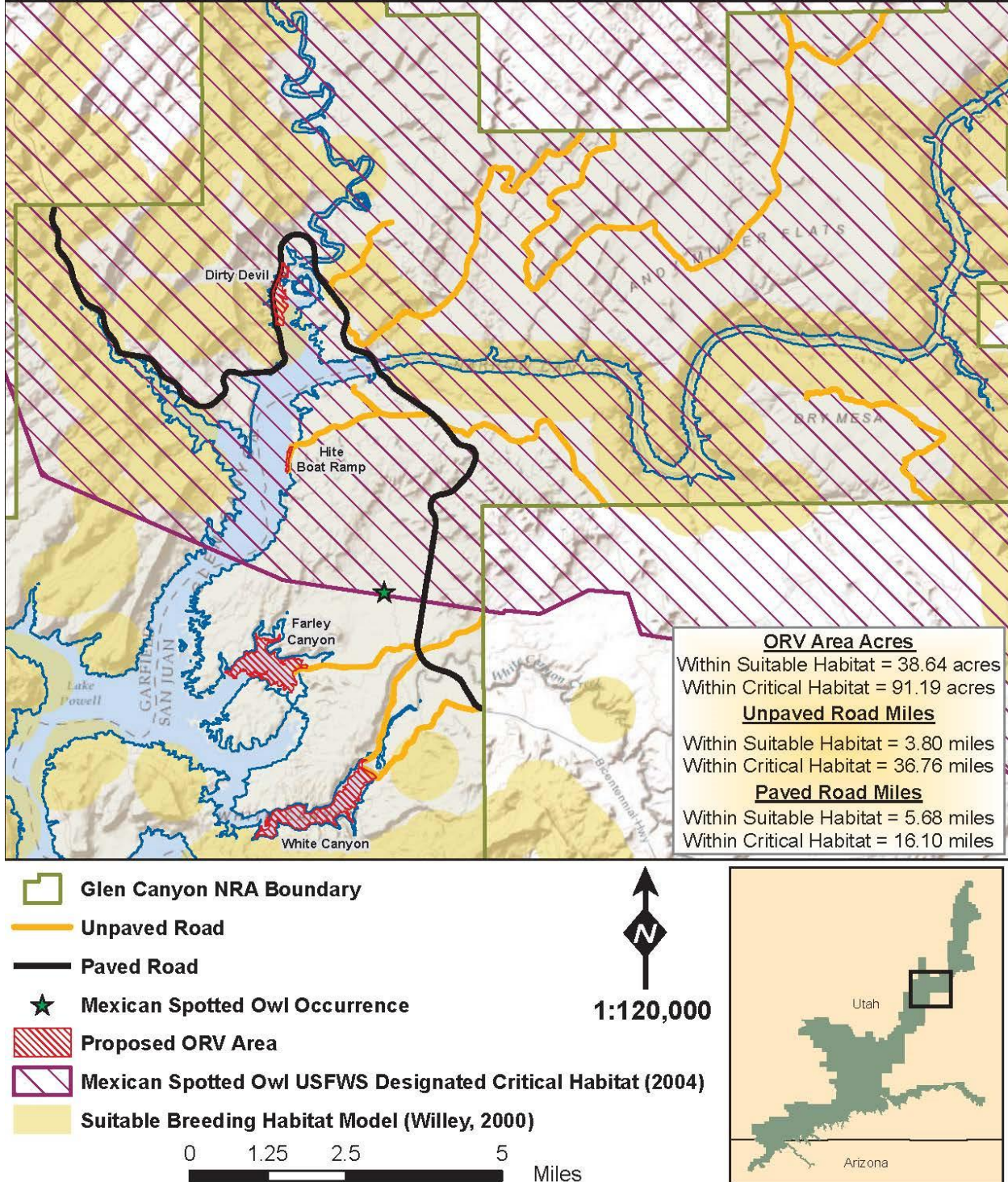


Figure 50. Mexican Spotted Owl occurrences, designated critical, and suitable breeding habitat overlap with plan area roads and proposed ORV Routes in the Southern Orange Cliffs area.

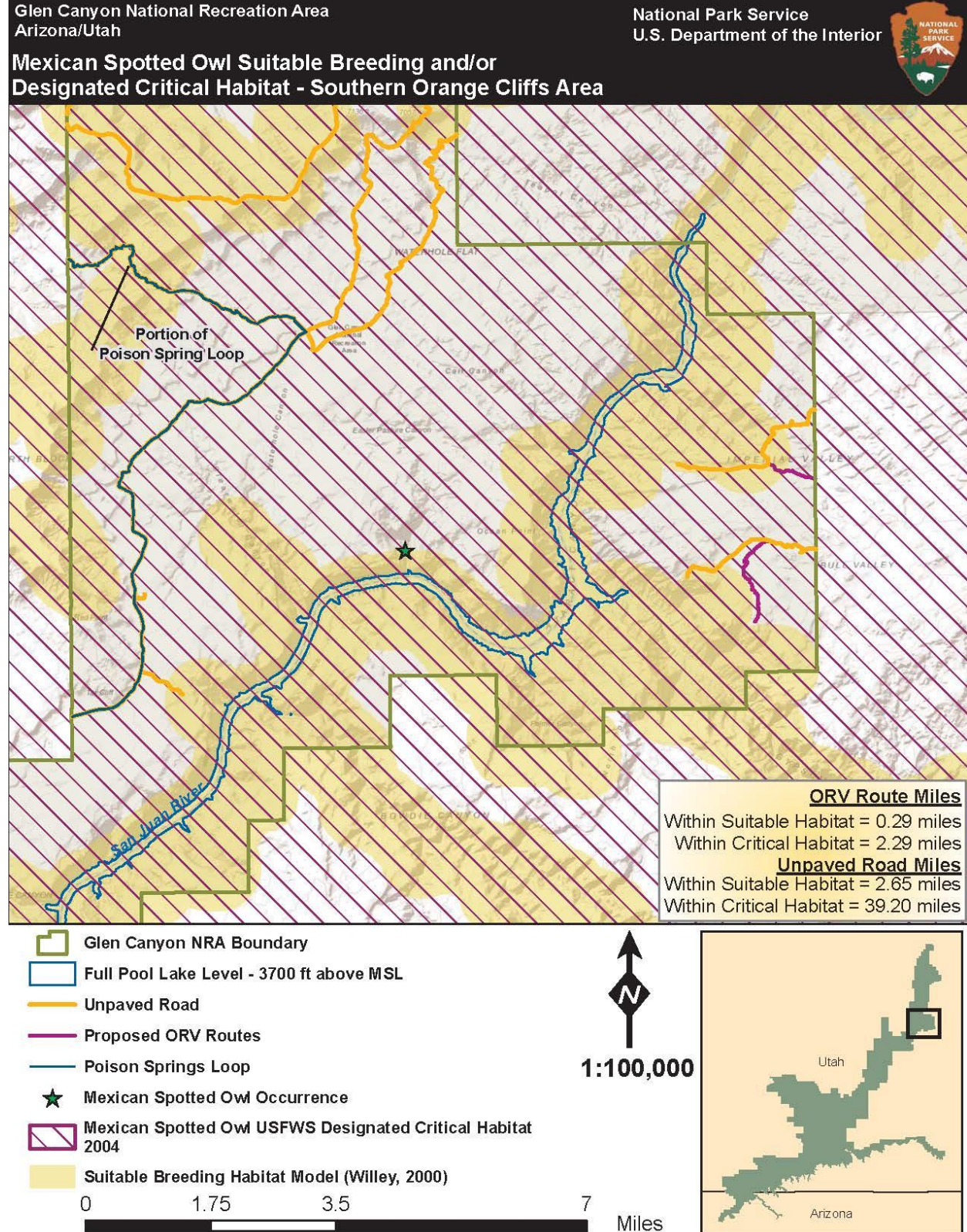
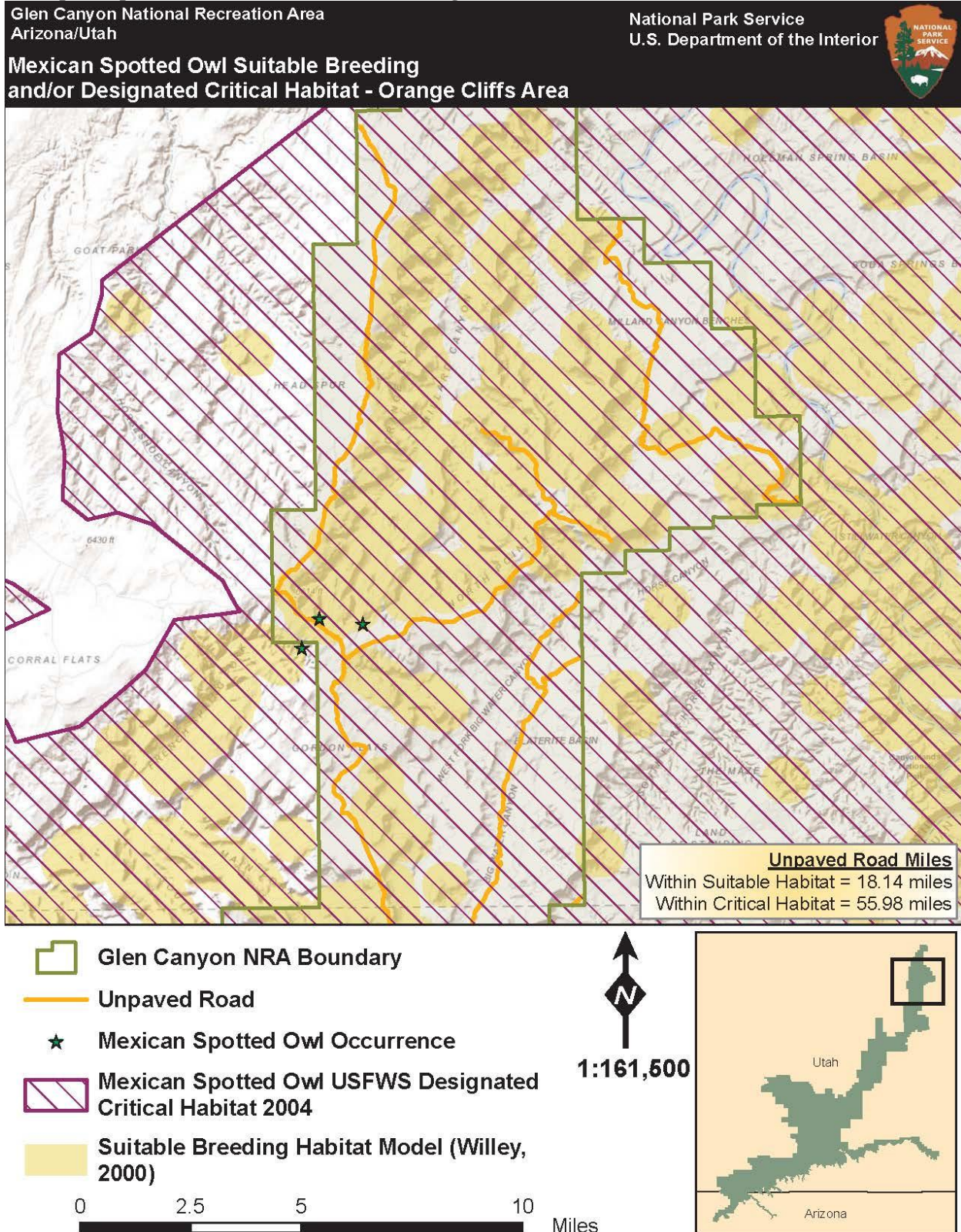


Figure 51. Mexican Spotted Owl occurrences, designated critical, and suitable breeding habitat overlap with plan area roads in the Northern Orange Cliffs area.



ORV activity may occur is Ferry Swale, two miles north of Nine Mile Draw and five miles north of Waterholes Canyon and ca. 1000 feet higher in elevation.

NPS staff have evaluated all areas associated with the action area, including unpaved park roads and accessible shorelines, and have determined that no suitable breeding habitat (with appropriate PCE's) occur within 0.5 miles of the action area.

Southwestern Willow Flycatcher (Endangered)

The southwestern willow flycatcher, federally listed as endangered, nests in dense riparian habitats along streams, lakesides, and other wetlands. Some of the most common plants used for nesting include willow (*Salix* spp.), box elder (*Acer negundo*), tamarisk (*Tamarix* spp.), buttonbush (*Cephalanthus* spp.), cottonwood (*Populus* spp.), and mesquite (*Prosopis* spp.). Nests are found in dense thickets of these and other plant species that are about 12 to 24 feet high. Migration habitat is believed to occur primarily along riparian corridors. Nesting habitat is currently known to occur at elevations below 8,500 feet (USFWS 2011a). Threats to this species include loss and modification of breeding habitat, water diversions, grazing, and cowbird parasitism.

Destruction and modification of riparian habitats have been caused mainly by the reduction or removal of surface and subsurface water due to diversion and groundwater pumping, changes in flood and fire regimes due to dams and stream channelization, vegetation clearing, and changes in soil and water chemistry due to the disruption of natural hydrologic cycles (USFWS 2002). Other reasons for the decline/vulnerability of the flycatcher include the fragmented distribution and low numbers of the current population; predation; cowbird brood parasitism; and other events such as fires and floods that are naturally occurring, but have become more frequent and intense as a result of the proliferation of invasive non-native plant populations and degraded watersheds.

The recent introduction, spread, and effect of the tamarisk leaf beetle threatens the flycatcher by defoliating and killing nesting habitat. The leaf beetle has expanded into the southwestern United States and into the flycatcher's range beyond where the beetle was expected to survive and persist. Accidental and purposeful human transportation appears to be accelerating its distribution. Tamarisk often flourishes in areas where native tree growth is affected by land/water management actions (such as river damming, flow regulation, diversion, groundwater pumping, and over grazing). Because tamarisk provides structure and density, over half of all known flycatcher territories contain tamarisk. Loss of tamarisk vegetation without replacement by native trees will likely impact the flycatcher and other riparian obligate wildlife in Arizona (USFWS 2011a). All of the impacts described contribute to the baseline conditions for the southwestern willow flycatcher. NPS biologists forecast improvements to potential flycatcher habitat over the next 10 years as a result of a Lees Ferry restoration project located near the action area. Also, the recent revision of critical habitat designations, combined with actions consistent with the species' recovery plan, represent beneficial cumulative impacts that would offset some of the continuing adverse effects. The proposed action would not contribute to cumulative effects on the southwestern willow flycatcher.

Southwestern willow flycatchers have not been documented as breeding in Glen Canyon, although a possible pair was found during vegetation surveys on the Escalante River in 1997 at George's Camp, an area on the river ca. 8 miles from the nearest park road (Spence et al. 2011). Small numbers migrate through Glen Canyon in late spring, especially along the San Juan River (Spence et al. 2011). In riparian vegetation below Glen Canyon Dam, 25 point count surveys for riparian and aquatic birds were completed between 1992 and 1999 (Spence and Holmes 2004). During these surveys there were only two reported sightings of willow flycatchers, both in 1997. Due to the timing of the sightings and lack of response to taped calls, it has been postulated by the surveyors that these individuals were likely a

subspecies other than southwestern willow flycatcher that were migrating through the area. In 2006, protocol level surveys for southwestern willow flycatcher at Hidden Slough were negative. There is a single breeding record that exists at Lees Ferry from before Glen Canyon Dam was built; however, no breeding of this species has been detected for more than 50 years in or near the action area. The existing tamarisk stands at Hidden Slough (River Mile -6.5R above Lees Ferry) and Leopard Frog Marsh (River Mile -8.8L above Lees ferry at Horseshoe bend) were evaluated, and it was determined these stands do not currently have suitable southwestern willow flycatcher breeding habitat (Beatty 2013).

Based on vegetation data and surveys conducted in the park since 1991 (Spence 2016), the following areas within the action area overlap with suitable habitat as outlined in Sogge et al. (2010); Clay Hills Crossing on the San Juan River, Paiute Farms accessible shoreline, Last Chance Creek, the Colorado River at and adjacent to the Lees Ferry District (Figures 52-54).

Suitable habitat during migration is available in the vicinity of the Clay Hills Crossing takeout for river runners (see Figure 52). Both downstream and upstream along the San Juan River, extensive dense riparian habitat exists that may also support breeding, although none has been documented. Small dense patches of large tamarisk also occur, mostly lacking native riparian shrubs or trees, near the road end at the Paiute Farms accessible shoreline.

There are no recorded sightings during migration at Lees Ferry where the paved road ends at the boat ramp, although suitable riparian thickets occur both downstream and upstream of the ramp for ca. 0.5 miles. Although generally consisting of a relatively thin margin along the Colorado River, there are some dense patches and areas with overstory cottonwoods south of the ramp in the vicinity of the river runner camp, although no flycatchers have been reported from this area (Figure 53).

The unpaved Park Road 230 crosses Last Chance Creek (Figure 54). Riparian vegetation is limited in this area, but patches of tamarisk, willow and cottonwoods occur both upstream and downstream of the crossing that could potentially be utilized by birds for resting or foraging during migration.

Extensive suitable habitat also occurs in Glen Canyon along the San Juan, Colorado, Green, Dirty Devil and Escalante Rivers, but with the exception of Lees Ferry, Last Chance Creek, Paiute Farms and Clay Hills Crossing, these are all in more remote areas well removed from the action area accessible shorelines and roads, and are all >0.5 miles from any portions of the action area. However, breeding has never been documented in any of these areas and they are not included in the species critical habitat designation. Critical habitat does not occur in or near Glen Canyon NRA.

Exotic plant control and management along the San Juan River has been conducted on a regular basis by the BLM, NPS and Navajo Nation. These activities include control of Russian olive and several herbaceous exotics, and occur in areas above Grand Gulch, and thus would have only minor indirect effects to migrating individuals. These activities could have potential long-term beneficial effects to the species.

Figure 52. Southwestern Willow Flycatcher suitable habitat overlap with plan area roads and proposed ORV Areas in the Clay Hills Crossing area.

Glen Canyon National Recreation Area, Arizona/Utah

National Park Service
U.S. Department of the Interior



**Southwestern Willow Flycatcher Suitable Habitat -
Clay Hills Crossing and Paiute Farms**

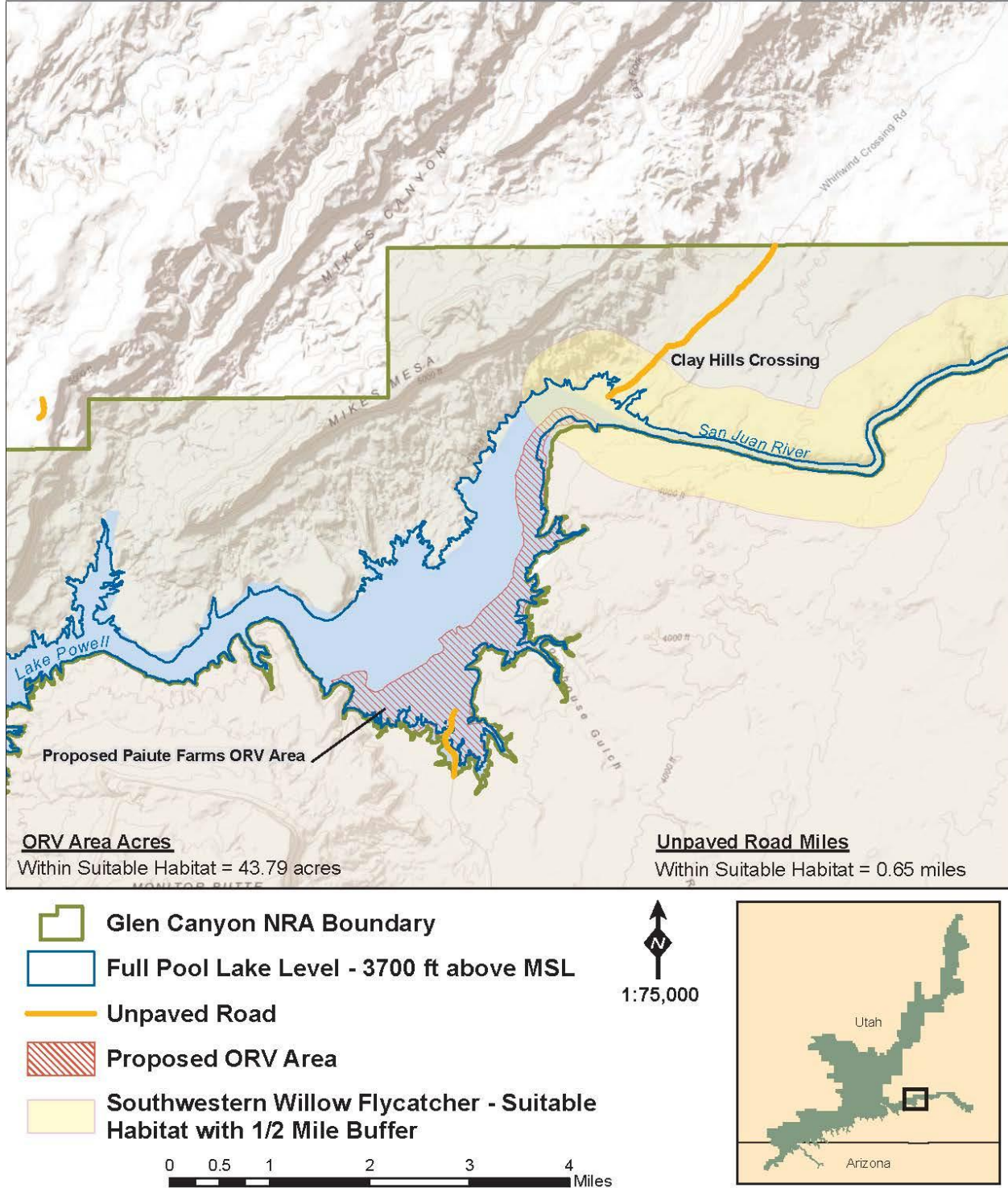


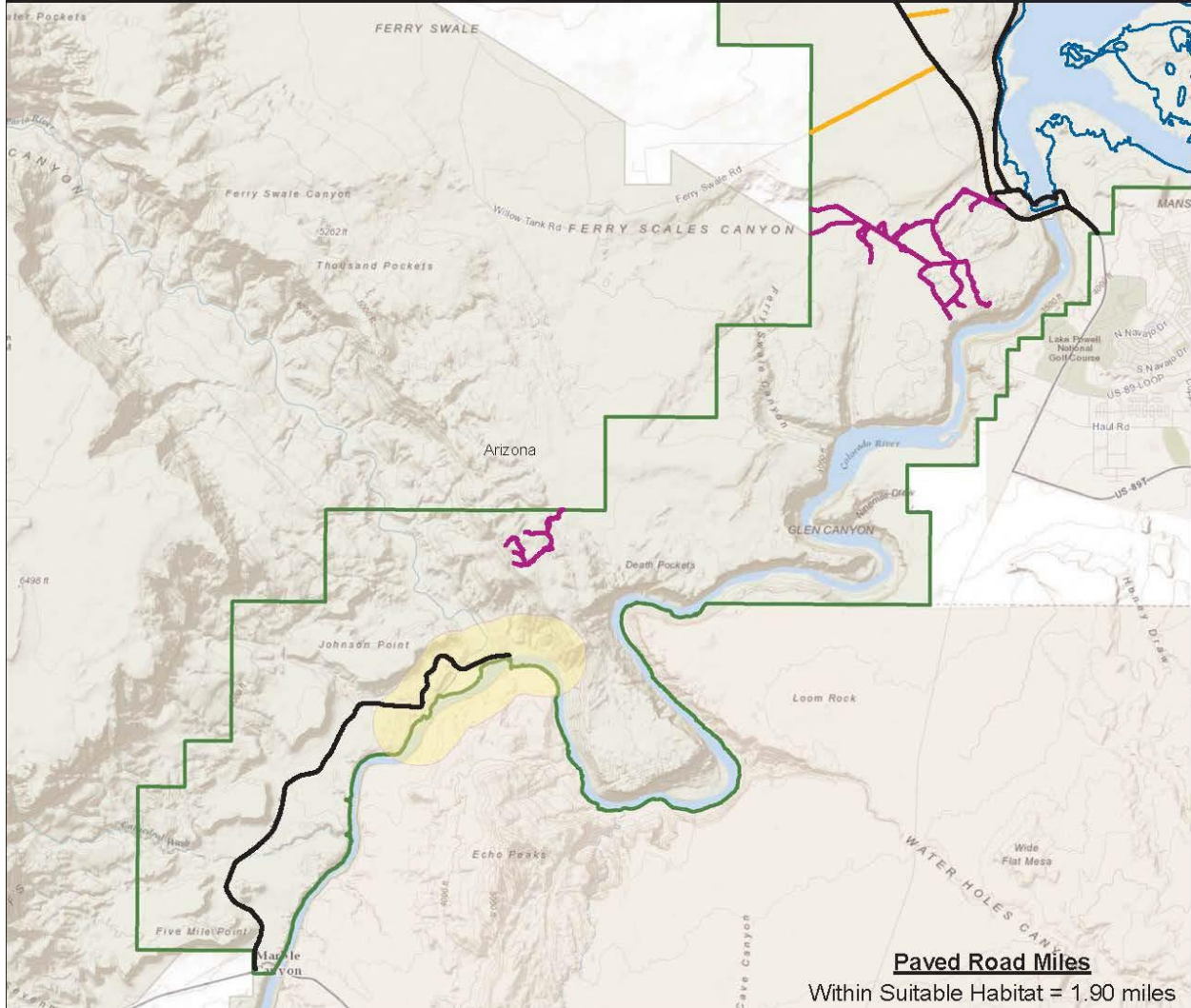
Figure 53. Southwestern Willow Flycatcher and Yellow-billed Cuckoo suitable habitat overlap with plan area roads and proposed ORV Routes in the Lees Ferry area.

Glen Canyon National Recreation Area
Arizona/Utah

National Park Service
U.S. Department of the Interior



Yellow-billed Cuckoo and Southwest Fly Catcher Suitable Habitat - Arizona



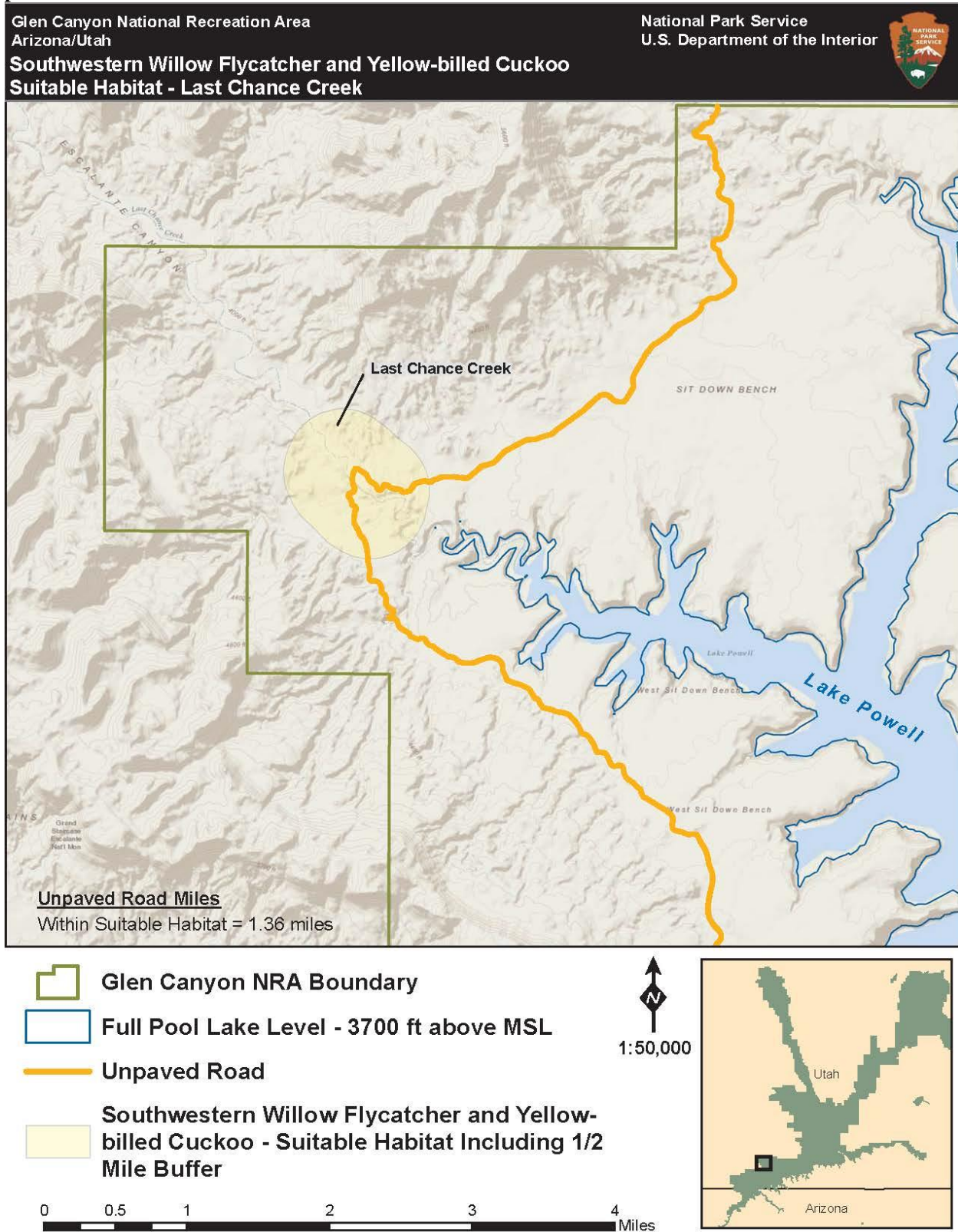
- Glen Canyon Boundary
- Full Pool Lake Level - 3700 ft above MSL
- Paved Road
- Unpaved Road
- Proposed ORV Routes
- Yellow Billed Cuckoo/Southwest Fly Catcher Suitable Habitat

0 1.5 3 6 Miles

1:95,000



Figure 54. Southwestern Willow Flycatcher and Yellow-billed Cuckoo suitable habitat overlap with plan area roads in the Last Chance Creek area.



Yellow-Billed Cuckoo (Threatened)

The yellow-billed cuckoo, federally listed by USFWS on 3 October 2014, nests in large blocks of relatively dense, multi-layered wooded, streamside riparian habitat, with varying combinations of Fremont cottonwood, willow, velvet ash (*Fraxinus velutina*), Arizona walnut (*Juglans major*), mesquite, and tamarisk. Some birds have been observed nesting in orchards adjacent to riparian habitat. Because yellow-billed cuckoo prefer nest sites with low total ground cover, moderately high canopy closure, and presence of water, there are some locations near the action area where they have the potential to occur. In Arizona, cuckoos are found nesting statewide, mostly below 6,000 feet in the central, western, and southeast part of the state (USFWS 2012b). In Utah, the species is known to breed along the Green and Colorado Rivers in northeastern and eastern portions of the state where dense riparian vegetation occurs, and nesting has occurred up to 8,500 feet. Smaller populations are found along the San Juan River in extreme western Colorado and adjacent Utah, as well as along the lower Dolores River in eastern Utah.

The yellow-billed cuckoo is presently common east of the Continental Divide, and historically, the species was widespread and locally common in Arizona and eastern Utah. Unfortunately, cuckoo populations have declined region wide due to degradation or loss of more than 90 to 95 percent of its preferred riparian habitat as a result of conversion to agriculture, dams and river flow management, bank protection, overgrazing, and competition from invasive non-native plants (USFWS 2011b).

Large declines in the distribution and abundance of the yellow-billed cuckoo have occurred as a result of pesticide use and the destruction of preferred riparian habitat (Hughes 1999). Threats to the yellow-billed cuckoo include habitat loss, overgrazing, and pesticide application. The principal causes of riparian habitat losses are conversion to agricultural and other uses, dams and river flow management, stream channelization and stabilization, and livestock grazing (74 FR 57823).

Suitable habitat includes multi-layered riparian woodland and forest, with emergent trees such as cottonwood (*Populus deltoides*) and Goodding Willow (*Salix gooddingii*). Size and width of suitable riparian patches are also critical (FR Vol. 79, No. 158, Part IV, 2014). However, cuckoos have been known to breed in smaller patches as well. Areas along the San Juan River from ca. Grand Gulch to ca. 1 mile below Clay Hills Crossing include vegetation with appropriate structure including tall emergent trees and dense shrubby understories, but widths are seldom greater than 30-50 meters. Some patches below Clay Hills Crossing on the north side of the river are large enough to be suitable, but largely consist of tamarisk with little native vegetation. However, these patches have potential as native species colonize.

In Glen Canyon, the yellow-billed cuckoo is considered a rare transient in dense riverside thickets. Yellow-billed cuckoos have not been documented as breeding in Glen Canyon, although breeding may occur upstream of Clay Hills Crossing along the San Juan River (Spence et al. 2011). Observations of cuckoos are associated with migration (early June and September) at Clay Hills Crossing. Birds have been documented upstream and rarely during the breeding season from late June to late August, with three records, all in 2006. Historically, the cuckoo has only been observed a few times in the Glen Canyon stretch below Glen Canyon Dam and near Clay Hills Crossing in dense riparian thickets. However, during migration the species can occur in a wide variety of habitats, often away from riparian zones.

Based on vegetation data and surveys conducted in the park since 1991 (Spence 2016), the following areas within the action area overlap with suitable or proposed critical habitat or are within 0.5 miles as outlined in the Utah Ecological Office's Guidelines for the Identification of Suitable Habitat for WYBCU in Utah; Clay Hills Crossing, Paiute Farms accessible shoreline (Figure 55), Last Chance Creek (Figure 55), and the Lees Ferry District (Figure 53). The proposed critical habitat designation that includes portions of Paiute Farms will be discussed under Section 9.2 below.

Suitable habitat during migration is available in the vicinity of the Clay Hills Crossing takeout for river runners (Figure 55). Upstream along the San Juan River, starting about 2 miles upstream, patches of suitable habitat exist that may also support breeding, although they are relatively small and isolated. Small dense patches of large tamarisk also occur, although without emergent trees, near the road end at the Paiute Farms accessible shoreline (Haltermann et al. 2015).

There is one record from June 1995 at Lees Ferry where the paved road ends at the boat ramp. Dense riparian thickets occur both downstream and upstream of the ramp for ca. 0.5 miles. Although generally not multilayered, there are some areas with overstory cottonwoods south of the ramp in the vicinity of the river runner camp, although no cuckoos have been reported from this area (Figure 53).

Last Chance Creek, where park road 230 crosses, includes some native riparian species, but is largely dominated by tamarisk, much of which is dying due to the tamarisk leaf beetle. The area above and below the road crossing is very marginal suitable habitat, but the use of the area during migration by cuckoos cannot be ruled out (Figure 54).

Extensive suitable habitat also occurs in Glen Canyon along the San Juan, Colorado, Green, Dirty Devil and Escalante Rivers, but with the exception of Lees Ferry, Paiute Farms and Clay Hills Crossing, these are all in more remote areas well removed from the action area accessible shorelines and roads, and are also all >0.5 miles from any portions of the action area.

Exotic plant control and management along the San Juan River has been conducted by the Navajo Nation. These activities include control of Russian olive and several herbaceous exotics, and occur in areas above Grand Gulch, and thus would have only insignificant indirect effects to migrating individuals, and may produce minor to major beneficial effects on migratory habitat in the future.

The recent introduction, spread, and effect of the tamarisk leaf beetle threatens the yellow-billed cuckoo by defoliating and killing tamarisk-associated nesting habitat (Paxton et al. 2011). The leaf beetle has expanded into the southwestern United States beyond where the beetle was expected to survive and persist. Accidental and purposeful human transportation appears to be accelerating its distribution. Tamarisk often flourishes in areas where native tree growth is affected by land/water management actions (such as river damming, flow regulation, diversion, groundwater pumping, and over grazing). Loss of tamarisk vegetation without replacement by native trees will likely impact the yellow-billed cuckoo and other riparian bird populations (Paxton et al. 2011).

Numerous climate change studies have revealed that the Southwest is warming rapidly, and this may be affecting many Neotropical migrant bird species such as the yellow-billed cuckoo. A study conducted by Anders and Post (2006) revealed the tendency of cuckoo populations to decline after warm years, suggesting that this species may be sensitive to climate change. Therefore, climate change may indirectly affect cuckoo food availability and habitat quality, resulting in population declines (Anders and Post 2006).

***Jones cycladenia* (Threatened)**

Cycladenia humilis var. *jonesii* was first collected from the Pipe Spring area in Arizona and Utah in 1882 by Andrew Siler (USFWS 1986), but was not described until 1942 by Alice Eastwood (USFWS 1986). Recent genetics work suggests that the varietal status of the species may need to be re-evaluated, as a preliminary study found that there were significant differences found in California populations but few between known populations in Nevada and the Colorado Plateau (Last 2009). The species is found in Utah and Arizona on Chinle, Cutler, and Summerville Formations (Spence 1994), with related varieties in

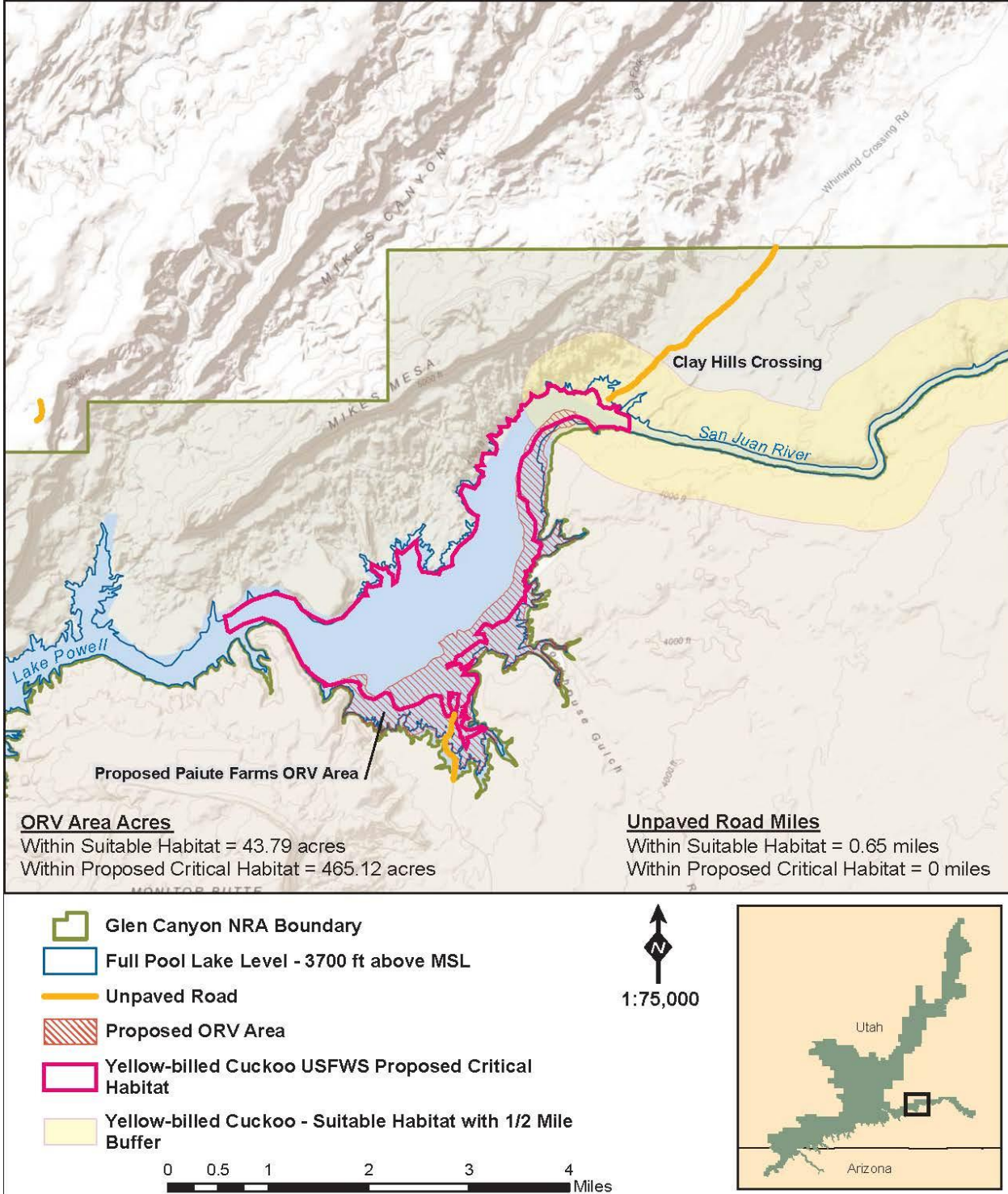
Figure 55. Yellow-billed Cuckoo proposed critical habitat overlap with plan area roads and proposed ORV Areas in the Clay Hills Crossing area.

Glen Canyon National Recreation Area, Arizona/Utah

National Park Service
U.S. Department of the Interior



Yellow-billed Cuckoo Proposed Critical and Suitable Habitat - Clay Hills Crossing and Paiute Farms



Nevada and California. There is no designated critical habitat for the species. Overlap of Chinle deposits with Ferry Swale roads and accessible shorelines is shown in Figures 56 – 58.

Cycladenia humilis var. *jonesii* is a showy, pink flowered perennial that ranges from 11 to 36 cm tall, with round somewhat thickened leaves in opposite pairs, growing on steep Chinle Formation substrates in Glen Canyon NRA (Spence 1994). It is highly rhizomatous, which seems to account for most of its persistence and spread, since sexual reproduction is quite rare (Sipes and Tepedino 1995, Spence 1994). Flowering typically occurs between April and June, followed by senescence of ramets in summer. Fruit set is very low, aborted seed numbers are high, pollinators are rarely seen, and seedlings are rare to non-existent (Sipes and Tepedino 1995, Spence 1994, Hughes 2000). Surveys at one location, the Purple Hills, near Moody Canyon between 1992 and 2013 indicate a highly significant increase in the number of ramets, particular since 2007 ($r^2=0.78$; Spence and Palmquist 2014).

All known populations in the park except one are on extremely steep Chinle slopes, typically at angles >35 degrees, in remote areas well removed from park roads, typically >1/2 mile and at 500-1000 feet higher in elevation. The one exception is a population in Middle Moody Canyon, ca. 2 miles down canyon from the end of NPS Route 332. This population occurs on less steep slopes and flat areas near the bottom of the wash near a hiking trail. This population represents <1% of the total estimated ramets among all GLCA populations. It is possible for illegal off-road activity in this canyon to affect portions of this population.

Accessible shorelines with Chinle outcrops include Copper Canyon, Paiute Farms and Blue Notch. Informal surveys have been conducted at Blue Notch, but not the other two shorelines. As part of the proposed action additional surveys will be conducted at all suitable shorelines in the spring of 2016 using recommended protocols for rare plants developed by the USFWS. If populations are found they will be excluded from the action area by the use of barriers (see proposed conservation measures).

Brady's pincushion cactus (Endangered)

Pediocactus bradyi was listed as endangered under the ESA in 1979 (44 FR 61784; USFWS 1985), due to illegal collecting and its extremely small geographic distribution in northern Arizona. The species is an extreme habitat specialist, requiring white gravel/cobble surfaces overlying swelling clays. Currently, all known occurrences are associated with the Kaibab Limestone Formation and the underlying Moenkopi Formation (Haskins 2015). Critical habitat has not been designated for the species.

The species is a small single-stemmed cactus with diameters reaching ca. 60 mm in large individuals, and has large pale cream flowers that open in early to late March. The species, like other members of the genus, has contractile roots that partially or completely pull the plant underground as the soils dry out. The underlying clays, when wet, start to swell and push the plants back aboveground in winter (Spence 1993).

In Glen Canyon, *P. bradyi* has been found only in the Lees Ferry area, in a polygon ca. 2 x 3 km south of the Paria River, and between the canyon rims and the paved Lees Ferry access road. This area includes ca. 600-700 hectares of suitable habitat. All of this habitat was surveyed by trained botanists, primarily in 2013-2015, away from known occurrences and long-term monitoring plots. In all ca. 600 plants were located, but there are likely more as the species is extremely difficult to detect, especially when not in flower. A few plants occur within ca. 100 meters of the paved road on the east side.

Figure 56. Chinle Formation Outcrops Associated with the Ferry Swale Area Roads.

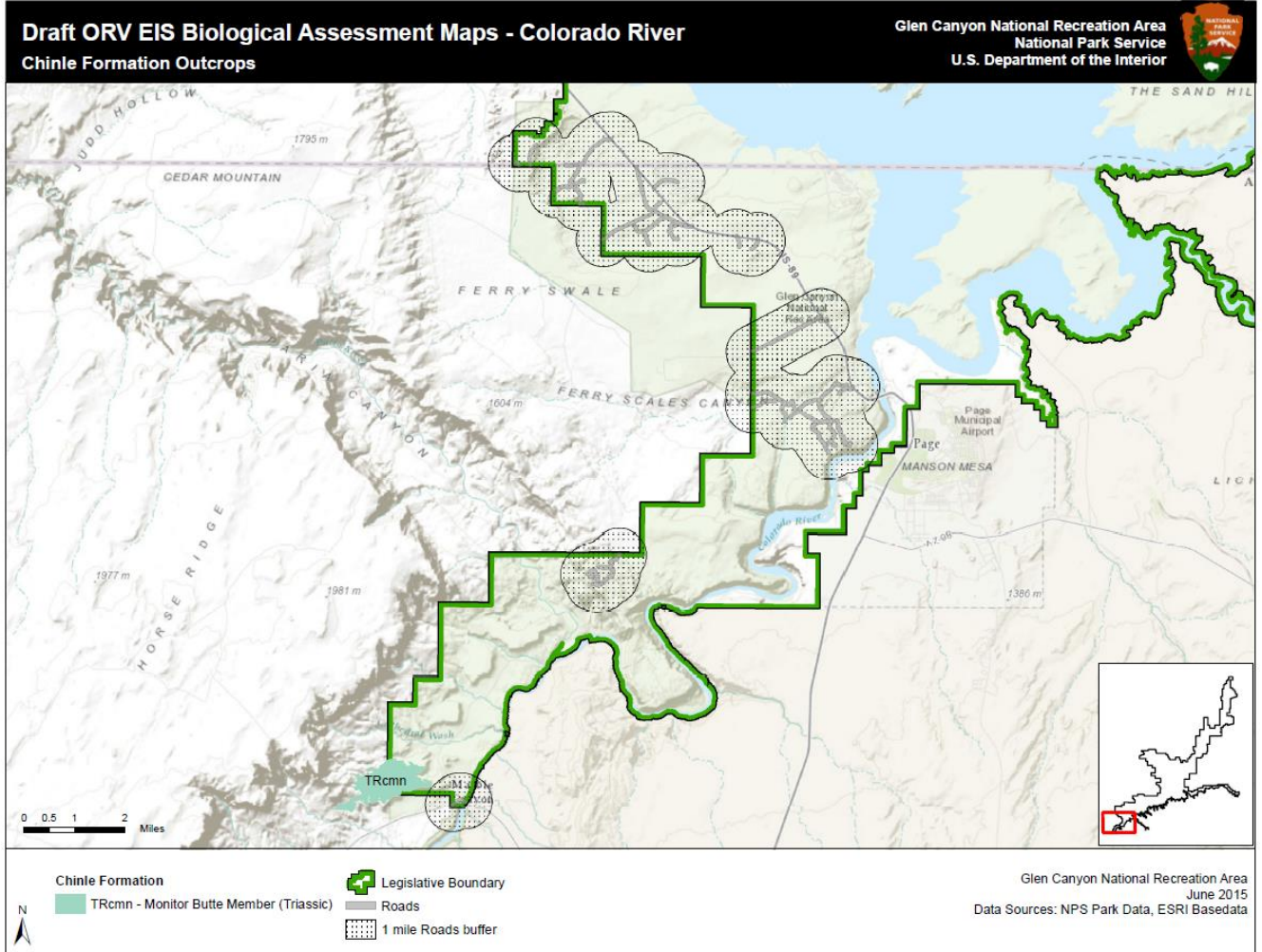


Figure 57. Chinle Formation Outcrops Associated with Accessible Shorelines in Upper Lake Powell.
Shorelines include Dirty Devil, White Canyon, Farley, Blue Notch, and Red Canyon.

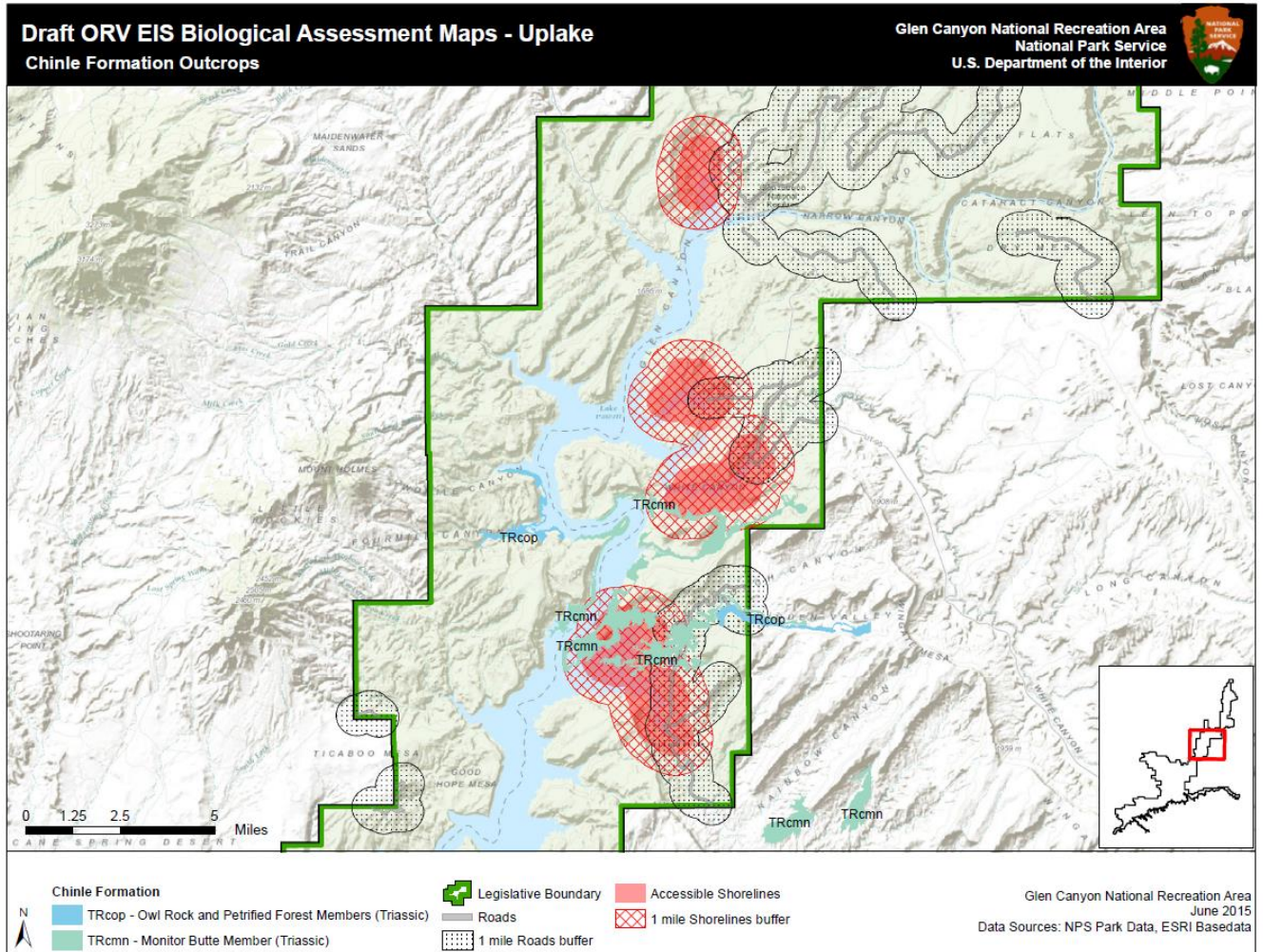
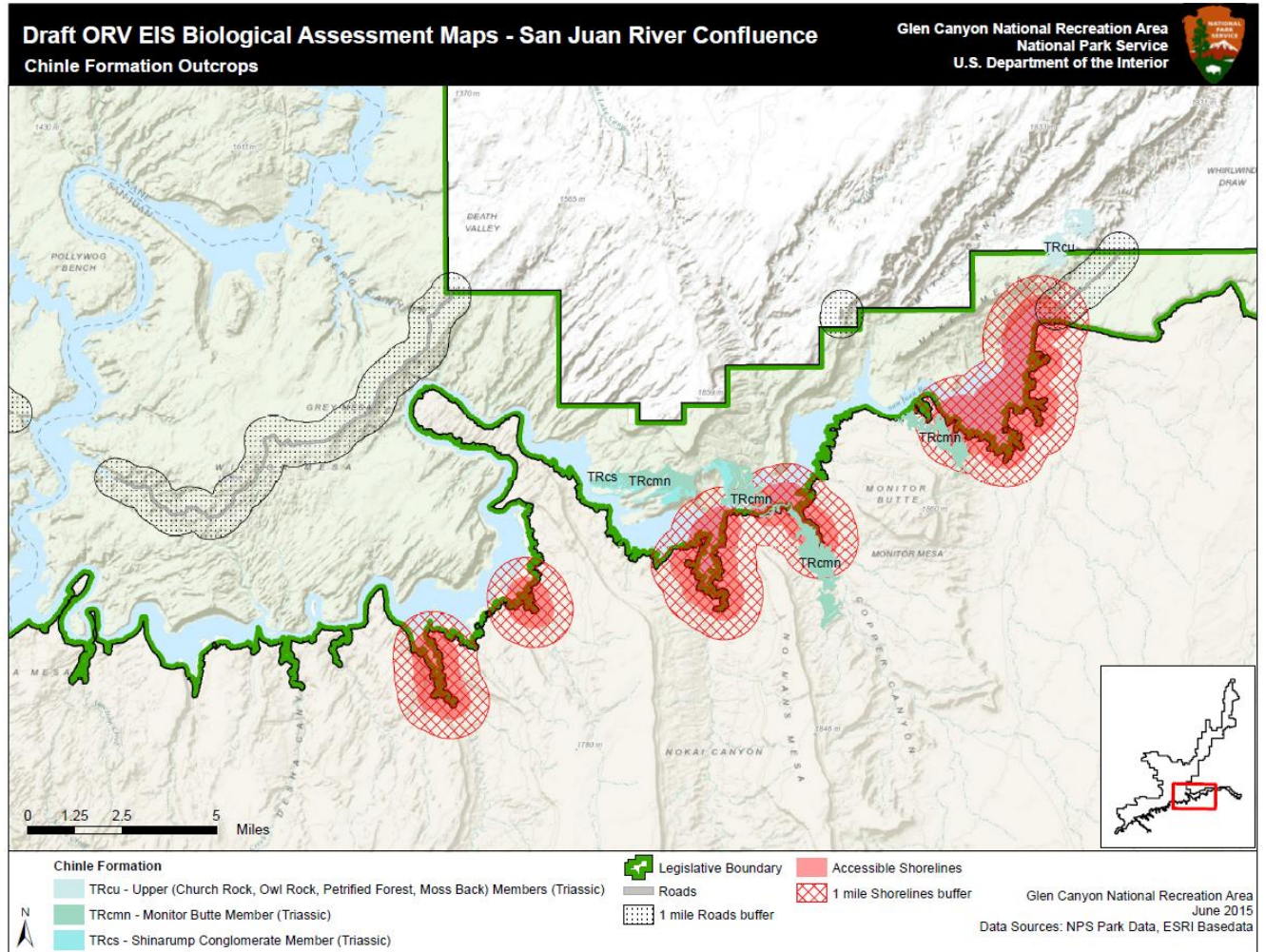


Figure 58. Chinle Formation Outcrops Associated with Accessible Shorelines in Upper San Juan Arm of Lake Powell. Shorelines include Neskahi, Nokai Dome, Paiute Canyon, Copper Canyon and Paiute Farms.



A working group composed of NPS, USGS, BLM, Navajo Nation and Flagstaff Arboretum botanists has been formed, initiated with ESA Section 6 funding, to complete surveys and to study the genetics and ecology of the species. Using a random stratified sampling approach with points throughout the potential suitable habitat and geographic range of the species, the species' overall status and distribution will be determined. This work will be completed in 2016.

Siler's pincushion cactus (Threatened)

Pediocactus sileri was originally listed as endangered under the ESA in 1979, but subsequent surveys revealed many additional populations and its status was downgraded to threatened in 1993 (USFWS 1993). It is a medium-sized species reaching 10 cm in height and 7-8 cm wide, with flowers that are yellowish with purple veins. The principal flowering time is March through April. The species occurs on gypsiferous badlands derived from the Red Member of the Moenkopi, primarily in northwestern Coconino County and adjacent Washington and western Kane Counties in Utah. Elevations range from ca. 900-1700 meters. The species has not been found in GLCA, but since there are a few records on both Chinle and Kaibab Formations which do outcrop in the park, there is a slight possibility that it might be found with additional surveys, likely at some of the accessible shorelines where Chinle deposits occur. Recent work within the range has shown major mortality in the past few years for this species (FERC Lake Powell Pipeline Project Draft Preliminary Licensing Proposal, 2015). There is no designated critical habitat for the species.

8.0 Environmental Baseline

As defined under the ESA, the environmental baseline includes past and present impacts of all federal, state, and private actions in the action area; the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation; and the impact of state and private actions which are contemporaneous with the section 7 consultation process. Future actions and their potential effects are not included in the environmental baseline. This section in combination with the previous section defines the current status of the species and its habitat in the action area and provides a platform to assess the effects of the proposed action under consultation with the USFWS.

Profound changes to the ecosystems conditions have occurred within the action area over the past 150 years that can be attributed to both direct and indirect human impacts. Much of these occurred prior to the establishment of the Glen Canyon in 1972 or the withdrawal of much of the action area for reclamation purposes in 1953. Prior to establishment of Glen Canyon, timber harvest and road construction from mining and other settlement activities as well as intensive livestock grazing affected most of this area. Native Americans had much less intensive and extensive impacts on the landscape. Although their influences on fire and game populations may have been ecologically significant, the magnitudes of these impacts were less than the changes wrought during the Euro-American settlement period.

Much of the area was only sparsely settled by Euro-Americans until the latter decades of the 19th century, when the Church of Jesus Christ of Latter Day Saints began a focused settlement of much of Southern Utah and Northern Arizona. Typical of these settlement efforts was the construction of the Hole-in-the-Rock Road from the community of Escalante, UT in order to cross the Colorado River and found the community of Bluff, UT (DOI-BLM-UT-0300-0008-EA 2011). The Lonely Dell Ranch and nearby Lees Ferry Crossing are typical of early pioneer settlement activities that took place within the Glen Canyon area.

Lands within Glen Canyon were first used for livestock grazing 100 years prior to the establishment of the recreation area (NPS 2015). Since then, grazing has had an adverse effect on vegetation by changing

plant community composition and structure in upland areas and increasing the presence of nonnative and exotic vegetation. Grazing has had an adverse effect on vegetation by changing plant community composition and structure in upland areas (Bich, et. al. 1995) and increasing the presence of nonnative and exotic vegetation. Research has shown that livestock grazing can promote the spread and dominance of certain invasive exotic species, such as cheatgrass (*Bromus tectorum*), red brome (*Bromus rubens*), halogeton (*Halogeton glomeratus*), and Russian thistle (*Salsola pestifer*). In addition, past and current grazing activities have likely impacted riparian areas within the districts by increasing erosion, reducing native vegetation, and reducing water quality. Previous studies have indicated that grazing significantly reduces the shrub, cryptogammic, and herbaceous cover on sites; and in arid regions, recovery after grazing can take many years (Jefferies and Klopatek 1987).

Mineral resources within Glen Canyon include oil-impregnated rock, oil and gas, coal, uranium, vanadium, copper, manganese, gold, construction materials, halite and gypsum. Mining activities over the past two centuries have had location-specific impacts at prospect locations and several larger uranium mine ventures such as the Jomac, El Pequito and Whirlwind mines, but the largest impact associated with mining has been the bulldozing of over 100 miles of roads during exploration activities in the period of 1940-60. Many of these roads have been reutilized for recreational and grazing access in more modern times, and a substantial quantity have revegetated as part of natural succession patterns.

By far the largest impact on the area was the damming of the Colorado River and the creation of Lake Powell, which began to fill in 1963 and reached full pool in 1980, impounding 25,000,000 acre-feet of water, flooding 163,000 acres of canyons and backcountry, and altering the historic flooding pattern along the main stem of the Colorado River. All four federally listed fish species were eliminated from resulting Lake Powell either by direct impacts or from predation by introduced non-native fish such as striped bass. Riparian woodlands along the original river channel and the associated glens and pools in side canyons were eliminated, removing breeding, feeding, roosting and other habitats important for federally listed birds, especially the southwestern willow flycatcher, which was abundant in Glen Canyon prior to the reservoir. The rising and falling water levels as a result of natural fluctuations and dam operations have exposed more or less of the accessible shoreline areas, negatively impacting vegetation. Due to fluctuating lake levels, native vegetative communities are not able to establish along the shoreline, limiting shoreline vegetation. The fluctuating water levels along the shoreline create suitable conditions for exotic species to thrive, increasing the nonnative vegetation cover along the shoreline and displacing native vegetation (NPS 2015).

Hydroelectric power facilities were constructed concurrently with the Glen Canyon Dam as well a number of transmission stations and power lines that transmit electricity to and from the area. The enabling legislation for Glen Canyon provides for a utility corridor in which rights-of-way were established. Disturbance of soils, vegetation and wildlife has primarily been limited to the construction sites, but roads associated with the operation and maintenance of these utility lines provided additional access to the surrounding areas, with the corresponding direct and indirect impacts to a larger footprint than the original construction.

Recreational development in Glen Canyon began in force soon after the creation of Lake Powell in 1963 and has included the construction of multiple marinas, lodging, boat ramps, parking areas, campgrounds, access roads, housing and visitor facilities (NPS 1979). Other activities that have resulted in impacts on the natural environment include motor vehicle use, hiking, boating, commercial filming and photography, and routine park operations. These activities and their effects to species and their habitats are particularly relevant and important in Glen Canyon where increased human developments such as the Wahweap and Bullfrog Marinas, Burr Trail and Warm Creek Roads and Lees Ferry Boat Ramp have all impacted each of these species directly and indirectly, both in the short and long-term.

The spread of tamarisk leaf beetles (*Diorhabda* spp.; to control tamarisk *Tamarix* spp.) in Glen Canyon has resulted in beneficial impacts on native vegetation. The tamarisk leaf beetle was released as a biological control agent in certain areas of the West in 2001 to help manage tamarisk, which is a highly invasive plant that grows along the Colorado River and in riparian habitats throughout the Southwest (NPS n.d.d). Although the beetle was not released in Glen Canyon, it has arrived and thrives at various locations throughout Glen Canyon since ca. 2010. Tamarisk is known to displace native trees such as cottonwoods and willows, can reduce habitat quality for native animals, increase soil salinity, and increase the risk of fire; therefore, continued defoliation of tamarisk would result in long-term beneficial impacts on vegetation (NPS n.d.d). However, there are concerns in managing tamarisk: defoliation may lead to site conditions that favor the establishment of other invasive nonnative plants and an increased short-term fire hazard may result if the majority of tamarisk is killed in an area and dense stands of dead stems remain (Harms and Hiebert 2009). Therefore, although beneficial impacts would result over the long term, localized short-term adverse impacts on vegetation are likely to result from the removal of tamarisk.

Off-road use can have an adverse impact on ambient air quality through its destabilizing effects on soils and through mobile source emissions. Additionally, impacts of fugitive dust due to off-road activity can be problematic. In considering whether to analyze the impacts of the proposed action on air quality in detail, NPS relied on current and predicted use numbers for Glen Canyon, creating models using the American Meteorological Society / U.S. Environmental Protection Agency Regulatory Model (AERMOD) which contains results based on five years of meteorological data collected at Page, AZ for 2005–2009. The analysis demonstrated that current off-road driving by conventional vehicles and OHVs had minimal impact on air quality and would not result in emission levels that would be harmful to the environment. Dust can also be a concern related to off-road driving of conventional and non-conventional motor vehicles. One cactus species (*Pediocactus bradyi*) found in Glen Canyon is especially susceptible to dust. However, according to a recent survey, this species does not exist within any of the areas in which OHV use currently occurs or is being contemplated. Based on AERMOD dispersion modeling, the air quality analysis concluded that additional OHV use would not cause or contribute to any exceedances of the particulate matter National Ambient Air Quality Standards. Further, since off-road use under this plan/EIS would be primarily for reaching shoreline destinations and then parking, dust is anticipated to be minimal.

The two potential impacts on water resources from current off-road use are disturbance and pollution. Disturbance occurs as off-road use breaks down stream banks, compacts soils, and damages riparian vegetation, all of which can lead to erosion and siltation; however, no off-road use is occurring in riparian areas of Glen Canyon. Pollution may occur if motorized vehicles leak or otherwise discharge oil or gasoline, or if increased public use due to off-road access leads to problems with human waste management.

Due to the ephemeral nature of the streams in off-road use areas and the overall arid climate, disturbance and the resulting erosion has not been an identified problem at Glen Canyon. Localized events may lead to increased turbidity of lake waters, which can cause decreased sunlight penetration, temperature variations, and the introduction of sediment; however, these impacts would be short term and localized, and would not cause a threat to water quality.

Each of these activities have directly affected the species addressed in this assessment directly and indirectly by habitat alteration such as removal and degradation of nesting/denning, foraging, and sheltering habitats, negatively affecting movement corridors, increased fragmentation, increased noise and other human disturbances which has displaced animals causing increased stress, mortality, and negatively affected reproduction. Thus, the distribution and abundance of populations has been negatively affected within the action area both in and outside Glen Canyon.

8.1 Previous Consultations with the USFWS Within the Action Area

Table 5. Relevant past consultations with the USFWS and determinations for actions within the action area for all federally listed and proposed species.

¹ESA determinations: **NE** = No effect, **NLAA** = May affect, not likely to adversely affect, and **LAA** = May affect, likely to adversely affect.

Project	Park Unit	Type of Project	Species Addressed	Determination ¹	Date
<i>Personal Watercraft Rulemaking</i>	<i>Glen Canyon</i>	<i>Recreation</i>	<i>Humpback Chub, Bonytail Chub, Colorado Pikeminnow, Razorback Sucker, Bald Eagle, American Peregrine Falcon, Southwestern Willow Flycatcher, Western Yellow-Billed Cuckoo</i>	<i>NLAA</i>	<i>2002</i>
<i>Uplake Development Concept Plan</i>	<i>Glen Canyon</i>	<i>Facility Planning</i>	<i>Humpback Chub, Bonytail Chub, Colorado Pikeminnow, Razorback Sucker, Bald Eagle, California Condor, Mexican Spotted Owl, Southwestern Willow Flycatcher</i>	<i>NLAA NE</i>	<i>2006</i>
<i>Rim Trail Project</i>	<i>Glen Canyon</i>	<i>Trail Plan</i>	<i>California Condor, Mexican Spotted Owl; Brady Pincushion Cactus</i>	<i>NLAA</i>	<i>2009</i>

8.2 Past and Current Activities within the Action Area

As described previously in Sections 4.0 and 8.0, human use of the action area has occurred in the past and continues to impact the area.

The Bureau of Reclamation manages the operations of Glen Canyon Dam and the resulting storage of water in Lake Powell. Water levels in Lake Powell will continue to fluctuate on average of 25 vertical feet but as much as 60 feet annually within a lake level range of 3,490 and 3,720 feet above mean sea level. Within this vertical range shorelines along Lake Powell can migrate up to a half-mile between a high lake level after spring run-off and lower levels during late winter. Resulting impacts on shoreline vegetation and soils will continue to effect species utilizing these habitats.

The operation of hydroelectric power facilities at the Glen Canyon Dam continues through the present and has impacts that are similar to the operation of Lake Powell as a flood storage reservoir. Roads associated with the operation and maintenance of these utility lines continue to provide access to the surrounding areas within the utility corridor that crosses the Ferry Swale area with the corresponding direct and indirect impacts to a larger footprint than the original construction of the transmission lines.

Grazing within Glen Canyon is administered by the Bureau of Land Management (BLM). Grazing has continued and is permissible under Glen Canyon's enabling legislation. The BLM and NPS work together to administer grazing leases and protect the values and purposes of the recreation area. Currently, four BLM districts administer the 34 grazing allotments including Grand Staircase Escalante National Monument, Hanksville Field Station, Monticello Field Office, and Arizona Strip Field Office. Glen Canyon includes all or part of 34 grazing allotments encompassing approximately 882,678 acres. However, no livestock grazing is authorized in five of these allotments (approximately 120,317 acres). Four areas (Antelope Island, Horseshoe South, Robber's Roost and the Escalante River) covering approximately 71,705 acres are no longer grazed by livestock due to retirement of the grazing privileges

through a willing seller/buyer arrangement. In addition, approximately 139,522 acres park-wide within Glen Canyon are not within designated grazing allotments (NPS 2015).

Current grazing operations would contribute ongoing, incremental adverse impacts to vegetation associated with livestock grazing. NPS management of grazing would also result in beneficial effects to vegetation by providing additional management tools such as modifications to season of use, stipulating maximum forage utilization for different seasons and plant communities, by identifying desired conditions for plant communities, and protecting special status species and important or sensitive communities (NPS 2015).

Human-caused sounds, including watercraft, off-road vehicles, and aircraft overflights (air tours, general aircraft, military operations, and high altitude commercial jet aircraft) are present at Glen Canyon. Past acoustic monitoring has shown that sound characteristics and noise levels vary greatly at Glen Canyon depending on location and time of year (Ambrose and Florian, 2013). Although higher noise levels occur consistently in developed areas (e.g. marinas) and near the lake during the summertime, the large and remote backcountry of the park reflects very low ambient sound levels, in some cases levels below the ability for monitoring tools to detect. The majority of air tours at Glen Canyon occur above or adjacent to Lake Powell, Rainbow Bridge, and Horseshoe Bend on the Colorado River below the Glen Canyon Dam, with only a small portion occurring in or near the action area.

Mining activities described earlier in this section have largely ceased. There are 99 listed mine features in the abandoned mine lands database within Glen Canyon and no mines are currently active. The enabling legislation designated the BLM for the administration of any future mining leases, and the only potential leasing opportunities are for 85,000 acres of tar sands within Glen Canyon that form part of the Tar Sands Triangle of southern Utah that was mapped in the early 1960s.

Recreational activities including boating, auto touring, backpacking, horseback riding, rafting, ORV use, fishing, hunting and hiking have grown since the opening of the area to recreation in the early part of the century. Over two million visitors visit Glen Canyon annually. Most large developments of visitor facilities have already occurred and the majority of current park operations consist of the replacement of older facilities and the maintenance of current facilities.

Similar to tamarisk, at the GSENM District, Russian olive (*Elaeagnus angustifolia*) was brought into the area as erosion control after the Dust Bowl in the 1930s. Since then, the species has spread, replacing native vegetation in the towns of Escalante and Boulder, and along the Escalante River. In general, Russian olive causes river channelization and is shading the river corridor, cooling the water temperature. Since 2000, volunteers have been working on Russian olive removal and restoration of the Escalante River watershed (Escalante River Watershed Partnership 2011; Spence and Whitham 2015). Although short-term adverse impacts are likely to result from removal efforts (i.e., reduction in vegetative cover), beneficial impacts have resulted and would continue for vegetation from the removal of Russian olive along the Escalante River as native vegetation may return.

In addition to controlling tamarisk and Russian olive, the NPS has been controlling Ravenna grass (*Saccarum ravennae*) along the Colorado River corridor and around Lake Powell. Ravenna grass was initially planted as an ornamental at Lees Ferry in the late 1970's. The grass germinates in a wide variety of soil and canopy cover conditions and is a threat to riparian habitats (Stevens n.d.). The past, ongoing, and future control of this species will have a beneficial impact on riparian and spring vegetation in the district as it is an aggressive invasive species that out-competes all other plants.

Each of these activities have directly affected and will continue to affect the species addressed in this assessment directly and indirectly by habitat alteration such as removal and degradation of

nesting/denning, foraging, and sheltering habitats, negatively affecting movement corridors, increased fragmentation, increased noise and other human disturbances which has displaced animals causing increased stress, mortality, and negatively affected reproduction. The scope of these effects varies widely within the action area as described in the following sections.

9.0 Effects to Evaluated Species / Critical Habit And Determinations

Throughout the following sections on evaluated species the terms insignificant and discountable are used, and are defined as:

- Insignificant effects: “relate to the size of the impact and should never reach the scale where *take* occurs. Based on best judgment, a person would not (1) be able to meaningfully measure, detect or evaluate insignificant effects”;
- Discountable effects: “are those *extremely unlikely* to occur. Based on best judgment a person would not (2) expect discountable effects to occur”.

Within the action area, the acres of disturbance are considered to be those along the GMP road and ORV route corridors and within the allowed or proposed ORV areas. The total acres of existing disturbance is calculated as 7,640 acres, distributed across the 1,254,306 acres of Glen Canyon as follows:

- 75 miles of paved roads with an estimated corridor of 66’ (0.0125 miles) or 600 acres
- 313 miles of unpaved roads with an estimated corridor of 24’ (0.0045 miles) or 910 acres
- 15 accessible shoreline ORV areas of varying size with a total of 5,950 acres, and
- Lone Rock Play Area ORV area of 180 acres.

No new previously undisturbed lands will be impacted by this plan, and one accessible shoreline, Warm Creek, will be closed (50 acres).

9.1 Federally Listed Species

California Condor

Direct and Indirect Effects

The back country unpaved road network in the park existed prior to its creation in 1972. At this time California condor had not been documented from Arizona or Utah for >40 years, and had not been re-introduced. Thus effects of unpaved road use were not analyzed. Individual condors or small groups of juveniles can occasionally be seen soaring over Glen Canyon. Since condors are curious birds they are often attracted to human activities. There is potential for individuals to fly over and land in or near the action area, or to visit and roost on surrounding cliffs and rims, although roosting and other ground-based activities are highly unlikely around humans and their vehicles due to training protocols to reduce approaching humans by the released animals. In rare cases, condors may be directly affected (flushing, increased stress levels) by interaction with vehicles and recreationists on action area roads or shorelines.

There is only one record of attempted breeding in Glen Canyon. In 2012, condors 273M and 302F established the first nest in Glen Canyon near Colorado River Mile -5.0R on the west side of the canyon in an area called the Death Pockets. The nest failed, likely due to a lack of appropriate nesting structure such as caves which do not occur in Navajo Sandstone. This site is more than 2 miles from any action

area boundaries. There have been no subsequent nest attempts in Glen Canyon. Birds are likely to occasionally forage throughout the Wahweap-Colorado River area, and cliffs along the Colorado River may provide suitable roosting habitat. These cliffs are more than 1 mile from the closest part of the action area near Ferry Swale.

Collisions between birds and conventional motor vehicles, OHVs, and street-legal ATVs cannot be entirely ruled out, but would be considered discountable. There are no documented records of vehicle-condor collisions in the park since re-introduction efforts started in 1996. Noise-induced stress and flushing from carcasses and roosts may occur, but would be considered insignificant due to condors rarely using the action area. Implementing reduced speed limits of 15 mph at Lone Rock and accessible shorelines, and 25 mph on most park roads and at Ferry Swale would help further reduce and minimize negative impacts of off-road use by reducing the level of noise and impacts related to vehicle travel at higher speeds. The closure of 38 miles of ORV routes in the Ferry Swale area will have additional beneficial effects as this will decrease the potential for collision of vehicles with condors and reduce the level of noises and associated impacts. Interaction with and disturbance from the public would continue to occur regardless of implementing the proposed action. Generally, park rangers and resource staff will communicate with staff from the Peregrine Fund and Arizona Game & Fish Department to prevent or stop these interactions.

Modeling results (see EIS Ch. 4 Sound Analysis) using anticipated increases in vehicle numbers in the action area indicate in general relatively minor increases in sound levels beyond ambient background (20 dBA) for the action area. For GMP roads and accessible shorelines typical modeled levels range from 20-35 dBA at ca. 800' feet from roads and shorelines. These levels are unlikely to have more than very minor and localized effects on condors, including potential increases in physiological stress, and flushing birds from carcasses or roost sites. At 0.5 miles no road or shoreline modeled values rise above the level of background natural ambient conditions. Thus these slight increases in ambient noise levels are considered insignificant. Condors are extremely rare in the action area, with the only recent activity occurring downstream of the Lees Ferry area at and downstream of the Highway 89A Bridge. No suitable nesting habitat occurs within 0.5 miles of the action area or in the general vicinity of Lees Ferry. Although part of the overall action area, this area is closed to ORV activity and related Plan activities due to the presence of *Pediocactus bradyi* in the vicinity. Thus impacts to condors as a result of the Plan are considered discountable.

Cumulative Effects

Cumulative effects are defined somewhat differently under ESA and NEPA. Under ESA, cumulative effects are reasonably foreseeable future state, private and tribal activities only. For ESA cumulative effects, we do not consider the effects of future federal actions. ESA cumulative effects are additive to the environmental baseline (past and ongoing actions and their effects) we described above in that section of the BA. Conversely, under NEPA, cumulative effects include all past and ongoing actions and their effects that are additive to the effects from all reasonably foreseeable future actions (federal and non-federal) as well. For ESA consultation purposes in this BA, we are use the ESA definition of cumulative effects.

A summary of non-federal (private, state, or tribal only) activities that are reasonably likely to occur within the action area and that directly and indirectly affect species/critical habitat are addressed in this section by species. These are added to the environmental baseline (discussed above).

Future activities that may affect California condors include river recreation, aircraft overflights, and actions on adjacent Navajo Indian Reservation lands. These future non-federal activities occur on a regular basis, and will continue to occur regardless of whether the proposed plan is implemented. The

most likely impacts are from people-condor interactions, recreational activities that may disturb roosting birds, or aircraft flights that may force condors to take evasive maneuvers. Recreation is increasing in the area, and will likely continue to increase, leading to greater numbers of visitors and increased aircraft and boat activities.

The canyon rims along the action area are less than ten miles from Page Municipal Airport, which has daily flights by commuter companies, as well as commercial air tours during the spring through fall seasons, and year-round private plane use. Planes fly over the rims in the area on a daily basis. The Federal Aviation Administration (FAA) policy directs pilots operating noise producing aircraft (fixed-wing, rotary-wing and hot air balloons) over noise-sensitive areas to make every effort to fly not less than 2,000 feet above ground level, weather permitting, to reduce potential interference with wildlife and complaints of noise disturbances caused by low flying aircraft over noise-sensitive areas (FAA 2004). The noise level of most of these aircraft is higher than any noise that will be generated by project implementation activities (e.g., motor vehicle use). In addition, air tours occasionally occur along the rims of Glen Canyon below the dam, including in areas near attempted nesting by California condors. The NPS is currently working with FAA and the air tour operators to alter tour routes in the canyon corridor to reduce or eliminate impacts to raptors and condors. Other projects and planning actions by for utility access by the Arizona Department of Transportation (DOT, Coconino County) may occur.

To the south of Ferry Swale and along the accessible shoreline areas south of the San Juan River and Arm is the boundary of the Navajo Indian Reservation. The local landowners live fairly close to this boundary, and in the future may attempt to develop their lands along the river or canyon rims. However, to date no development has occurred or been proposed.

Interrelated and Interdependent Actions and Their Effects

Interrelated activities are part of the proposed action that depends on the action for their justification, and interdependent activities have no independent utility apart from the action. There are no interrelated or interdependent actions associated with this project; therefore, there are no anticipated adverse effects to this species.

Incidental Take

There will be no incidental take of this federally listed species under this proposed action.

Effect Determination

For California condor, the NPS determination is *may affect, not likely to adversely affect*. This determination is due to the rarity of the species in the action area, and the extremely unlikely and discountable possibility of a condor-vehicle collision and minimal increases in noise levels. Also, stress-related effects from noise and vehicle activity would be considered discountable and insignificant due to general avoidance by birds of areas where humans occur. Project implementation activities will be relatively short term, involve relatively few workers, and will produce relatively little noise and dust. The Applicant Committed Conservation Measures (Section 3.3) for California condor are part of the proposed action and will be implemented to mitigate any potential effects and to support the determination. These include among others appropriate contacts in case condors are detected in the action area, reduced speed limits, monitoring of condor activities, additional protection measures including temporary closures, and providing information to recreationists on the species status and behavior. These conservation measures, along with potential impacts and determination effects are summarized in Table 6.

Table 6. Summary of potential effects to California condor, proposed Applicant Committed conservation measures, and effect determinations.

Potential Effects	Conservation Measures	Effect Determination
Attracted to workers and project activities	Human-avoidance training prior to release; educational materials for visitors; project work done in non-breeding season	Insignificant and Discountable
Vehicle collisions	Reduced speed limits on unpaved roads and accessible shorelines	Insignificant and Discountable
Flushing and other adverse behavioral effects noise	Reduced speed limits; insignificant increases in noise levels based on modeling results; project work done in non-breeding season	Insignificant and Discountable
Interference with nesting and breeding	There is no nesting habitat within 1 mile of the action area. Temporary closures within 1 mile of nests if they are identified in the future; further coordination with USFWS; any project work done in non-breeding season	Insignificant and Discountable
Closures	Closures of Warm Creek shoreline, closure and restoration of some sections of unpaved roads in Ferry Swale will reduce noise and vehicle impacts	Beneficial

Mexican Spotted Owl

Direct and Indirect Effects

Mexican spotted owl was not listed when Glen Canyon was established, thus the effects of keeping these unpaved roads open were not analyzed. Analysis of current Mexican spotted owl data shows that existing park roads and several proposed ORV areas and routes within the action area overlap with both suitable and designated critical owl habitat (Figures 40 - 51). Table 7 lists the geographic correlation of the applicable project components with designated critical habitat and records of owl occurrence. NPS has assessed the presence and intensity of current and proposed vehicle use on and off park roads in the Glen Canyon Off-road Vehicle Management Plan / Draft Environmental Impact Statement (NPS 2016). The assessment factored in the distance, frequency, duration, and source of the disturbance from these recreational activities, and the preferred alternative limits human activities during the breeding season in areas occupied by owls.

Potential effects include vehicle-bird collisions, flushing or altered foraging and roosting behaviors from noise and human activities, and potential effects to breeding near nest sites. Since owls are active at night, some effects are likely to be reduced compared with diurnal species. Migration and dispersal patterns are unlikely to be effected by the proposed plan actions, as these behaviors occur at night, and strict noise limits are enforced between 10 PM and 6 AM year-round throughout the park. Vehicle and noise effects may affect individuals at roost sites or around nests during daylight hours. Visitation within the project area is most common during the period May-September, thus some overlap occurs with owl breeding activities. In most instances, likely disturbances have been avoided or reduced by siting ORV areas, routing ORV routes and designating park roads for street-legal ATV and/or OHV use outside designated critical and suitable habitat to the extent possible. In addition, low posted speed limits on most unpaved roads and at accessible shorelines will greatly reduce any potential collisions with vehicles. There are no reported instances of owl-vehicle collisions in the park.

Two proposed ORV areas, Blue Notch and Red Canyon, are located along the shoreline at the terminus of these canyons with the Lake Powell shoreline in Good Hope Bay (Figure 48). These areas include some suitable habitat within the area and nearby. An historic occurrence of an owl has been noted on the

northeastern edge of Mancos Mesa, which is ca. 1,000 ft. higher and greater than one mile from these proposed ORV areas. Because of the rough conditions of the adjacent access roads, the ruggedness of the surrounding terrain, and the long distances from paved roads, these proposed ORV areas are currently rarely used by visitors with conventional motor vehicles based on patrol data. Allowing the use of these areas by street-legal ATVs under the preferred alternative is not anticipated to substantially increase the use of these areas. Impacts on individual owls might be detectable, but would be considered minor and would be limited to potential noise-related impacts such as flushing of roosting birds within the designated shoreline.

Two proposed ORV areas, Farley Canyon and White Canyon, are located along the shoreline at the terminus of these canyons with the Lake Powell shoreline. Suitable owl habitat exists directly to the south of White Canyon (Figure 49). An historic occurrence of an owl has been noted on the flats near Farley Canyon to the northwest of the intersection of State Highway 95 and unpaved NPS Route 630, an unlikely location for other than a dispersing owl. NPS Route 630 and the Farley Canyon ORV area are currently utilized intermittently by visitors with conventional motor vehicles. The historic owl occurrence is located approximately one mile from the unpaved road. Allowing the use of these areas by street-legal ATVs under the preferred alternative is not anticipated to substantially increase the use of these areas. Minor effects on this species might be detectable, but would be localized and would be limited to potential noise-related impacts to dispersing individuals including flushing of roosting birds within the designated accessible shoreline area, particularly between May and September when visitation peaks. The White Canyon area is no longer accessible to vehicles due to low lake level and is likely to remain so.

There are five accessible shoreline areas along the upper San Juan Arm (Figures 44 and 45). None of these are in designated critical habitat, but suitable habitat overlaps with some of them. In addition, high quality breeding habitat occurs on Navajo Nation lands adjacent to the Paiute and Neskahi areas (Figure 44). Because of the rough conditions of the adjacent access roads, the ruggedness of the surrounding terrain, access through the Navajo Nation, and the long distances from paved roads, these proposed ORV areas are currently only sporadically used by visitors with conventional motor vehicles, primarily local Navajo families who use the areas year-round. Allowing the use of these areas by street-legal ATVs under the preferred alternative is not anticipated to substantially increase the use of these areas. Owl-vehicle collisions would be extremely unlikely and would be discountable. Impacts on individual owls might be detectable, but would be considered minor and would be limited to potential noise-related impacts such as flushing of roosting birds within the designated shoreline.

The Dirty Devil accessible shoreline is along Highway 95 near the mouth of the Dirty Devil River, with most areas within 30 meters of the road (Figure 49). Suitable habitat occurs west of the shoreline and road on the adjacent cliffs. Allowing the use of these areas by street-legal ATVs under the preferred alternative is not anticipated to substantially increase the use of these areas. Owl-vehicle collisions would be extremely unlikely and would be discountable. Impacts on individual owls might be detectable, but would be considered minor and would be limited to potential noise-related impacts such as flushing of roosting birds within the designated shoreline. Use of this shoreline area has dropped off substantially in recent years due to low lake levels.

The Cave Spring owl sighting is adjacent (ca. 40 meters) to an unpaved park road (NPS Route 262) on Grand Bench (Figure 43), and at a lower elevation in a canyon than the road, within suitable habitat. Thus at this site, noise levels may equal or exceed the threshold of 69 dBA on occasion. However, there has been only a single incidental sighting at the cave by BLM staff in 2008 without accompanying documentation. This may have been a dispersing juvenile if correctly identified. The cliffs around Grand Bench include some suitable habitat.

The Alstrom Point record (Figure 42) from September 23, 2014 was of an individual flying along the east

rim, in several cases flying over the unpaved road to the point. Later, the bird was observed flying eastward towards Gunsight Butte. The age and origin of this bird is unknown, but may have been a dispersing individual. This road is fairly heavily utilized during daylight hours by visitors, primarily between April and September. This area includes some suitable habitat, generally along the cliffs around the Point. Thus there are potential impacts to roosting or dispersing birds.

The Crosby Canyon area (Figure 41) is not within designated critical habitat, but suitable habitat occurs within the area, and a small patch of high quality breeding habitat occurs to the southwest, ca. 1 mile from current shoreline areas. This area sees fairly high levels of visitation, and in the past has also been used as a movie set location. Impacts on individual owls might be detectable, but would be considered minor and would be limited to potential noise-related impacts such as flushing of roosting birds within the designated shoreline.

Table 7. Geographic correlation of action area components with Mexican spotted owl designated critical habitat and occurrences.

Project Area Component	Component Type	Critical Habitat Unit	Mexican Spotted Owl Occurrence
NPS Route 450	Unpaved park road	CP-13	No records in Wilson Mesa region
NPS Route 332	Unpaved park road	CP-13	Closest record is >3 miles south in East Moody Canyon
Middle Moody Trailhead	ORV route	CP-13	Closest record is >3 miles south in East Moody Canyon
NPS Route 330	Unpaved park road	CP-13	Closest record is 20 miles north in Miller's Canyon
State Hwy 276 and Bullfrog Marina roads	Paved roads	CP-13	One record in unlikely location >1.5 miles south on island in Bullfrog Bay
State Hwy 276 and Halls Crossing Marina roads	Paved roads	CP-13	One record in unlikely location >3 miles west on island in Bullfrog Bay
Burr Trail	Paved road	CP-13	Miller's Canyon records are 8 miles to west
Bullfrog North and South	ORV area	CP-13	One record in unlikely location >8 miles south on island in Bullfrog Bay
Stanton Creek	ORV area	CP-13	One record in unlikely location >2 miles west on island in Bullfrog Bay
Orange Cliffs Unit roads, including NPS Routes 633 and 744	Unpaved park roads	CP-14	3 records in inaccessible slot canyons near Hans Flat Ranger Station; distances range from 1.1-1.6 miles from roads
East Gypsum Canyon Overlook	ORV route	CP-14	Clearwater Canyon record is >3 miles west
Imperial Valley	ORV route	CP-14	Clearwater Canyon record is >3 miles west
Hite Marina roads	Paved park roads	CP-14	None
Hite Boat Ramp	ORV area	CP-14	None
Dirty Devil	ORV area	CP-14	None
Farley Canyon	ORV area	N/A	One record in unlikely location on flats near Farley Canyon >3 miles east
White Canyon	ORV area	N/A	One record in unlikely location on flats near Farley Canyon >4 miles north
State Highway 95 and NPS Route 630	Unpaved road	N/A	One record in unlikely location on flats near Farley Canyon ca. 1 mile north
Blue Notch	ORV area	N/A	One historic record >2.5 miles south
Red Canyon	ORV area	N/A	One historic record >1.5 miles west
NPS Route 262	Unpaved park road	N/A	One record adjacent (ca. 40 meters) to road is likely a dispersing individual
NPS Route 264	Unpaved park road	N/A	One record adjacent to road is likely a dispersing individual
Gunsight Springs Trailhead	ORV route	N/A	Record near Alstrom Pt is >4 miles south

Beneficial impacts on Mexican spotted owls and suitable habitat, however, are possible at Warm Creek (50 acres and ca. 2.3 miles of unpaved roads) as a result of discontinuation of off-road use, although this area is not in designated critical habitat. Potential habitat within and to the west and east of this closed

shoreline would be restored to natural conditions over the long term, resulting in localized, long-term benefits to sensitive birds occurring in that area. Similarly, implementing a speed limit of 15 mph at shoreline areas and enforcement of quiet hours after 10:00 p.m. would help lessen some of the potential impacts of off-road use on owls by reducing the level of noise and impacts related to vehicle travel at higher speeds (e.g., vehicle -wildlife collision, dust particles, noise). Slower speeds allow for longer reaction times to break or otherwise avoid collision with the animals.

The Ferry Swale route area is adjacent the west rim of Glen Canyon below Glen Canyon Dam (Figure 40). Although no mapped data sets exist for this area, the canyon walls offer likely suitable roosting habitat. The unpaved road reaches the rim in one area, thus it is possible for effects to any roosting individuals in the immediate vicinity. The Lone Rock camping and ORV area is not associated with any suitable habitat, with the closest suitable (but not designated) habitat ca. 4 miles to the west on BLM lands.

There are substantiated as well as unconfirmed reports of Mexican spotted owls from the rims of Cataract Canyon in designated critical habitat (Figure 49), although no breeding has been confirmed. An analysis of the distance from the canyon rim to the closest road (unpaved NPS Route 633) indicates that the closest approach is 0.8 miles near Freddie's Cistern. Based on the inverse square law and a decline of 6 dBA for every doubling of distance, and assuming a L_{max} noise level of 85 dBA at the road at a distance of 10 feet, the attenuation of the sound wave out to 0.5 miles on a flat surface would mean that on the rim the sound level would be ca. 34 dBA, slightly above background ambient (see also sound effects analysis in EIS Chapter 4). Using an L_{max} of 96 dBA at the tailpipe the attenuation would be to ca. 42 dBA at 0.5 miles. This would be a worst case scenario, as the terrain in the area is rugged and vegetated, which would tend to reduce noise propagation more than on a hypothetical flat surface. Noise guidelines in the 2012 revised Mexican spotted owl Recovery Plan includes an upper threshold of 69 dBA within 50 meters of a nesting site (USFWS 2012c). Additional work indicates that birds can tolerate noise levels up to ca. 92 dBA from helicopters and 46 dBA from chainsaws at distances greater than ca. 100 meters (Delaney et al. 1999). Based on this assessment, there is likely to be only minor (but potentially significant) effects to individual birds or breeding pairs based on the ORV EIS preferred alternative in this area.

Detailed modeling results (see EIS Ch. 4 Sound Analysis) using anticipated increases in vehicle numbers in the action area indicate in general relatively minor increases in sound levels beyond ambient background (20 dBA) for the action area. For GMP roads and accessible shorelines typical modeled levels range from 20-35 dBA at ca. 800' feet from roads and shorelines. These levels are unlikely to have more than minor effects on wildlife. At 0.5 miles no road or shoreline modeled values rise above the level of background natural ambient conditions. However, individuals within a few hundred feet of roads and accessible shorelines might experience minor (but potentially significant) effects within suitable and critical habitat for the species.

Cumulative Effects

Current activities that may affect the Mexican spotted owl include river recreation, aircraft overflights, development in the Ticaboo area north of Bullfrog, and actions on adjacent Navajo Indian Reservation lands. These activities occur on a regular basis, and will continue to occur regardless of whether the proposed plan is implemented, and are similar to those described under the California condor discussion above.

The Ferry Swale area west of Page in the action area is less than five miles from Page Municipal Airport, which has daily flights by commuter companies, as well as commercial air tours during the spring through fall seasons, and year-round private plane use. Planes fly over the area on a daily basis. The Federal Aviation Administration (FAA) policy directs pilots operating noise producing aircraft (fixed-wing,

rotary-wing and hot air balloons) over noise-sensitive areas to make every effort to fly not less than 2,000 feet above ground level, weather permitting, to reduce potential interference with wildlife and complaints of noise disturbances caused by low flying aircraft over noise-sensitive areas (FAA 2004). The noise level of most of these aircraft is higher than any noise that will be generated by project implementation activities (e.g., motor vehicle use). In addition, air tours occasionally occur along the rims of Glen Canyon below the dam, including in areas near where dispersing owls may roost. The NPS is currently working with FAA and the air tour operators to alter tour routes in the canyon corridor to reduce or eliminate impacts to raptors and condors.

To the south of Ferry Swale and along the accessible shoreline areas along the San Juan River is the boundary of the Navajo Indian Reservation. The local landowners live fairly close to this boundary, and in the future may attempt to develop their lands along the river or canyon rims. However, to date no development has occurred or been proposed.

Interrelated and Interdependent Actions and Their Effects

Interrelated activities are part of the proposed action that depends on the action for their justification, and interdependent activities have no independent utility apart from the action. There are no interrelated or interdependent actions associated with this project; therefore, there are no anticipated adverse effects to this species.

Incidental Take

There is a potential for limited incidental take through adverse impacts to individuals (flushing, noise affects) from increased recreational activity to this federally listed species under this proposed action.

Effect Determination

For the Mexican spotted owl, the NPS determination is ***may affect, not likely to adversely affect***. Although the likelihood that a Mexican spotted owl would be present in the area affected by the proposed action is low, it is not discountable due to extensive overlap with suitable and designated critical habitat. Thus there would be potentially adverse impacts to individuals. Potential effects from vehicle activity (collisions) along back country unpaved roads would be extremely unlikely and are considered discountable. Any project implementation activities (e.g. installation of signs, restoration of illegal ORV routes) will occur outside of the Mexican spotted owl breeding season. Reduced speed limits and the general lack of overlap between the road networks, known locations of owls indicates that direct effects (e.g., collisions) are discountable. However, noise-related impacts to dispersing, roosting or foraging individuals cannot be ruled out. Adherence to the Applicant Committed Conservation Measures (Section 3.3) will help mitigate these impacts, and include among others additional surveys for owls starting in 2017, altering routes and area boundaries to protect owls, avoidance of all known owl nests, reduced speeds for vehicles, additional signage and information on owls for recreationists, and applying specific guidelines and protection measures including area closures within 0.5 miles for protection of owls that may be detected. The conservation measures, potential impacts and effects determinations are summarized in Table 8.

Table 8. Summary of potential effects to Mexican spotted owl, proposed Applicant Committed conservation measures, and effect determinations.

Potential Effects	Conservation Measures	Effect Determination
Vehicle collisions	Reduced speed limits on unpaved roads and accessible shorelines; educational materials for visitors	Insignificant and Discountable
Flushing and other adverse behavioral effects due to noise	Surveys of suitable nesting habitat; Seasonal closures of roads and ORV areas; reduced speed limits; insignificant increases in noise levels based on modeling results; any project work done in non-breeding season;	Insignificant and Discountable
Interference with nesting and breeding	Closures within 0.5 mile buffer of nest; further coordination with USFWS; project work done in non-breeding season	Insignificant and Discountable
Closures	Closures of Warm Creek shoreline, closure of restoration of some sections of unpaved roads in Ferry Swale will reduce noise and vehicle impacts; temporary closures of action areas where designated and suitable habitat occurs within 0.5 miles until surveys for owl presence can be completed	Beneficial
Effects on undocumented individuals	Additional focused surveys 2017-2019 in suitable and critical habitat and in action area using USFWS protocols	Beneficial
Population status and trends	Long-term monitoring	Beneficial
Low lake levels	Several accessible shorelines (Bullfrog North and South, White Canyon) are currently closed due to low lake levels. These will remain closed barring significant increases in lake levels.	Beneficial

Southwestern Willow Flycatcher

Direct and Indirect Effects

The back country unpaved road network in the park existed prior to its creation in 1972. At that time the southwestern willow flycatcher was not listed, thus effects of keeping these unpaved roads open were not analyzed. Although the southwestern willow flycatcher formerly bred in Glen Canyon along the Colorado River prior to the construction of Glen Canyon Dam, there have been no confirmed nesting or presence of breeding pairs in the action area since the early 1960's (Spence et al. 2011). Individuals of migrating willow flycatchers have been observed in the vicinity of the action area (at Clay Hills Crossing), but the species presence can be considered rare and transient (Spence et al. 2011). Also, some of these records may be of other subspecies rather than the southwestern subspecies. Suitable habitat occurs along the Green, Dirty Devil, Colorado, Paria, San Juan and Escalante Rivers in the park although not considered acceptable for designation as critical habitat, and to date no breeding has been confirmed (Spence 2016).

Most suitable habitat is in inaccessible reaches of river corridors well removed from the action area. Because there is an extremely low likelihood that individuals of the species would occur in the action area that could be affected by the proposed action, effects on the species would be limited. Potential effects include vehicle-bird collisions and flushing or altered foraging and roosting behaviors from noise and human activities. As flycatchers are active during daytime hours, some effects are likely to be greater compared with nocturnal species. Vehicle and noise effects may affect individuals at roost sites, during foraging or as birds are migrating in spring and fall through riparian areas. Effects on southwestern

willow flycatcher are thus considered minor (but potentially adverse) as a result of implementing the preferred alternative, primarily as a result of noise or recreational disturbance to migrating and foraging individuals in a few areas along the Colorado River at Lees Ferry, the San Juan River at Clay Hills Crossing, river sections along the Paiute Farms accessible shoreline and Last Chance Creek, totaling ca. 100 acres. Recreational visitation within these action areas is most common during the period May-September. However, visitation is year-round at Lees Ferry, and there is an extended visitation season from March to September at Clay Hills Crossing. Thus there is significant overlap during flycatcher migration times and any potential breeding activities. In most instances, likely disturbances have been avoided or reduced by siting ORV areas, routing ORV routes and designating park roads for street-legal ATV and/or OHV use outside suitable habitat to the extent possible. In addition, low posted speed limits on most unpaved roads and at accessible shorelines will greatly reduce any potential collisions with vehicles. There will be no additional impacts or disturbances to riparian vegetation within suitable habitat in this plan.

Modeling results (see EIS Ch. 4 Sound Analysis) using anticipated increases in vehicle numbers in the action area indicate in general relatively minor increases in sound levels beyond ambient background (20 dBA) for the action area. For GMP roads and accessible shorelines typical modeled levels range from 20-35 dBA at ca. 800' feet from roads and shorelines. These levels are unlikely to have more than minor effects on wildlife. At 0.5 miles no road or shoreline modeled values rise above the level of background natural ambient conditions.

Cumulative Effects

Current activities that may affect the southwestern willow flycatcher include aircraft overflights, actions on adjacent Navajo Indian Reservation lands, and invasive species management by other agencies, primarily along the San Juan River. These activities occur on a regular basis, and will continue to occur regardless of whether the proposed plan is implemented. The local landowners live fairly close to this boundary, and in the future may attempt to develop their lands along the river. However, to date no development has occurred or been proposed.

Interrelated and Interdependent Actions and Their Effects

Interrelated activities are part of the proposed action that depends on the action for their justification, and interdependent activities have no independent utility apart from the action. There are no interrelated or interdependent actions associated with this project; therefore, there are no anticipated adverse effects to this species.

Incidental Take

There is a potential for limited incidental take through adverse impacts to individuals (flushing, noise affects) from increased recreational activity to this federally listed species under this proposed action.

Effect Determination

For the southwestern willow flycatcher, the NPS determination is *may affect, not likely to adversely affect*. Although the endangered southwestern willow flycatcher has been observed in the vicinity of the action area (Spence et al. 2011), its presence can be considered rare and transient, and some records may in fact represent migration of other subspecies through the region. No suitable nesting habitat occurs within 0.5 miles of the action area. Effects that alter foraging, migrating and roosting behaviors to individuals may occur, primarily from noise and recreational activities, at some action area sites. These

Table 9. Summary of potential effects to southwestern willow flycatcher, proposed Applicant Committed conservation measures, and effect determinations.

Potential Effects	Conservation Measures	Effect Determination
Vehicle collisions	Reduced speed limits on unpaved roads and accessible shorelines; educational materials for visitors	Insignificant and Discountable
Flushing and other adverse behavioral effects due to noise	Reduced speed limits; insignificant increases in noise levels based on modeling results; project work done in non-breeding season; there is limited overlap of suitable habitat in action area at some accessible shorelines and park roads during life-history periods including migration.	Insignificant and Discountable
Interference with nesting and breeding	Closures within 0.5 mile buffer of nest (if nests are identified in the future); further coordination with USFWS; any project work done in non-breeding season	Insignificant and Discountable
Effects on undocumented individuals	Additional focused surveys 2017-2019 within action area using USFWS protocols	Beneficial
Population status and trends	Long-term monitoring	Beneficial

effects will be insignificant and discountable, as the species is extremely rarely detected in the park. As described above, any potentially disturbing actions or project implementation activities (e.g. installation of signs, restoration of illegal ORV routes) will cause only minor effects on migrating flycatcher individuals, with no effects on breeding since suitable nesting habitat does not occur within 0.5 miles of the action area and the species does not currently breed within 50 miles of the boundaries of Glen Canyon. The Applicant Committed Conservation Measures (Section 3.3) include among others additional survey work as warranted based on observations and application of additional guidelines and protection measures including closures if birds are detected in the action area. The conservation measures, potential impacts and effects determinations are summarized in Table 9.

Yellow-Billed Cuckoo

Direct and Indirect Effects

The back country unpaved road network in the park existed prior to its creation in 1972. At this time western yellow-billed cuckoo was not listed, thus effects of keeping these unpaved roads open were not analyzed. In Glen Canyon, the yellow-billed cuckoo is considered a rare transient in dense riverside tamarisk-willow-cottonwood thickets. Historically, the cuckoo has been observed only twice in the vicinity of the project area. Specifically, the species has been recorded only at the Colorado River at Lees Ferry (1995), and on the San Juan River at Clay Hills Crossing (many records), as anecdotal records and from surveys using USFWS cuckoo protocols avian surveys. However, there has been regular observations of birds during migration and the breeding season from Clay Hills Crossing upstream along the San Juan River. Breeding may occur outside the project action area upstream from Clay Hills Crossing on the San Juan River (Spence et al. 2011). Suitable roosting and migratory habitat occurs sporadically elsewhere along major rivers, primarily along the Colorado, Escalante and San Juan Rivers. However, relatively few areas support large dense multi-canopy stands of riparian vegetation that are required by cuckoos for breeding (see critical habitat section 9.2; Spence 2016). Overlap between the action area and suitable and proposed critical habitat occurs at Lees Ferry, Last Chance Creek, the Paiute Farms accessible shoreline, and Clay Hills Crossing at the boat ramp takeout, totaling ca. 500 acres (based on USFWS proposed critical habitat in Unit 66). Visitation within the action area is most common

during the period May-September, although the Paiute Farms area is used year-round by local Navajo families. Visitation is also year-round at Lees Ferry, and there is an extended visitation season from March to September at Clay Hills Crossing. Thus there is significant overlap during cuckoo migration and with any potential breeding.

Because there is an extremely low likelihood of a yellow-billed cuckoo being present in the action area, direct effects on individuals would be extremely rare. Collisions on unpaved roads and at accessible shorelines with moving vehicles are considered discountable as they are also extremely unlikely. Posted speed limits in general are slow enough that birds should be able to avoid moving vehicles. All proposed actions involving motorized vehicles could result in some indirect effects since ORV recreational impacts such as noise would take place year-round. Thus impacts could include flushing of roosting birds or alterations of foraging behaviors during migration and the breeding season. Because of the rare, transient presence of the yellow-billed cuckoo in the action area, and the small extent of suitable riparian vegetation associated with the action area, it is likely there would be only minor (but potentially adverse) effects to the species as a result of the proposed action. There are no reported instances of cuckoo-vehicle collisions in the park.

Modeling results (EIS Ch. 4 Sound Analysis) using anticipated increases in vehicle numbers indicate in general relatively minor increases in sound levels beyond ambient background (20 dBA) for the action area. For GMP roads and accessible shorelines typical modeled levels range from 20-35 dBA at ca. 800' feet from roads and shorelines. These levels are unlikely to have more than minor effects on wildlife. At 0.5 miles no road or shoreline modeled values rise above the level of background natural ambient conditions.

Cumulative Effects

To the south of the San Juan Arm is the boundary of the Navajo Indian Reservation. Current activities that may affect the yellow-billed cuckoo include actions on adjacent Navajo Indian Reservation lands where localized habitat degradation could occur, affecting individuals or breeding pairs, and collecting for tamarisk and willows by local people along the San River River and Arm of the lake. These activities occur on a regular basis, and will continue to occur regardless of whether the proposed plan is implemented. The local landowners live fairly close to the project boundary, and in the future may attempt to develop their lands along river rims and in the Paiute Farms area. However, to date no development has occurred or been proposed.

Interrelated and Interdependent Actions and Their Effects

Interrelated activities are part of the proposed action that depends on the action for their justification, and interdependent activities have no independent utility apart from the action. There are no interrelated or interdependent actions associated with this project; therefore, there are no anticipated adverse effects to this species.

Incidental Take

There is a potential for limited incidental take through adverse impacts to individuals (flushing, noise affects) from increased recreational activity to this federally listed species under this proposed action.

Effect Determination

For the yellow-billed cuckoo, the NPS determination is *may affect, not likely to adversely affect*. Although the yellow-billed cuckoo has been observed in the action area at Clay Hills Crossing (Spence et

al. 2011), its presence can be considered rare and transient. The species does not currently breed near the action area, nor is there any currently appropriate breeding habitat within 0.5 miles of the action area (see under Designated Habitat 9.3). However, all potential effects cannot be considered discountable due to overlap with suitable and some proposed critical habitat. Thus there would be potentially adverse impacts to individuals. Effects from vehicle activity (collisions) along back country unpaved roads would be extremely unlikely and are considered discountable. Any project implementation activities (e.g. installation of signs, restoration of illegal ORV routes) will occur outside of the cuckoo breeding season. Reduced speed limits and the general lack of overlap between the road networks, known locations of cuckoos suggests that direct effects (e.g., collisions) are discountable. Noise-related impacts to roosting, migrating or foraging individuals may occur, however these effects will be insignificant and discountable. Adherence to the Applicant Committed Conservation Measures (Section 3.3) will help mitigate these impacts, and include among others additional surveys for cuckoos starting in 2017, altering routes and area boundaries to protect documented occurrences, avoidance of all known nests, reduced speeds for vehicles, additional signage and information on cuckoos for recreationists, and applying specific guidelines and protection measures including area closures within ½ mile for protection of individual birds that may be detected.

Any project implementation activities (e.g. installation of signs, restoration of illegal ORV routes) will occur outside of the yellow-billed cuckoo breeding season. In order to support the determination, the Applicant Committed Conservation Measures (Section 3.3) include among others survey work associated with accessible shoreline areas and application of additional guidelines and protection measures including closures if birds are detected in the action area. The conservation measures, potential impacts and effects determinations are summarized in Table 10.

Table 10. Summary of potential effects to western yellow-billed cuckoo, proposed Applicant Committed conservation measures, and effect determinations.

Potential Effects	Conservation Measures	Effect Determination
Vehicle collisions	Reduced speed limits on unpaved roads and accessible shorelines; educational materials for visitors	Insignificant and Discountable
Flushing and other adverse behavioral effects due to noise	Identification of suitable habitat; implementation of protocol-level surveys; Reduced speed limits; insignificant increases in noise levels based on modeling results; project work done in non-breeding season; there is limited overlap of suitable and proposed critical habitat in action area at some accessible shorelines and park roads during critical life-history periods including migration.	Insignificant and Discountable
Interference with nesting and breeding	Closures within 0.5 mile buffer of suitable habitat until surveys are conducted; closures within 0.5 mile buffer of habitat patch where nesting birds are detected; further coordination with USFWS; any project work done in non-breeding season	Insignificant and Discountable
Effects on undocumented individuals	Additional focused surveys 2017-2019 in suitable habitat within action area using USFWS protocols	Beneficial
Population status and trends	Long-term monitoring	Beneficial

Jones' Cycladenia

Direct and Indirect Effects

There are no known populations in suitable habitat for the species within the action area. Some roads in existence prior to the establishment of Glen Canyon National Recreation Area come within 2-3 miles of known populations, with all but one in Middle Moody Canyon on extremely steep upper Chinle slopes. The Middle Moody Canyon population is widespread, and some plants occur near the wash, ca. 2 miles down canyon from the nearest road. Potential threats to this species include modification of habitat from construction activities, mining activities, livestock grazing and off-road vehicle activity. Climate change is also implicated although to date no declines in the species in the region have been detected. No mining leases occur in Glen Canyon in areas where the species exists. Authorized grazing and illegal ORV activity has minimal impacts as all but one known population in the park occurs on steep inaccessible slopes. Indirect effects are not currently known for this species, but may include future climate change and monitoring efforts by NPS staff. Since some accessible shorelines include un-surveyed habitat, surveys will be conducted prior to plan implementation, and appropriate measures will be taken to protect new populations. Suitable habitat includes upper members of the Chinle Formation, which occur widely in the park but which are largely inaccessible to vehicle traffic except for potential areas associated with a few shorelines. These areas will be surveyed in spring of 2017 using recommended USFWS rare plant protocols.

Cumulative Effects

Current activities that may affect Jones cycladenia include actions on adjacent Navajo Indian Reservation lands where localized habitat degradation could occur, affecting individuals or populations, and collecting for tamarisk and willows by local people along the San River River and Arm of the lake. These activities occur on a regular basis, and will continue to occur regardless of whether the proposed plan is implemented. The local landowners live fairly close to the project boundary, and in the future may attempt to develop their lands along canyon rims and in the Paiute Farms area. However, to date no development has occurred or been proposed.

Interrelated and Interdependent Actions and Their Effects

Interrelated activities are part of the proposed action that depends on the action for their justification, and interdependent activities have no independent utility apart from the action. There are no interrelated or interdependent actions associated with this project; therefore, there are no anticipated adverse effects to this species.

Incidental Take

There will be no incidental take of this federally listed species under this proposed action.

Effect Determination

No populations of *Cycladenia humilis* var. *jonesii* are near or associated with any park roads or any accessible shorelines. If additional surveys in 2017 discover new populations appropriate actions will be taken to prevent any effects. Thus the NPS determination for this species is ***may affect, not likely to adversely affect***. In order to support the determination, the Applicant Committed Conservation Measures (Section 3.3) include additional surveys in 2017, and protection measures including closures if new populations are detected in the action area. The conservation measures, potential impacts and effects determinations are summarized in Table 11.

Brady pincushion cactusDirect and Indirect Effects

Known occupied habitat occurs for the species within the action area in the Lees Ferry District. Potential threats to this species include modification of habitat from construction activities and off-road vehicle activity. No mining leases occur in Glen Canyon in areas where the species exists. Illegal ORV activity has been documented in the District, although monitoring has not indicated that any plants have been affected to date. Indirect effects are not currently known for this species, but likely includes future climate change and monitoring efforts by NPS staff. In dry years rodent predation is heavier on the species, and thus could become a critical factor with future climate change that may lead to more extreme droughts. Critical habitat for the species has not been designated.

Cumulative Effects

Current activities that may affect *Pediocactus bradyi* include actions on adjacent Navajo Indian Reservation lands where localized habitat degradation could occur, affecting individuals or populations, and grazing activities on Bureau of Land management lands to the south of Marble Canyon. These activities occur on a regular basis, and will continue to occur regardless of whether the proposed plan is implemented.

Interrelated and Interdependent Actions and Their Effects

Interrelated activities are part of the proposed action that depends on the action for their justification, and interdependent activities have no independent utility apart from the action. There are no interrelated or interdependent actions associated with this project; therefore, there are no anticipated adverse effects to this species.

Table 11. Summary of potential effects to Jones' cycladenia, Brady pincushion cactus, and Siler's pincushion cactus, proposed Applicant Committed conservation measures, and effect determinations.

Potential Effects	Conservation Measures	Effect Determination
Jones' cycladenia		
Undocumented populations	Additional surveys in action area using USFWS protocols	Beneficial
Impacts to individuals including crushing, damage or reproductive losses	Barriers and closures including minimum 300 foot buffers from project area activities	None
Status and trends	Long-term monitoring of populations	Beneficial
Brady pincushion cactus		
Impacts to individuals including crushing, damage or reproductive losses	Action area closed to ATV's; regular patrols of occupied habitat	None
Status and trends	Long-term monitoring of populations	Beneficial
Siler's pincushion cactus		
Undocumented populations	Additional surveys in action area using USFWS protocols	Beneficial
Impacts to individuals including crushing, damage or reproductive losses	Barriers and closures including minimum 300 foot buffers from action area activities	None
Status and trends	Develop long-term monitoring of any discovered populations	Beneficial

Incidental Take

There will be no incidental take of this federally listed species under this proposed action.

Effect Determination

The actions to be initiated under the plan in the Lees Ferry District include closure of the Lees Ferry District and all paved roads to ATV's, and regular monitoring at known occupied sites. Thus the NPS determination for this species is ***no effect***. In order to support the determination, the Applicant Committed Conservation Measures (Section 3.3) include maintaining regular patrols and education of the public that the road is closed to all but conventional vehicles. These conservation measures, along with potential impacts and determinations of effect are summarized in Table 11.

Siler's pincushion cactus

Direct and Indirect Effects

No known occupied habitat occurs for the species within the action area or in the park. Some roads in existence prior to the establishment of Glen Canyon National Recreation Area cross areas of Moenkopi Formation badlands, but not the specific member that the species prefers. Potential threats to this species include modification of habitat from construction activities, mining activities, livestock grazing and off-road vehicle activity. Climate change is also implicated as there have been recent declines in the species. Indirect effects are not currently known for this species, but may include future climate change. Since some accessible shorelines include un-surveyed suitable habitat (Chinle Formation), surveys will be conducted prior to plan implementation, and appropriate measures will be taken to protect any populations that are found. These areas will be surveyed in spring of 2017.

Cumulative Effects

Current activities that may affect *Pediocactus sileri* include actions on BLM and AZ and UT State lands along the Lake Powell Pipeline proposed corridor, which is in the planning stage.

Interrelated and Interdependent Actions and Their Effects

Interrelated activities are part of the proposed action that depends on the action for their justification, and interdependent activities have no independent utility apart from the action. There are no interrelated or interdependent actions associated with this project; therefore, there are no anticipated adverse effects to this species.

Incidental Take

There will be no incidental take of this federally listed species under this proposed action.

Effect Determination

No populations of *Pediocactus sileri* are known from the action area or park. If new surveys in 2016 discover populations appropriate actions will be taken to prevent any effects. Also, there are no proposed changes to the GMP road network (widening, re-routing, etc.) that could potentially affect newly located plants. Thus the NPS determination for this species is ***may affect, not likely to adversely affect***. In order to support the determination, the Applicant Committed Conservation Measures (Section 3.3) include

additional surveys in 2017, and protection measures including closures and barriers if the species is detected in the action area. These conservation measures, along with potential impacts and determinations of effect are summarized in Table 11.

9.2 Critical Habitat

Mexican Spotted Owl

Direct and Indirect Effects

Critical habitat is designated for the Mexican spotted owl (USFWS 2012c), with one habitat block (Dark Canyon Primitive and Wilderness Unit CP-14) that includes the Orange Cliffs Unit, and the second (Glen Canyon Reef Unit CP-13) associated with the Waterpocket Fold and east side of the Escalante River. Figures 44, 46, 47, 49, 50, and 51 are detailed maps showing overlap within the project with designated critical habitat as well as other modeled habitat types. The overall overlap with designated critical habitat in the action area can be found in Figures 39-51. These maps also included acreage overlap with critical habitat for shorelines and roads. Four proposed ORV areas in Glen Canyon are within designated critical habitat: Bullfrog North and South and Stanton Creek in CP-13 and Hite Boat Ramp and Dirty Devil in CP-14. This analysis includes both protected and restricted habitat elements (PCE's) within designated critical habitat definitions. The Bullfrog North and South and Stanton Creek ORV areas are open flat-lying stretches of shoreline along Lake Powell, lacking primary PCE's such as required for breeding habitat, although some low cliffs (<30 m) occur along the margins of the accessible shorelines in the vicinity that could potentially be used for roosting. The Hite Boat Ramp ORV area is a flat, rocky shoreline located between two boat ramps within the developed marina on Lake Powell. The Dirty Devil ORV area is a slick-rock shoreline located between Lake Powell and within 100 meters of Utah State Highway 276. These two areas are open flat rocky and sandy sites, lacking suitable primary and restricted habitat including PCE's such as cliffs, narrow canyons, steep slopes, cool microsites, mixed conifer-hardwood forests species with high canopy density, ground cover, and large trees. Although off-road use would continue at these shorelines under the preferred alternative, the owl is likely to rarely use these areas, probably by dispersing individuals (NPS 2007; Spence 2012). Insignificant impacts on non-PCE features from the preferred alternative might be detectable, but would be localized and would be limited to potential noise-related impacts within roosting or foraging areas, or minor disturbance from construction effects during placement of barriers, signs and information kiosks, and removal of dead and dying tamarisk.

Several existing park roads and proposed ORV routes are situated within designated critical habitat for the Mexican spotted owl (see Figures 39-51). Many of these include the paved state highways as well as paved and developed areas at the Bullfrog, Hall's Crossing and Hite marinas, all established in the 1960's. Effects of road use on the species critical habitat would be considered insignificant, as there are no PCE components on or adjacent to these roads. Highway 276 cuts through some cliffed areas where there are some but not all PCE components, but this road has been in use for >50 years and is a heavily utilized state highway. No previously undisturbed areas within the action area that overlaps with critical habitat will be disturbed in this plan. No PCE's in protected or restricted habitats will be disturbed or affected by this plan. An analysis of breeding habitat elements (PCE's) shows that no suitable breeding habitat occurs within 0.5 miles of the action area.

Prohibiting OHV and street-legal ATV use on the majority of the roads in the Orange Cliffs Unit could also benefit the Mexican spotted owl and its critical habitat by limiting habitat disturbance and noise-related impacts.

Cumulative Effects

The proposed action would not contribute to cumulative effects on the owl's designated critical habitat as a result of other plans and projects.

Effect Determination

As described above and in the Applicant Committed Conservation Measures (Section 3.3), all potentially disturbing actions will cause insignificant impacts to Mexican spotted owl designated critical habitat, and no impacts to PCE's associated with owl habitat. Thus, the NPS determination is *may affect, not likely to adversely affect* designated critical habitat. The conservation measures, potential impacts and effects determinations are summarized in Table 12.

Southwestern Willow Flycatcher

Direct and Indirect Effects

Critical habitat was revised in 2012 (USFWS 2005, 2012a). There is no designated critical habitat for the species in the action area, with the closest known areas downstream ca. 50 miles from Lees Ferry on the Colorado River and well upstream of Mexican Hat on the San Juan River near the New Mexico border. The action area lacks critical habitat components (Beatty 2013).

Table 12. Summary of potential effects to Mexican spotted owl designated critical habitat and Primary Constituent Elements (PCEs), proposed Applicant Committed conservation measures, and effect determinations.

Potential Effects	PCE's or Other Habitat Elements	Conservation Measures	Effect Determination
Impacts to roosting and migration habitat	Some cliff habitats and narrow canyons associated with several action areas, but most PCE's missing within 0.5 miles	Educational materials for visitors; temporary or permanent closures; project activities outside of breeding season; no new disturbances	None
Impacts to Protected habitat	No PCE's within action area	No project activity associated with protected habitat	None
Impacts to Restricted habitat	No PCE's within action area	No project activity associated with restricted habitat	None

Cumulative Effects

Due to the absence of critical habitat within the action area, the proposed project would have no cumulative effects on designated southwestern willow flycatcher critical habitat.

Effect Determination

Due to the absence of critical habitat within the action area, the proposed action would have no effects on designated southwestern willow flycatcher critical habitat. Thus, the NPS determination is this action will have *no effect* on designated critical habitat.

9.3 Proposed Critical Habitat

Yellow-Billed Cuckoo

Direct and Indirect Effects

The USFWS published the proposed critical habitat designation following listing of the western yellow-billed cuckoo (Federal Register, Vol. 79, No. 158, 2014). Proposed habitat unit 66 is situated mostly within Glen Canyon NRA, from several miles upstream of Clay Hills Crossing, down to Paiute Farms on the San Juan Arm of Lake Powell. This area includes the old San Juan marina (long since abandoned) and associated accessible shoreline. In addition, a small portion of the proposed habitat above 3720 feet occurs on the Navajo Nation outside of Glen Canyon.

The proposed habitat unit includes several miles of the San Juan River from ca. Grand Gulch down past Clay Hills Crossing to the waterfall, then below that it includes much of the exposed lake sediments known as Paiute Farms. Because of concerns regarding disturbance including fires, visitation and habitat suitability, Glen Canyon conducted an aerial survey of the area on November 3, 2014. Based on these surveys, as well as general observations based on many San Juan River trips, the river corridor down to the Clay Hills Crossing, and to ca. 1-2 miles below the Clay Hills Crossing on the north side only, may provide suitable migratory and roosting habitat (Figure 59). However, the rest of the proposed habitat unit 66 is currently unsuitable for cuckoos, and is not likely to change significantly in the next 20-30 years, as either these areas will continue to convert to upland vegetation or may be drowned by future lake rises.

The Paiute Farms area consists of exposed sediment from Lake Powell, and has been above water for ca. 10-12 years. Much of the area consists of dead or dying low-statured tamarisk, generally <3 m in height (Figures 60-61). With down cutting, especially below the waterfall, much of this vegetation is dying out as water tables drop and sediments dry out. Areas to the south of the waterfall, where patches of tamarisk occur, are heavily disturbed by fires, wood collection, and off-road vehicle activity, primarily by residents of the Navajo Nation. Some hunting also likely occurs in this area. In this part of the action area, there may be limited impacts to proposed critical habitat through project activities such as construction of barriers, and placement of signs and informational kiosks. These would be done outside of breeding and migration times for the species. Minor impacts to riparian vegetation, primarily removal of dead and dying tamarisk, would occur during these projects. None of the riparian vegetation in proposed unit 66 actually includes the PCE's for breeding by the species based on the proposed habitat rules, primarily due to the narrow width (<50 m) in most areas. Paiute Farms area is dominated by large nearly pure stands of low-statured tamarisk with high mortality from the tamarisk leaf beetle and drying out of the sediments. None of the PCE requirements are met in this area.

As recently as 1998 the area was under Lake Powell, and may be inundated again in the future. With continued down cutting, these large tamarisk patches are likely to contract to narrow fringes along the river, and gradually be replaced by cottonwoods and willows. Most of the areas in the photos is likely to be invaded by upland species and exotics.

New recommendations were submitted to USFWS in January 2015 as part of the general NPS response to this proposed critical habitat based on observations on the vegetation in the area. The NPS suggests that the habitat unit be redrawn to include the high quality habitat along the San Juan River only, from Grand Gulch to ca. one miles below the Crossing (just above the waterfall) on the north side (Figure 62). Except for a small area (<1 acre) at the Clay Hills Crossing takeout for river trips, none of this proposed new critical habitat unit occurs within the action area.

Cumulative Effects

The proposed action would not contribute to cumulative effects on proposed critical habitat as a result of other plans and projects. If the current boundaries of the proposed habitat unit 66 are maintained, then there may be localized and insignificant cumulative effects in the Paiute Farms area as a result of collecting of tamarisk and willows by the Navajo residents in the vicinity, hunting, or setting of accidental fires.

Effect Determination

Based on the original mapped proposed critical habitat unit 66 boundaries as indicated by the USFWS, there may be insignificant impacts to habitat such as posting signs and delimiting travel areas and shoreline boundaries. Under this proposed scenario the critical habitat determination would be *may effect, not likely to adversely affect critical habitat*. In order to support the determination, the Applicant Committed Conservation Measures (Section 3.3) include additional measures to protect proposed critical habitat. As part of the NPS response to the proposed critical habitat for western yellow-billed cuckoo, comments on unit 66 were forwarded to the USFWS in January 2015. Based on this revision, all potentially disturbing actions will not disturb any future yellow-billed cuckoo habitat components. Under this scenario the critical habitat determination would be *no effect*. Table 13 summarizes these conservation measures, potential impacts and determination of effects.

Table 13. Summary of potential effects to western yellow-billed cuckoo designated critical habitat, proposed Applicant Committed conservation measures, and effect determinations.

Potential Effects	Critical Habitat Elements	Conservation Measures	Effect Determination
Impacts to roosting and migration habitat	Riparian vegetation associated with some action areas, including Last Chance Creek, Lees Ferry	Educational materials for visitors; no impacts to riparian vegetation other than minor exotic plant control	Insignificant and Discountable
Impacts to proposed designated critical habitat	Riparian vegetation associated with Paiute Farms accessible shoreline (ca. 100 acres)	Educational materials for visitors; temporary or permanent closures; no impacts to riparian vegetation other than minor exotic plant control	Insignificant and Discountable
Impacts to proposed designated critical habitat	Riparian vegetation associated with Clay Hills Crossing and the San Juan River (<10 acres)	Educational materials for visitors; temporary or permanent closures; no impacts to riparian vegetation	None



Figure 59. Dense riparian vegetation at Clay Hills Crossing. Tallest trees are ca. 15 meters, with dense understory of tamarisk and willow.



Figure 60. Paiute Farms accessible shoreline, below Clay Hills Crossing, showing dead and dying tamarisk and a few cottonwoods (ca. 6-8 meters height).



Figure 61. Paiute Farms accessible shoreline, looking South towards the San Juan River Waterfall. Note the roads on the south shores, and the large stands of dying tamarisk except directly along the river.

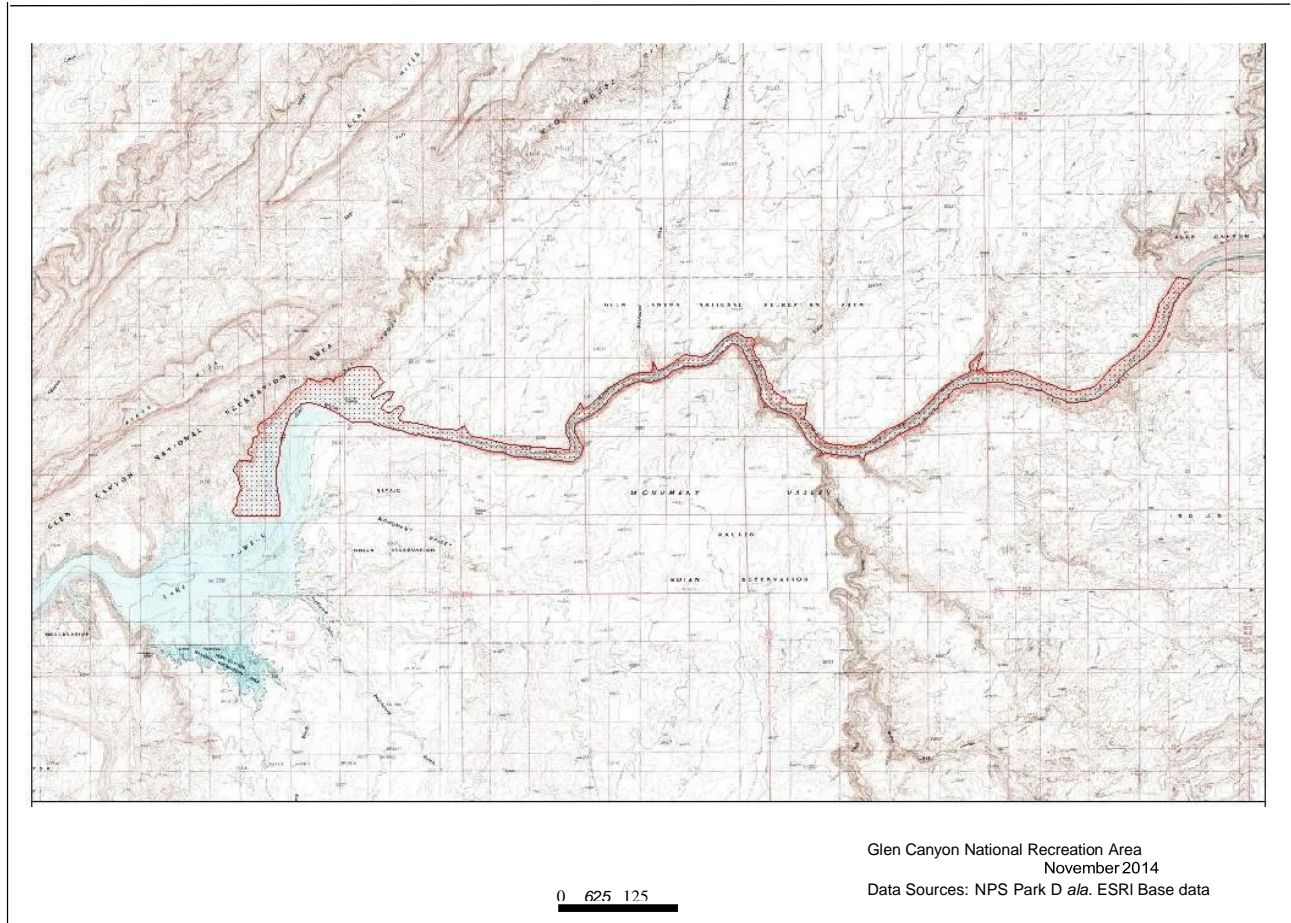


Figure 62. Proposed Revised Boundaries for Yellow-billed Cuckoo Critical Habitat Unit 66, San Juan Arm and River, Glen Canyon National Recreation Area, adjacent to the Paiute Farms accessible shoreline.

10.0 Effect Determination Summary

Table 14. Effect determinations for species addressed.

Common Name	Scientific Name	Status	Species Determination of Effect	Critical Habitat Determination of Effect
California Condor	<i>Gymnogyps californianus</i>	Experimental Population, Non-essential	NLAA	
Mexican Spotted Owl	<i>Strix occidentalis lucida</i>	Threatened	NLAA	NE
Southwestern Willow Flycatcher	<i>Empidonax traillii extimus</i>	Endangered	NLAA	NE
Yellow-Billed Cuckoo	<i>Coccyzus americanus</i>	Threatened	NLAA	NLJ
Jones' Cycladenia	<i>Cycladenia humilis</i> var. <i>jonesii</i>	Threatened	NLAA	
Brady pincushion cactus	<i>Pediocactus bradyi</i>	Endangered	NE	
Siler's pincushion cactus	<i>Pediocactus sileri</i>	Threatened	NLAA	

¹ NE=no effect; NLAA=may affect, not likely to adversely affect; LAA=may affect, likely to adversely affect; BI=beneficial impact; NLJ=not likely to jeopardize the continued existence or adversely modify proposed critical habitat

11.0 Need for Re-Assessment Based on Changed Conditions

This BA and findings above are based on the best current data and scientific information available. A new analysis and revised BA must be prepared if one or more of the following occurs: (1) new species information (including but not limited to a newly discovered activity area or other species information) reveals effects to threatened, endangered, proposed species, or designated/proposed critical habitat in a manner or to an extent not considered in this assessment; (2) the action is subsequently modified or it is not fully implemented as described herein which causes an effect that was not considered in this assessment; or (3) a new species is listed or critical habitat is designated which may be affected by the action that was not previously analyzed herein.

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Appendices

Appendix A. Specific Elements of the Glen Canyon Off-road Vehicle Management Plan Environmental Impact Statement Preferred Alternative.

Lone Rock Beach ORV Area, Kane County, UT

- No changes to types of motor vehicles currently allowed. Off-road use by conventional motor vehicles, OHVs, and street-legal ATVs would continue.
- The speed limit remains at 15 mph.
- New requirements:
 - The use of Lone Rock Beach ORV area would require an ORV Permit.
 - Approximately 20 acres of the beach would be designated as a vehicle-free zone.

Lone Rock Beach Play ORV Area, Kane County, UT

- No changes to types of motor vehicles currently allowed. Off-road use by conventional motor vehicles, OHVs, and street-legal ATVs would continue.
- New requirements:
 - The use of Lone Rock Beach Play Area ORV area would require an ORV permit and a safety flag.

Accessible Shoreline ORV Areas

- All accessible shoreline ORV areas would continue to be subject to closure if low lake levels inhibit adequate management of motor-vehicle use.
- Changes in motorized use:
 - Eight existing ORV areas where conventional motor vehicles are currently allowed would also have street-legal ATV use allowed from March 1 through October 31:
 - Blue Notch, San Juan County, UT
 - Bullfrog North and South, Garfield County, UT
 - Approximately 20 acres would be designated as a vehicle-free zone
 - Crosby Canyon, Kane County, UT
 - Dirty Devil, Garfield County, UT
 - Farley Canyon, San Juan County, UT
 - Red Canyon, San Juan County, UT
 - Stanton Creek, Garfield County, UT
 - Approximately 20 acres as a vehicle-free zone
 - White Canyon, San Juan County, UT
 - Four existing ORV areas where conventional motor vehicles are currently allowed would also have street-legal ATV use allowed year round:
 - Copper Canyon, San Juan County, UT
 - Hite Boat Ramp, San Juan County, UT
 - Neskahi, San Juan County, UT
 - Paiute Canyon, San Juan County, UT
 - Two new ORV areas would be established where conventional motor vehicles and street-legal ATV use would be allowed year round:
 - Nokai Canyon, San Juan County, UT
 - Paiute Farms, San Juan County, UT

- One existing ORV area would be closed to motor vehicle use and restored to natural condition:
 - Warm Creek, Kane County, UT
- New requirements:
 - The use of all accessible shoreline ORV areas would require an ORV permit.
 - The speed limit at accessible shoreline ORV areas would be established at 15 mph.
 - Quiet hours between 10:00 p.m. and 6:00 a.m. would be established at accessible shoreline ORV areas.

Park Roads

- The speed limits on paved park roads would not change and would remain as currently posted.
- Street-legal ATVs would continue to be authorized for use on the following paved park roads in accordance with state law:
 - US Highway 89, Coconino County, AZ and Kane County, UT
 - Wahweap developed area, Coconino County, AZ and Kane County, UT
 - Lone Rock entrance road, Kane County, UT
 - Burr Trail, Garfield County, UT
 - State Highway 276, Garfield, Kane and San Juan Counties, UT
 - Bullfrog developed area, Garfield and Kane Counties, UT
 - State Highway 95, Garfield and San Juan Counties, UT
 - Hite entrance road and developed area, San Juan County, UT
 - Halls Crossing developed area, San Juan County, UT
- Street-legal ATVs would continue to be prohibited from use on the following unpaved roads (Orange Cliffs Unit):
 - A portion of NPS Route 633, Garfield County, UT
 - NPS Route 731, Garfield County, UT
 - NPS Route 756, Garfield County, UT
 - NPS Route 763, Garfield County, UT
 - NPS Route 787, Garfield County, UT
 - NPS Route 633, Wayne County, UT
 - NPS Route 744, Wayne County, UT
 - NPS Route 763, Wayne County, UT
 - NPS Route 765, Wayne County, UT
 - NPS Route 774, Wayne County, UT
 - NPS Route 775, Wayne County, UT
 - NPS Route 777, Wayne County, UT
- Changes in motorized use:
 - Street-legal ATVs would be prohibited from use on the following paved roads:
 - The Lees Ferry Access Road and within the Lees Ferry developed area, Coconino County, AZ
 - Street-legal ATVs would continue to be authorized and OHVs would be authorized on the following unpaved park roads:
 - Seismograph Road, Coconino County, AZ
 - Dump Road, Coconino County, AZ (after administrative closure is lifted)
 - A portion of NPS Route 633, Garfield County, UT (south of Orange Cliffs Unit boundary)

- NPS Route 332, Garfield County, UT
- GC0028D, Garfield County, UT
- GC13480, Garfield County, UT
- GC116050, Garfield County, UT
- NPS Route 231, Kane County, UT
- NPS Route 262, Kane County, UT
- NPS Route 264, Kane County, UT
- NPS Route 265, Kane County, UT
- NPS Route 279, Kane County, UT
- NPS Route 330, Kane County, UT
- K6150, Kane County, UT
- K6160, Kane County, UT
- K7200, Kane County, UT
- K8175, Kane County, UT
- NPS Route 430, San Juan County, UT
- NPS Route 431, San Juan County, UT
- NPS Route 450, San Juan County, UT
- NPS Route 632, San Juan County, UT
- NPS Route 650, San Juan County, UT
- NPS Route 651, San Juan County, UT
- NPS Route 657, San Juan County, UT
- B244, San Juan County, UT
- D0016, San Juan County, UT
- D0138, San Juan County, UT
- D0154, San Juan County, UT
- D1184, San Juan County, UT
- D1880, San Juan County, UT
- D1887, San Juan County, UT
- D2056, San Juan County, UT
- D2639, San Juan County, UT
- Street-legal ATVs and OHVs would be authorized on the following unpaved park roads (eight mile portion of Poison Spring Loop):
 - A portion of NPS Route 633, Garfield County, UT
 - NPS Route 730, Garfield County, UT
- The speed limit on unpaved park roads would be established at 25 mph or as posted.

ORV Routes

- Conventional vehicles, street-legal ATVs and OHVs would continue to be used and would be authorized for use on the following ORV routes:
 - Corrals Road, Coconino County, AZ
 - Ferry Swale Road (includes portions of BLM Routes 1099 and 1325), Coconino County, AZ
 - Ferry Swale Spur Road, Coconino County, AZ
 - BG Cave Road, Coconino County, AZ
 - Substation Road, Coconino County, AZ
 - Powerline Road, Coconino County, AZ
 - Powerline Loop Road, Coconino County, AZ
 - Ferry Swale Dune Road, Coconino County, AZ

- Seismograph Road Spur 1, Coconino County, AZ
- Seismograph Road Spur 2, Coconino County, AZ
- Seismograph Road Spur 3, Coconino County, AZ
- Middle Moody Trailhead, Garfield County, UT
- Gunsight Springs Trailhead, Kane County, UT
- Studhorse Point Road, Kane County, UT
- East Gypsum Canyon Overlook, San Juan County, UT
- Imperial Valley, San Juan County, UT
- Changes in motorized use:
 - All motor vehicles would be prohibited from the following user-created routes which would be restored to natural conditions if appropriate:
 - Powerline Road extension, Coconino County, AZ
 - Switchyard Roads, Coconino County, AZ
 - Tower Road and extensions, Coconino County, AZ
 - Historic Hwy 89 route, Coconino County, AZ
 - BLM Routes 1405 and 1407 extensions, Coconino County, AZ
 - Ferry Swale Road extensions, Coconino County, AZ
 - ADOT yard extensions, Coconino County, AZ
 - Corrals Road Wash Spur, Coconino County, AZ
 - Corrals Road Admin Fence Spur, Coconino County, AZ
 - Wildcat Tank Road Spur, Coconino County, AZ
 - Corrals Road Spur 3, Coconino County, AZ
 - Seismograph Road Spur 4, Coconino County, AZ
 - Seismograph Road Spur 5, Coconino County, AZ
 - Greenehaven Spurs, Coconino County, AZ
 - Corrals Road Spur, Coconino County, AZ
 - BLM Administrative Route V1128, Coconino County, AZ
 - The speed limit on ORV routes would be established at 25 mph or as posted.
 - Motor vehicle use on all ORV routes would require an ORV permit.

Appendix B. Official Listing of Federally Listed Species for Glen Canyon Off-road Management Plan (Proposed Project).



United States Department of the Interior

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Consultation Code: 06E23000-2016-SLI-0013

October 19, 2015

Event Code: 06E23000-2016-E-00029

Project Name: Glen Canyon National Recreation Area ORV EIS

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (<http://www.fws.gov/windenergy/>) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm>; <http://www.towerkill.com>; and <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment



United States Department of Interior
Fish and Wildlife Service

Project name: Glen Canyon National Recreation Area ORV EIS

Official Species List

Provided by:

Utah Ecological Services Field Office
2369 WEST ORTON CIRCLE, SUITE 50
WEST VALLEY CITY, UT 84119
(801) 975-3330
<http://www.fws.gov>
<http://www.fws.gov/utahfieldoffice/>

Expect additional Species list documents from the following office(s):

Arizona Ecological Services Field Office
2321 WEST ROYAL PALM ROAD, SUITE 103
PHOENIX, AZ 85021
(602) 242-0210
<http://www.fws.gov/southwest/es/arizona/>
http://www.fws.gov/southwest/es/EndangeredSpecies_Main.html

Consultation Code: 06E23000-2016-SLI-0013

Event Code: 06E23000-2016-E-00029

Project Type: LAND - MANAGEMENT PLANS

Project Name: Glen Canyon National Recreation Area ORV EIS

Project Description: EIS and Off-road Vehicle Plan for Glen Canyon NRA, including primarily 4 counties in UT, with back country roads and accessible shorelines.

Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

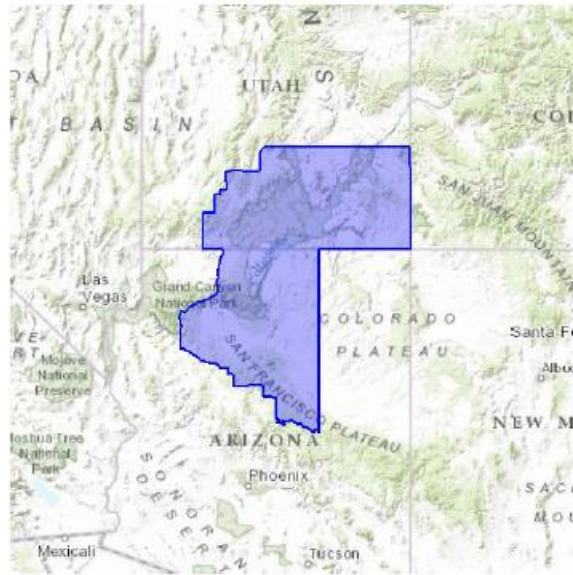
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United States Department of Interior
Fish and Wildlife Service

Project name: Glen Canyon National Recreation Area ORV EIS

Project Location Map:



Project Coordinates: The coordinates are too numerous to display here.

Project Counties: Coconino, AZ | Garfield, UT | Kane, UT | San Juan, UT | Wayne, UT

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United States Department of Interior
Fish and Wildlife Service

Project name: Glen Canyon National Recreation Area ORV EIS

Endangered Species Act Species List

There are a total of 26 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 3 of these species should be considered only under certain conditions. Critical habitats listed under the Has Critical Habitat column may or may not lie within your project area. See the Critical habitats within your project area section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Birds	Status	Has Critical Habitat	Condition(s)
California condor (<i>Gymnogyps californianus</i>) Population: U.S.A. (specific portions of Arizona, Nevada, and Utah)	Experimental Population, Non-Essential		Species is considered Experimental non-essential population Species is considered Endangered
Gunnison sage-grouse (<i>Centrocercus minimus</i>) Population: entire	Threatened		
Mexican Spotted owl (<i>Strix occidentalis lucida</i>) Population: Entire	Threatened	Final designated	
Southwestern Willow flycatcher (<i>Empidonax traillii extimus</i>) Population: Entire	Endangered	Final designated	
Yellow-Billed Cuckoo (<i>Coccyzus americanus</i>) Population: Western U.S. DPS	Threatened	Proposed	
Fishes			
Bonytail chub (<i>Gila elegans</i>)	Endangered	Final designated	

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United States Department of Interior
Fish and Wildlife Service

Project name: Glen Canyon National Recreation Area ORV EIS

Population: Entire			
Colorado pikeminnow (<i>Ptychocheilus lucius</i>) Population: Entire, except EXPN	Endangered	Final designated	
Greenback Cutthroat trout (<i>Oncorhynchus clarki stomias</i>) Population: Entire	Threatened		
Humpback chub (<i>Gila cypha</i>) Population: Entire	Endangered	Final designated	Watershed discharge that would affect the Grand Canyon
Razorback sucker (<i>Xyrauchen texanus</i>) Population: Entire	Endangered	Final designated	
Virgin River Chub (<i>Gila seminuda</i> (=robusta)) Population: Entire	Endangered	Final designated	
Woundfin (<i>Plagopterus argentissimus</i>) Population: Entire, except EXPN	Endangered	Final designated	
Flowering Plants			
Autumn Buttercup (<i>Ranunculus aestivalis</i> (=acriiformis))	Endangered		
Barneby reed-mustard (<i>Schoenocrambe barnebyi</i>)	Endangered		
Jones Cycladenia (<i>Cycladenia humilis</i> var. <i>jonesii</i>)	Threatened		
Kodachrome bladderpod (<i>Lesquerella tumulosa</i>)	Endangered		

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United States Department of Interior
Fish and Wildlife Service

Project name: Glen Canyon National Recreation Area ORV EIS

Last Chance townsendsia (<i>Townsendia aprica</i>)	Threatened		
Navajo sedge (<i>Carex specuicola</i>)	Threatened	Final designated	
San Rafael cactus (<i>Pediocactus despainii</i>)	Endangered		
Siler Pincushion cactus (<i>Pediocactus (=echinocactus, =utahia) sileri</i>)	Threatened		
Ute ladies'-tresses (<i>Spiranthes diluvialis</i>)	Threatened		
Welsh's milkweed (<i>Asclepias welshii</i>)	Threatened	Final designated	
Winkler cactus (<i>Pediocactus winkleri</i>)	Threatened		
Wright Fishhook cactus (<i>Sclerocactus wrightiae</i>)	Endangered		
Mammals			
Utah prairie dog (<i>Cynomys parvidens</i>) Population: U.S.A.(UT)	Threatened		High intensity surveys, as defined by the Utah Prairie Dog Survey Protocol (http://www.fws.gov/utahfieldoffice/), are required for all projects with temporary or permanent impacts. Low intensity surveys, as defined by the Utah Prairie Dog Survey Protocol (http://www.fws.gov/u

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Project name: Glen Canyon National Recreation Area ORV EIS

			tahfieldoffice/), are required for all projects with temporary or permanent impacts.
Snails			
Kanab ambersnail (<i>Oxyloma haydeni kanabensis</i>) Population: Entire	Endangered		

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United States Department of Interior
Fish and Wildlife Service

Project name: Glen Canyon National Recreation Area ORV EIS

Critical habitats that lie within your project area

The following critical habitats lie fully or partially within your project area.

Birds	Critical Habitat Type
Mexican Spotted owl (<i>Strix occidentalis lucida</i>) Population: Entire	Final designated
Southwestern Willow flycatcher (<i>Empidonax traillii extimus</i>) Population: Entire	Final designated
Yellow-Billed Cuckoo (<i>Coccyzus americanus</i>) Population: Western U.S. DPS	Proposed
Fishes	
Bonytail chub (<i>Gila elegans</i>) Population: Entire	Final designated
Colorado pikeminnow (<i>Ptychocheilus lucius</i>) Population: Entire, except EXPN	Final designated
Humpback chub (<i>Gila cypha</i>) Population: Entire	Final designated
Razorback sucker (<i>Xyrauchen texanus</i>) Population: Entire	Final designated
Flowering Plants	
Navajo sedge (<i>Carex specuicola</i>)	Final designated
Welsh's milkweed (<i>Asclepias welshii</i>)	Final designated

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