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AESO/SE  
02-21-89-F-0106-R1

January 3, 2006

Memorandum

To: Superintendent, Grand Canyon National Park, Grand Canyon, Arizona

From: Field Supervisor

Subject: Biological Opinion for the Colorado River Management Plan

Thank you for your request for formal consultation with the U.S. Fish and Wildlife Service (FWS) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act). Your request for formal consultation regarding effects of the Colorado River Management Plan (CRMP) on the bald eagle (*Haliaeetus leucocephalus*), California condor (*Gymnogyps californianus*), Mexican spotted owl (MSO) (*Strix occidentalis lucida*), southwestern willow flycatcher (*Empidonax traillii extimus*), brown pelican (*Pelecanus occidentalis californicus*), humpback chub (*Gila cypha*), humpback chub critical habitat, razorback sucker (*Xyrauchen texanus*), razorback sucker critical habitat, Kanab ambersnail (*Oxyloma haydeni kanabensis*), and desert tortoise (*Gopherus agassizii*) was dated June 22, 2005, and received by us on June 24, 2005. At issue are impacts that may result from the CRMP in Grand Canyon National Park (GRCA) in Coconino and Mohave counties, Arizona.

The June 22 letter included a request for concurrence with a determination that the proposed action is not likely to adversely affect Mexican spotted owl critical habitat and the Yuma clapper rail (*Rallus longirostris yumanensis*). Our concurrence with those determinations is included in Appendix A.

The June 22 letter also included a determination by GRCA that the project is not likely to adversely modify proposed critical habitat of the southwestern willow flycatcher. On October 19, 2005, FWS published the final rule for designation of critical habitat for the southwestern willow flycatcher (U.S. Fish and Wildlife Service 2005). No locations in the GRCA were designated as critical habitat, therefore we do not address effects to critical habitat in this biological opinion. GRCA also determined that the proposed action is not likely to jeopardize the continued existence of the candidate species relict leopard frog (*Rana onca*) and yellow-billed cuckoo (*Coccyzus americanus*). These candidate species are not addressed in this biological opinion.

This biological opinion is based on information provided in biological assessments (BAs), meetings, telephone conversations, email messages, and other sources of information. Literature

cited in this biological opinion is not a complete bibliography of all literature available on the species of concern, the type of actions and their effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at this office.

## **CONSULTATION HISTORY**

Table 1 is a summary of the consultation history for the proposed action. All tables are included at the end of this document.

## **BIOLOGICAL OPINION**

### **DESCRIPTION OF THE PROPOSED ACTION**

The CRMP is primarily a visitor-use management plan which specifies actions to preserve park resources and the visitor experience while enhancing recreational opportunities (James 2005). GRCA intends this plan to cover at least the next ten years, but recognizes that a longer period may be required to achieve some of the plan's goals, objectives, and desired conditions. The CRMP focuses on visitor use issues and the associated impacts to natural and cultural resources. Glen Canyon Dam operations, allocation of administrative use, Wild and Scenic River designation, formal Wilderness designation, backcountry operations, and commercial overflights are outside the scope of the CRMP.

The action area of the CRMP includes all of the 277-mile stretch of the Colorado River that runs through the Park. The action area is defined for the purposes of the analysis conducted in this Biological Assessment as the Colorado River corridor from Lees Ferry through GRCA and adjacent tribal lands to Lake Mead. The corridor is the band of river and riparian and desert habitats adjacent to the Colorado River between Lees Ferry and Lake Mead. The corridor includes the lower portions of the tributaries and side canyons to the mainstem Colorado, namely those areas potentially visited by recreationists hiking off the river. In addition, the action area includes the air above and adjacent to the river corridor, namely, the places where helicopters travel when taking recreationists to or from the river corridor. Except for cumulative impacts analysis or as specifically stated in the text, the analysis area does not include areas upstream from Lees Ferry (including Glen Canyon Dam), Lees Ferry itself (which is part of Glen Canyon NRA), or areas in Lake Mead NRA (including Pearce Ferry and South Cove).

Components of the CRMP include boating, hiking, camping, swimming, and other activities that are associated with river-running recreation, and helicopter flights transporting passengers to and from the river. Boating can take several forms including private and commercial, and non-motorized and motorized trips. A variety of watercraft is used by river-runners ranging from kayaks to large motorized pontoon rafts. One of the purposes of the river trips is to stop at various attractions for appreciation or further exploration. Because certain attractions are very well-known and popular, a concentration of use can and does occur at various locations.

Hiking associated with the proposed action can take the form of hiking along the Colorado River, trips up the numerous tributaries or side-canyons of the river, and hiking to or from various access points outside of the project area. Hiking can occur on trails, known routes, or simply

cross-country. Degree of access often determines what areas will be used for hiking. In addition, there are favorite routes or trails that are known and used by river-running recreationists. The popular trails or routes are often associated with particular attraction destinations. Thus, a concentration of use of the locations visited through hiking can occur. Because many of the river trips are multi-day excursions, camping, primarily at river-level, occurs along the Colorado River in the project area. Camping usually occurs on beaches large enough to accommodate the size of a given river party. Campsites are not assigned but rather used on a first-come, first-served basis. Camp sites are limited along the river, and very limited in some stretches. The limited campsites also result in concentrated use of particular areas for camping.

Due to the low temperature of the Colorado River in the project area, most swimming or other water play occurs in tributaries or side-canyons that contain warmer water. Such locations are very popular and concentrated use by recreationists occurs at the sites.

Other river-running activities can include collection of freshwater from springs and fishing. While some activities tend to be concentrated in certain locations, stops along the river are largely not restricted. Except for those locations where restrictions are in place, many recreation activities associated with river-running can occur at essentially any place along the Colorado River in the project area.

Helicopter flights associated with the proposed action occur in two general locations referred to as Whitmore Canyon and Quartermaster Canyon. The flights transport recreationists to and from several locations along the Colorado River. Flights associated with the Whitmore Canyon area originate from a private landing strip north of the mouth of Whitmore Canyon. The flight routes are essentially straight paths to a point at the mouth of Whitmore Canyon. Flights associated with the Quartermaster Canyon area originate from the Grand Canyon West landing strip and transport passengers upstream to a series of helipads along the river located from RM 262 to RM 263.

The CRMP will regulate the above components through allocation of use to motorized and non-motorized river-running trips and the determination of carrying capacity. Carrying capacity will be established through setting the seasons of use, the number of trip launches per day, the maximum group size, the maximum trip length, the allocation of river runner exchange by helicopter, and motorized upriver travel from Lake Mead. The various components of the CRMP will also be regulated through implementation of a variety of conservation measures that have been designed for the proposed action.

Two sets of alternatives have been developed by GRCA for the two different portions of the CRMP:

Lees Ferry Alternatives: These alternatives consist of a no-action alternative (Alternative A) and a set of seven additional alternatives (Alternatives B through H) for management of the section of the river from Lees Ferry (River Mile [RM] 0) to Diamond Creek (RM 226).

Lower Gorge Alternatives: These alternatives consist of a no-action alternative (Alternative 1) and a set of four additional alternatives (Alternatives 2 through 5) for management of the section of the river from Diamond Creek (RM 226) to Lake Mead (RM 277).

GRCA's preferred alternatives are the Lees Ferry Modified Preferred Alternative H and the Lower Gorge Modified Preferred Alternative 4. The modified preferred alternatives are described in Appendix B of this document. These two alternatives can be considered together as the NPS preferred alternative for the entire Colorado River corridor in Grand Canyon National Park, and constitute the proposed action reviewed in this BO. Additional details of the proposed action can be found in the Draft Environmental Impact Statement for the Colorado River Management Plan (Grand Canyon National Park 2004).

### **Conservation Measures**

Conservation measures are steps taken to minimize potential negative impacts that may occur due to implementation of the proposed action. GRCA will implement the following measures for the species considered herein as part of the proposed action.

#### *General*

- Conduct a regularly scheduled recreation use monitoring program.
- Increase the number of patrol trips and the level of resource protection enforcement activities.
- Increase the level of resource education that each river recreation participant receives.
- Compare indicator species abundance, richness, and diversity in and near camping and attraction sites with areas seldom visited by recreationists.
- Measure vegetation change through time by means of remote sensing imagery.
- Institute site closures of sensitive and impacted areas as warranted.
- Actively manage impacted areas through revegetation efforts.
- Construct official trails and aggressively close and rehabilitate all other trails.
- Prohibit collection and use of non-driftwood down woody material.
- If monitoring reveals significantly reduced driftwood materials, the use and collection of driftwood for campfires will be limited or prohibited.
- Entrance into caves will be by permit only until a bat inventory is complete.

### *Water Quality*

- Develop a hazardous material plan for the transport and storage of petroleum in the Quartermaster area.
- Ensure that any Federal and State regulations for the storage of petrochemicals are adhered to.
- Remove all petrochemical storage facilities from floodplains and riparian zones.
- In cooperation with the Hualapai Tribe, the State of Arizona, and other partners, implement a monitoring and treatment program to collect baseline data for basic water quality parameters, including pathogen indicators, nutrients, and hydrocarbons; establish toxicity thresholds; and monitor future water quality trends. These data would be used to adaptively manage the river, incorporating appropriate management actions to mitigate noncompliance with applicable water quality standards.
- Implement a spill prevention control plan that is developed in cooperation with the NPS, EPA, and the Hualapai Tribe. This plan should address transport, storage, and disposal of human waste, trash, and hazardous materials. Waste materials would be transported or stored only in appropriate containers that will not leak or spill.
- Work with Hualapai to determine the appropriate number and type of toilets at Quartermaster Canyon. Approximately one toilet would be needed for every 100 visitor-hours and located out of the flood plain (above the high water mark). They could be vault (concrete lined structure), evaporative (self-contained), or chemical, and each type would require proper disposal. Hand washing facilities could include a portable hand washing unit (requiring proper disposal of gray water) or hand sanitizer dispenser.

### *Bald Eagle*

- In March of each year, river-running trips (commercial, private, and science) will avoid stopping near Nankoweap Creek (RM 52) if eagles are observed in the area. GRCA will provide educational material to all river runners about minimizing the potential harassment of bald eagles in this area in March, and about the potential for bald eagles to occur in Grand Canyon at other places, and at other times of the year. GRCA will request that river runners report any eagle sightings. GRCA will report all eagle sightings by river runners or those observed during bird surveys to the Fish and Wildlife Service.
- Roosting eagles in the vicinity of Phantom Ranch will be monitored for three years to determine the extent of recreational impacts.

### *California Condor*

- River runners will receive educational information about condors during the beginning of their river running experience. This educational information will emphasize appropriate interactions with condors.
- GRCA will work cooperatively with other condor recovery partners and the Hualapai Tribe to determine patterns of condor use (e.g., flight routes) in the Whitmore Canyon and Quartermaster Canyon areas.
- GRCA will make condor information available to the Federal Aviation Administration (FAA) for training air tour (including helicopter) pilots at FAA-sponsored pilot safety meetings. GRCA will distribute brochures and make graphics of summer and winter flight routes available to the pilots. Pilots will be asked to actively watch for condors and to maintain safe distances between aircraft and condors.

### *Mexican Spotted Owl*

- River access to MSO Protected Activity Centers (PACs) known to be occupied by MSO, or PACs for which there is no occupancy information, will be restricted during the breeding season (March 1- August 31), where feasible and as determined by the GRCA wildlife biologist. The closures will include all reasonably accessible PACs, whether accessible by trail or not, known to be occupied in a given year, or for which occupancy is unknown. PACs will be closed during the breeding season unless doing so would significantly impact hikers traveling from the rim or river. MSO PACs in side canyons will not be closed if they are not within day-hiking distance of the river or not likely to be impacted by recreational activity. PAC closures will be determined on a year-by-year basis by the GRCA wildlife biologist, and will therefore change annually based on occupancy information. A notice of seasonal closure of these areas will be provided to all non-commercial and commercial river-runners and researchers prior to or just after the beginning of the peak season (March-April) and will be updated if necessary during the following months.
- As resources allow, GRCA will continue to survey MSO habitat accessible by recreationists from the river.
- Contingent upon availability of funding, GRCA will conduct regularly-scheduled vegetative monitoring in a representative number of accessible side canyons in which PACs have been designated (and an equal number of “control” canyons which are not considered easily accessible to river runners) to determine if recreational impacts are negatively affecting vegetation and critical habitat primary constituent elements.
- Contingent upon availability of funding, GRCA will conduct a study of the impact of human disturbance on MSO within the Grand Canyon.

- In consultation with the Hualapai Tribe, GRCA will work to determine the feasibility of surveying MSO habitat under helicopter flights associated with CRMP in the Quartermaster Canyon area. Contingent upon availability of funding, and if the Hualapai Tribe agrees, GRCA will work with the Tribe to conduct these MSO surveys.
- If MSO are found as a result of the surveys, GRCA, in consultation with the Hualapai Tribe and the FAA, will work to determine the necessity and feasibility (i.e., economically, safety-wise) of adjusting helicopter flight routes to avoid resident MSO. If adjustments are deemed to be appropriate and feasible and the parties agree, they will work cooperatively to determine flight route adjustments.

#### *Southwestern Willow Flycatcher*

- Contingent upon availability of funding, GRCA will strive to conduct annual southwestern willow flycatcher presence/absence and nest monitoring surveys (using the FWS recommended survey and nesting monitoring protocols), but no less than presence/absence surveys every other year in suitable flycatcher breeding habitat (nesting/foraging/dispersal, etc.) that may be affected by river recreationist activity. In order to determine the suitability of flycatcher breeding habitat that may be affected by river recreation, several methods may be appropriate. For example, habitat will be evaluated by: a) on-the-ground evaluations of previous locations where flycatchers have been detected breeding or suspected of breeding (migrant detections), and/or b) application of the Arizona Game and Fish Department flycatcher habitat model, and/or c) continued on-the-ground monitoring of habitat throughout the action area. GRCA will place closures (with a 0.5-mile buffer) at flycatcher breeding locations, or areas suspected as breeding locations, encountered during surveys and from habitat evaluations if the sites are likely to receive recreation use.(e.g., hiking, camping, river landings). Alternatively, if surveys cannot be funded, conducted, or completed as scheduled, then seasonal closures will be implemented at unsurveyed suitable flycatcher breeding habitat that may be impacted by river recreationists' activities. These closures will be determined by the GRCA wildlife biologist, will be in place from May 1 to August 15, will include closure to visitor use including hiking, camping, and river landings, and will be coordinated with and annually reported to the FWS.

#### *Brown Pelican*

- GRCA will educate all river runners regarding the potential for brown pelicans to occur in the river corridor, and that interactions with the birds are to be avoided and the birds are not to be harassed or harmed. Recreationists will be asked to report observations of the species to GRCA. GRCA will report any brown pelican sightings by river runners or any obtained during bird surveys to the FWS.

#### *Humpback Chub and Humpback Chub Critical Habitat*

- No boats will be allowed to enter or park in the Little Colorado River (LCR). To stop in the vicinity of the LCR, boats that launch from Lees Ferry may park upstream or

downstream of the confluence. Swimming and wading in the LCR will be allowed year round in the northern half of the river. The southern half of the river from the confluence to the park boundary (located approximately two miles upstream) will be closed to river runner swimming and wading from March 1 to November 31. River runners hiking the LCR who need to cross between the north and south sides will be allowed to wade and cross at the established crossing (marked by cairns), approximately 0.2 mile upstream of the confluence. Camping and fishing bans will remain in place. The purpose of these restrictions is to protect native fish habitat (including *Phragmites* along the south bank of the LCR) and spawning and young-of-the-year humpback chub.

- Contingent upon the availability of funding, GRCA will implement a contaminant study that examines the levels of potentially toxic chemicals and PPCPs (pharmaceuticals and personal care products) present in the Colorado River, including the LCR at its confluence. Surrogate aquatic biota will be examined, primarily trout, and results will then be extrapolated to the humpback chub. Non-lethal sampling of humpback chub may also be included, but under separate permit. The study would complement existing water quality studies that look at the impacts of recreation within GRCA.
- Contingent upon the availability of funding, GRCA will implement a study to examine behavioral changes of humpback chub in response to recreation in the LCR (feeding (avoidance of predators, etc.).
- Contingent upon the availability of funding, GRCA will implement a study to determine recreational impacts to native fish habitat. Two or more tributaries (such as Shinumo) will be examined and factors such as changes in vegetation and abundance of invertebrates will be measured.

#### *Razorback Sucker and Razorback Sucker Critical Habitat*

- Contingent upon availability of funding, GRCA will work cooperatively with Lake Mead National Recreation Area (LAME) to conduct surveys of backwaters and side channels in the Lower Gorge-Lake Mead interface, and that portion of LAME where project activities extend, for spawning razorback suckers (e.g., use of light traps to catch larvae may be an appropriate means of surveying). Recreational use of areas found to be used by razorback suckers during the spawning period will be avoided.

#### *Kanab Ambersnail*

- GRCA will implement a program to educate recreational and commercial guides about protecting the Kanab ambersnails in Vaseys Paradise and Upper Elves Chasm.
- Upper Elves Chasm will be closed to recreational access each year during the peak season (March through October) of river runner use.
- GRCA will provide logistical support (e.g., boat trips) to the Arizona Game and Fish Department's Kanab ambersnail monitoring program.

- Contingent upon availability of funding, GRCA will implement a study to determine recreational impacts to Kanab ambersnail at Vaseys Paradise.

### *Desert Tortoise*

- River recreationists using the Whitmore Canyon area will be educated to not handle or otherwise disturb any desert tortoises they may encounter. Recreationists will be required to pack their trash out of the area.

## **STATUS OF THE SPECIES**

### *Bald Eagle*

The bald eagle south of the 40th parallel was listed as endangered under the Endangered Species Preservation Act of 1966, on March 11, 1967 (U.S. Fish and Wildlife Service 1967), and was reclassified to threatened status on July 12, 1995 (U.S. Fish and Wildlife Service 1995). No critical habitat has been designated for this species. The bald eagle was proposed for delisting on July 6, 1999 (U.S. Fish and Wildlife Service 1999). The bald eagle is a large bird of prey that historically ranged and nested throughout North America except extreme northern Alaska and Canada, and central and southern Mexico.

The bald eagle occurs in association with aquatic ecosystems, frequenting estuaries, lakes, reservoirs, major rivers systems, and some seacoast habitats. Generally, suitable habitat for bald eagles includes those areas which provide an adequate food base of fish, waterfowl, and/or carrion, with large trees for perches and nest sites. In winter, bald eagles often congregate at specific wintering sites that are generally close to open water and offer good perch trees and night roosts (U.S. Fish and Wildlife Service 1995).

In addition to breeding bald eagles, Arizona provides habitat for wintering bald eagles, which migrate through the state between October and April each year. In 1997, the standardized statewide Arizona winter count totaled 343 bald eagles, including 193 adults, 134 subadults, and 16 of unknown age; in 1998, 183 adults, 103 subadults, and 4 of unknown age were recorded. The highest numbers of bald eagles, in both years, occurred on the Verde River and at San Carlos Reservoir (Beatty and Driscoll 1999).

Bald eagles in Arizona consume a diversity of food items, including some invertebrates. However, their primary food is fish, which are generally consumed twice as often as birds, and four times as often as mammals. Bald eagles are known to catch live prey, steal prey from other predators (especially osprey), and use carrion. Carrion constitutes a higher proportion of the diet for juveniles and subadults than it does for adult eagles. Diet varies depending on what species are available locally. This can be affected by the type of water system on which the breeding area is based (Hunt *et al.* 1992).

Even though the bald eagle has been reclassified to threatened, and the status of the birds in the Southwest is on an upward trend, the Arizona population remains small and under threat from a

variety of factors. Human disturbance of bald eagles is a continuing threat which may increase as numbers of bald eagles increase and human development continues to expand into rural areas (U.S. Fish and Wildlife Service 1999). The bald eagle population in Arizona is exposed to increasing hazards from the regionally increasing human population. These include extensive loss and modification of riparian breeding and foraging habitat through clearing of vegetation, changes in groundwater levels, groundwater pumping, surface water diversion, alteration of natural hydrologic regimes, changes in water quality, and alteration of prey base due to the presence of exotic aquatic species. Threats persist in Arizona largely due to the proximity of bald eagle breeding areas to major human population centers and recreation areas. Additionally, because water is a scarce resource in the Southwest, recreation is concentrated along available watercourses. Some of the continuing threats and disturbances to bald eagles include entanglement in monofilament fish line and fish tackle; overgrazing and related degradation of riparian vegetation; malicious and accidental harassment, including shooting, off-road vehicles, recreational activities (especially watercraft), and low-level aircraft overflights; alteration of aquatic and riparian systems for water distribution systems and maintenance of existing water development features such as dams or diversion structures; collisions with transmission lines; poisoning; and electrocution (Stalmaster 1987).

### *California Condor*

The California condor (*Gymnogyps californianus*) was listed as endangered on March 11, 1967 (32 FR 4001). Critical habitat was designated in California on September 24, 1976 (41 FR 187). Critical habitat has not been designated outside of California. The California condor remains one of the world's rarest and most imperiled vertebrate species. Despite intensive conservation efforts, the wild California condor population declined steadily until 1987, when the last free-flying individual was captured. During the 1980s, captive condor flocks were established at the San Diego Wild Animal Park and the Los Angeles Zoo, and the first successful captive breeding was accomplished at the former facility in 1988. Following several years of increasingly successful captive breeding, captive-produced condors were first released back to the wild in California in early 1992 and in Arizona starting in 1996.

The first release of condors into the wild in northern Arizona occurred on December 12, 1996. They were released within a designated nonessential experimental population area in northern Arizona and southern Utah. The area is bounded by Interstate 40 on the south, U.S. Highway 191 on the east, Interstate 70 on the north, and Interstate 15 to U.S. Highway 93 on the west. The nonessential experimental population status applies to condors only when they are within the experimental population area. For the purposes of section 7 consultation, when condors are on lands not within the National Wildlife Refuge System or the National Park System, but within the experimental population area, they are treated as if proposed for listing. When condors are on National Wildlife Refuge or National Park System lands within the designated experimental population area, they are treated as a threatened species. Any condors outside of the experimental population area are fully protected as endangered.

A five-year review of the effort indicates that, as of January 2002, 47 condors had been released in nine release events (Arizona Condor Review Team 2002). Reintroduction efforts have been complicated by predation, lead poisoning, bird-human interactions, and shootings. As of the date

of the published review, 18 birds had died and four had been returned to captivity due to behavioral concerns. After the first five years, there were 25 free-flying condors in northern Arizona with an additional eleven individuals in a flight pen for release early in 2002.

As of the date of this biological opinion, 274 California condors exist, and what is known as the Southwest (Arizona) population of California condors contained 57 individuals. That figure includes 48 free-flying individuals previously released into the population, 2 free-flying wild-fledged individuals, 2 nestlings in nests of free-flying parents, and 5 individuals temporarily held in field pens. Production in free-flying birds in the Southwest population was 1 nestling in 2003, 2 in 2004, and 2 in 2005.

### *Mexican Spotted Owl*

The MSO was listed as a threatened species in 1993 (USDI 1993). The primary threats to the species were cited as even-aged timber harvest and catastrophic wildfire, although grazing, recreation, and other land uses were also mentioned as possible factors influencing the MSO population. The FWS appointed the Mexican Spotted Owl Recovery Team in 1993, which produced the Recovery Plan for the Mexican Spotted Owl (Recovery Plan) in 1995 (USDI 1995). A detailed account of the taxonomy, biology, and reproductive characteristics of the MSO is found in the Final Rule listing the MSO as a threatened species (USDI 1993) and in the Recovery Plan (USDI 1995). The information provided in those documents is included herein by reference. Although the MSO's entire range covers a broad area of the southwestern United States and Mexico, the MSO does not occur uniformly throughout its range. Instead, it occurs in disjunct localities that correspond to isolated forested mountain systems, canyons, and in some cases steep, rocky canyon lands. Surveys have revealed that the species has an affinity for older, uneven-aged forest, and the species is known to inhabit a physically diverse landscape in the southwestern United States and Mexico.

The U.S. range of the MSO has been divided into six recovery units (RU), as discussed in the Recovery Plan. The primary administrator of lands supporting the MSO in the United States is the Forest Service. Most owls have been found within Forest Service Region 3 (including 11 National Forests in Arizona and New Mexico). According to the Recovery Plan, 91 percent of MSO known to exist in the United States between 1990 and 1993 occurred on lands administered by the Forest Service.

The proposed project will occur in the Colorado Plateau Recovery Unit which, according to the Recovery Plan, contained 62 (8 percent) of the known owl sites from 1990-1993. The Colorado Plateau RU includes most of southern and south-central Utah, plus portions of northern Arizona, northwestern New Mexico, and southwestern Colorado.

MSO habitat appears to be naturally fragmented in this RU, with most owls found in disjunct canyon systems or isolated mountain ranges. In northern Arizona, MSO have been reported in both canyon and montane situations. Recent records of MSO exist for the Grand Canyon and Kaibab Plateau, as well as for the Chuska Mountains, Black Mesa, Fort Defiance Plateau, and the Rainbow/Skeleton Plateau on the Navajo Nation. Federal lands account for 44 percent of this RU. Tribal lands collectively total 30 percent, with the largest single entity being the Navajo

Nation. Threats in this RU, according to the MSO Recovery Plan, include timber harvest; overgrazing; catastrophic fire; oil, gas, and mining development; and recreation.

Approximately 200 MSO PACs have been designated in the Colorado Plateau Recovery Unit (Shaula Hedwall pers. comm. 2005). Eleven (approximately 5.5 percent) of those PACS have been involved in actions where incidental take has been anticipated.

Historical and current anthropogenic uses of MSO habitat include both domestic and wild ungulate grazing, recreation, fuels reduction treatments, resource extraction (e.g., timber, oil, gas), and development. These activities have the potential to reduce the quality of MSO nesting, roosting, and foraging habitat, and may cause disturbance during the breeding season.

Researchers studied MSO population dynamics on one study site in Arizona (n = 63 territories) and one study site in New Mexico (n = 47 territories) from 1991 through 2002. The Final Report, titled “Temporal and Spatial Variation in the Demographic Rates of Two Mexican Spotted Owl Populations,” (*in press*) found that the Arizona population was stable (mean  $\Lambda$  from 1993 to 2000 = 0.995; 95% Confidence Interval = 0.836, 1.155) while the New Mexico population declined at an annual rate of about 6% (mean  $\Lambda$  from 1993 to 2000 = 0.937; 95% Confidence Interval = 0.895, 0.979). The study concludes that spotted owl populations could experience great (>20%) fluctuations in numbers from year to year due to the high annual variation in recruitment. However, due to the high annual variation in recruitment, the MSO is then likely very vulnerable to actions that impact adult survival (e.g., habitat alteration, drought, etc.) during years of low recruitment.

Since the owl was listed, we have completed or have in draft form a total of 156 formal consultations for the MSO. These formal consultations have identified incidences of anticipated incidental take of MSO in 358 PACs. The form of this incidental take is almost entirely in the form of harm or harassment. These consultations have primarily dealt with actions proposed by the Forest Service, Region 3. However, in addition to actions proposed by the Forest Service, Region 3, we have also reviewed the impacts of actions proposed by the Bureau of Indian Affairs, Department of Defense (including Air Force, Army, and Navy), Department of Energy, National Park Service, and Federal Highway Administration. These proposals have included timber sales, road construction, fire/ecosystem management projects (including prescribed natural and management ignited fires), livestock grazing, recreation activities, utility corridors, military and sightseeing overflights, and other activities.

### *Southwestern Willow Flycatcher*

The southwestern willow flycatcher is one of four currently recognized willow flycatcher subspecies (Phillips 1948, Unitt 1987, Browning 1993). It is a neotropical migrant that breeds in the southwestern U.S. and migrates to Mexico, Central America, and possibly northern South America during the non-breeding season (Phillips 1948, Stiles and Skutch 1989, Peterson 1990, Ridgely and Tudor 1994, Howell and Webb 1995). The historical breeding range of the southwestern willow flycatcher included southern California, Arizona, New Mexico, western Texas, southwestern Colorado, southern Utah, extreme southern Nevada, and extreme northwestern Mexico (Sonora and Baja) (Unitt 1987).

The southwestern willow flycatcher breeds in dense riparian habitats from sea level in California to approximately 8500 feet in Arizona and southwestern Colorado. Historical egg/nest collections and species descriptions throughout its range identify the southwestern willow flycatcher's widespread use of willow (*Salix* spp.) for nesting (Phillips 1948, Phillips *et al.* 1964, Hubbard 1987, Unitt 1987, San Diego Natural History Museum 1995). Currently, southwestern willow flycatchers primarily use Geyer willow (*Salix geyeriana*), coyote willow (*Salix exigua*), Goodding's willow (*Salix gooddingii*), boxelder (*Acer negundo*), saltcedar (*Tamarix* sp.), Russian olive (*Elaeagnus angustifolio*), and live oak (*Quercus agrifolia*) for nesting. Other plant species less commonly used for nesting include buttonbush (*Cephalanthus* sp.), black twinberry (*Lonicera involucrata*), cottonwood (*Populus* spp.), white alder (*Alnus rhombifolia*), blackberry (*Rubus ursinus*), and stinging nettle (*Urtica* spp.). Based on the diversity of plant species composition and complexity of habitat structure, four basic habitat types can be described for the southwestern willow flycatcher: monotypic willow, monotypic exotic, native broadleaf dominated, and mixed native/exotic (Sogge *et al.* 1997).

Tamarisk is an important component of the flycatcher's nesting and foraging habitat in Arizona and other parts of the bird's range. In 2001 in Arizona, 323 of the 404 (80 percent) known flycatcher nests (in 346 territories) were built in a tamarisk tree (Smith *et al.* 2002). Tamarisk had been believed by some to be a habitat type of lesser quality for the southwestern willow flycatcher, however comparisons of reproductive performance (U.S. Fish and Wildlife Service 2002c) and physiological conditions (Owen and Sogge 2002) of flycatchers breeding in native and exotic vegetation has revealed no difference.

Throughout its range the southwestern willow flycatcher arrives on breeding grounds in late April and May (Sogge and Tibbitts 1992, Sogge *et al.* 1993, Sogge and Tibbitts 1994, Muiznieks *et al.* 1994, Maynard 1995, Sferra *et al.* 1995, 1997). Nesting begins in late May and early June and young fledge from late June through mid-August (Willard 1912, Ligon 1961, Brown 1988a,b, Whitfield 1990, Sogge and Tibbitts 1992, Sogge *et al.* 1993, Muiznieks *et al.* 1994, Whitfield 1994, Maynard 1995). The entire breeding cycle, from egg laying to fledging, is approximately 28 days.

As reported by Smith *et al.* (2002), the largest concentrations or breeding locations of willow flycatchers in Arizona in 2001 were at the Salt River and Tonto Creek inflows to Roosevelt Lake (255 flycatchers, 141 territories); near the San Pedro/Gila river confluence (219 flycatchers, 118 territories); Gila River, Safford area (46 flycatchers, 21 territories); Alamo Lake on the Bill Williams River (includes lower Santa Maria and Big Sandy river sites) (39 flycatchers, 21 territories); Topock Marsh on the Lower Colorado River (26 flycatchers, 14 territories); Lower Grand Canyon on the Colorado River (21 flycatchers, 12 territories); Big Sandy River, Wikieup (14 flycatchers, 10 territories); and Alpine/Greer on the San Francisco River/Little Colorado River (5 flycatchers, 3 territories). The greatest numbers of flycatchers are found at two locations; Roosevelt Lake and the San Pedro/Gila confluence make up 259 (75%) of the 346 territories known in the state.

Only 68 (20%) of all known Arizona flycatcher territories in 2001 (40 on Gila River, 26 on Colorado River, 2 on Bill Williams River) were found below dams. Territories are primarily

found on free-flowing streams or surrounding impoundments. At Roosevelt (n=141) and Alamo (n=21) lakes, 162 territories (47% of statewide total) are found in the lake bottom (Smith *et al.* 2002). Recorded for the first time in the 2002 season, 5 to 10 territories were discovered in the conservation space of Horseshoe Reservoir on the Verde River (M. Ross U.S. Forest Service pers. comm.).

There are no extensive records for the actual cause of southwestern willow flycatcher mortality. Incidents associated with nest failures, human disturbance, and nestlings are typically the most often recorded due to the static location of nestlings, eggs, and nests. As a result, nestling predation and brood parasitism are the most commonly recorded causes of southwestern willow flycatcher mortality. Also, human destruction of nesting habitat through bulldozing, groundwater pumping, and aerial defoliants has been recorded in Arizona (T. McCarthy Arizona Game and Fish Department pers. comm.). Human collision with nests and spilling the eggs or young onto the ground have been documented near high use recreational areas (U.S. Fish and Wildlife Service 2002c). A southwestern willow flycatcher from the Greer Town site along the Little Colorado River in eastern Arizona, was found dead after being hit by a vehicle along SR 373. This route is adjacent to the breeding site (T. McCarthy Arizona Game and Fish Department pers. comm.).

### *Brown Pelican*

The brown pelican (*Pelecanus occidentalis*) was federally listed throughout its range in the U.S. as endangered in 1970 (35 *FR* 16047). The California brown pelican recovery plan describes the biology, reasons for decline, and the actions needed for recovery of brown pelicans along the Pacific coast (U.S. Fish and Wildlife Service 1983). In 1985, brown pelican populations on the Atlantic Coast of the U.S. (including all of Florida and Alabama) had recovered to the point where the eastern subspecies was delisted. While the California breeding populations have recovered since DDT use has stopped, persistent residues in the coastal environment continue to cause chronic reproductive problems.

Brown pelicans disperse between breeding seasons to as far north as British Columbia, Canada, and south to Mexico and possibly to Central America. Post-breeding dispersal patterns depend largely on oceanographic conditions, which in turn influence food availability (Anderson and Anderson 1976). During the non-breeding season, which varies between colonies but typically extends from July to January, brown pelicans roost communally. Roosting sites and loafing areas are essential habitat for breeding brown pelicans and non-breeding local and Mexican migrants. Brown pelicans have wettable plumage so they must have terrestrial roost sites to dry wet plumage after feeding or swimming (Jaques and Anderson 1987). Roost sites are also important for resting and preening. The essential characteristics of roosts include nearness to adequate food supplies; presence of physical barriers to predation and disturbance; sufficient surface space for individuals to interact normally; and adequate protection from adverse environmental factors such as wind and surf (Jaques and Anderson 1987). In Arizona, brown pelicans are seen on sand bars in rivers and lakes, dam structures, sewer pond dikes, retaining walls around reservoirs, and similar areas where they are not frequently disturbed.

In Arizona, adult and juvenile brown pelicans are seen annually along the Colorado River, often in association with the wildlife refuges found in that area. In the rest of Arizona, juvenile brown pelicans are observed commonly at water bodies along the Gila River drainage, such as at Tempe Town Lake, where five different juveniles were seen in 2003 (Michael Coffeen U.S. Fish and Wildlife Service pers. comm.). Other juvenile brown pelicans have been seen at other smaller water bodies such as the Gila Bend Air Force Facility sewer ponds. These sightings are typically reported because of the potential hazards to aircraft that the birds represent.

### *Humpback Chub*

The humpback chub (*Gila cypha*) was listed as endangered on March 11, 1967 (32 FR 4001). Critical habitat for humpback chub was designated in 1994 (59 FR 13374). Recovery goals for humpback chub, which amend and supplement the 1990 Recovery Plan, were finalized in 2002 (U.S. Fish and Wildlife Service 2002a).

The humpback chub is endemic to the Colorado River but the fish was not described as a species until the 1940s (Miller 1946), presumably because of its restricted distribution in remote white water canyons (U.S. Fish and Wildlife Service 1990). Because of this, its original distribution is not known.

Little is known about the specific spawning requirements of the humpback chub. It is known that the fish spawn soon after the highest spring flows when water temperatures approach 20 degrees C (68 degrees F) (Kaeding *et al.* 1990; Karp and Tyus 1990; U.S. Fish and Wildlife Service 1990). Adult humpback chub may be found in deep, swift waters with varying depths. Humpback chub spawn in the spring between March and May in the LCR when water temperatures are between 16 and 22 degrees C (60.8 to 71.6 degrees F). Swimming abilities of young-of-year humpback chub were determined to be significantly reduced when laboratory water temperatures were reduced from 20 to 14 degrees C (68 to 57.2 degrees F). Humpback chub spawned in Black Rocks on the Colorado River in 1983 when maximum daily water temperatures were 12.6 to 17 degrees C (54.7 to 62.3 degrees F) (Archer *et al.* 1985). Backwaters, eddies, and runs have been reported as common capture locations for young-of-year humpback chub (Valdez and Clemmer 1982). These data indicate that in Black Rocks and Westwater Canyon, young utilize shallow areas. Habitat suitability index curves developed by Valdez *et al.* (1990) indicate young-of-year prefer average depths of 2.1 feet with a maximum of 5.1 feet. Average velocities were reported at 0.2 feet per second.

Populations of this species occur in the LCR and Colorado River in the Grand Canyon, Black Rocks area of the Colorado River, Westwater Canyon, Cataract Canyon, Desolation/Gray Canyon, and Yampa Canyon (Valdez and Clemmer 1982, U.S. Fish and Wildlife Service 1990). A 2003 report (Humpback Chub Ad Hoc Committee 2003) indicated the following sizes of six populations: Yampa Canyon, 400 individuals; Desolation/Gray Canyon, 1,500 (in 2001) and 1,700 (in 2002); Black Rocks Canyon, 1,000; Westwater Canyon, 2,200-4,700; Cataract Canyon, 500; and Grand Canyon, 2,000-4,000.

The Grand Canyon population of humpback chub is the only successfully reproducing population in the lower Colorado River basin (Kaeding and Zimmerman 1983, Valdez and Ryel

1995). Additional aggregations of humpback chub have been documented elsewhere in Grand Canyon (Valdez and Ryel 1995) but the contribution of these fish to the species is not known. Recent data compiled by GCMRC indicates overall declines in the abundance and recruitment of humpback chub in the LCR since the early 1990s. These analyses were made from mark-recapture data in an open population model to construct estimates of population recruitment (1989-1997 brood years) and sub-adult and adult abundance (including fish over 150 mm [5.9 inches] total length; 1991-1999). Causes for the decline of humpback chub in Grand Canyon likely include temperature; infestation of Asian tapeworm; predation by or competition with warm-water non-native catostomids, ictalurids, cyprinids, and cold-water salmonids; and the hydrology of the regulated Colorado River.

A 2003 report (Humpback Chub Ad Hoc Committee 2003) stated that recent analyses of humpback chub in Grand Canyon have caused considerable concern due to uncertainties about the current size of the population and the strong probability that the population has been declining for at least a decade. The report stated that the most recent (at the time) assessment indicates that the spawning population is probably somewhere between 2,000 and 4,000 age-4 and older. It also reported that a different method, using the 'Supertag' assessment model, resulted in an estimate of 1,100-1,200 adults in 2001. Estimates of the LCR spawning population for 1992-95 were 2,000-4,700 adults. The assessment model also determined a lower level of recruitment (fish reaching maturity at age-4) over the last decade. If recruitment continues to be stable at an average of the 1995-98 rate, the population will likely stabilize at 1,000-3,000 adults.

A stock assessment of the humpback chub in the LCR was conducted in 2004 (Van Haverbeke 2005). Mark-recapture efforts indicate that there were 2,334 humpback chub (greater than 150 mm in total length) during the spring of 2004. That total included an estimate of 1,816 individuals that were 200 mm in length (four year old adults). The results of the fall mark-recapture effort indicate that there were 2,565 individuals including 796 adults.

The Humpback Chub Ad Hoc Committee (2003) identified flow regimes from dam releases, water temperature, predators, hazardous materials spills, and parasites as the immediate threats to humpback chub in Grand Canyon. Many of the past and current threats to the humpback chub in Grand Canyon are related to the presence and operation of Glen Canyon Dam (Humpback Chub Ad Hoc Committee 2003). Extreme daily flow fluctuations destabilize habitat, especially for young fish. High summer/fall base flows inundate juvenile rearing habitat. Cold hypolimnetic releases inhibit egg hatching and larval survival. Cold water temperatures cause thermal shock of fish less than 50 mm in total length descending from seasonally-warmed tributaries. Cold water temperatures enhance reproduction/survival of trout which are predators of humpback chub.

Scientific studies and recreation also affect humpback chub. Repeated capture and marking (PIT tagging) may lead to mortality. Recreational use of the LCR may affect reproductive habitat or interfere with reproduction.

Humpback chub are threatened by predation, parasites, and disease. Numerous potential predators and competitors of humpback chub occupy various tributaries and can invade Grand

Canyon. Channel catfish, black bullhead, and brown and rainbow trout are known predators of humpback chub. Common carp may consume large numbers of incubating eggs. Red shiners and fathead minnows compete with and prey upon young native fish in nursery habitat.

A large number (about 90%) of juveniles and adults are infested with the Asian tapeworm. Severe infestation can impact the gut and lead to death. Wounds caused by the *Lernaea* anchor copepod may fester and lead to infection. Whirling disease and intestinal nematodes are not found in humpback chub.

Environmental contaminants may also affect humpback chub. A number of potential sources of hazardous materials exist in the LCR watershed. Collectively, these affect water quality in occupied and critical habitat in the LCR and could affect reproduction and survival of all stages of humpback chub. A spill from an overturned tanker truck at one of the Cameron bridges could be transported downstream to occupied and critical habitat resulting in possible losses of all ages of humpback chub at the only spawning location of the species in Grand Canyon.

#### *Humpback Chub Critical Habitat*

Seven reaches of the Colorado River system were designated as critical habitat for humpback chub for a total river length of 379 miles (59 FR 13374). The reaches include a portion of the Yampa River in Colorado, portions of the Green and Colorado rivers in Utah, and portions of the Little Colorado and Colorado rivers in Arizona. Known primary constituent elements include water, physical habitat, and biological environment as required for each life stage. The threats identified in the humpback chub section above can also affect the primary constituent elements.

#### *Razorback Sucker*

The razorback sucker (*Xyrauchen texanus*) was first proposed for listing under the Endangered Species Act (Act) on April 24, 1978, as a threatened species, but was later withdrawn for technical reasons. In March 1989, the Fish and Wildlife Service was petitioned by a consortium of environmental groups to list the razorback sucker as an endangered species. The Fish and Wildlife Service made a positive finding on the petition in June 1989, which was published in the Federal Register on August 15, 1989. A final rule was published on October 23, 1991, with an effective date of November 22, 1991. The Razorback Sucker Recovery Plan was released in 1998 (U.S. Fish and Wildlife Service 1998). Recovery Goals were approved in 2002 (U.S. Fish and Wildlife Service 2002b).

The razorback sucker was once abundant in the Colorado River and its major tributaries throughout the Basin, occupying 3,500 miles of river in the United States and Mexico (U.S. Fish and Wildlife Service 1993). Records from the late 1800s and early 1900s indicated the species was abundant in the lower Colorado and Gila river drainages (Kirsch 1889, Gilbert and Scofield 1898, Minckley 1983, Bestgen 1990).

Since 1997, significant new information on recruitment to the wild razorback sucker population in Lake Mead has been developed (Holden *et al.* 2000) that indicates some degree of successful

recruitment is occurring. This degree of recruitment has not been documented elsewhere in the other remaining populations.

Adult razorback suckers use most of the available riverine habitats, although there may be an avoidance of whitewater type habitats. Main-channel habitats tend to be low velocity ones such as pools, eddies, nearshore runs, and channels associated with sand or gravel bars (Bestgen 1990). Adjacent to the main channel, backwaters, oxbows, sloughs, and flooded bottomlands are also used by this species. From studies conducted in the upper Colorado River basin, habitat selection by adult razorback suckers changes seasonally. They move into pools and slow eddies from November through April, runs and pools from July through October, runs and backwaters during May, and backwaters, eddies, and flooded gravel pits during June. In early spring, adults move into flooded bottomlands. They use relatively shallow water (ca. 3 feet) during spring, and deeper water (5-6 feet) during winter.

Razorback suckers also use reservoir habitat, where the adults may survive for many years. In reservoirs they use all habitat types, but prefer backwaters and the main impoundment (U.S. Fish and Wildlife Service 1998). Much of the information on spawning behavior and habitat comes from fishes in reservoirs where observations can readily be made. Spawning takes place in the late winter to early summer depending upon local water temperatures. Various studies have presented a range of water temperatures at which spawning occurs. In general, temperatures between 10° to 20° C are appropriate (summarized in Bestgen 1990). They typically spawn over cobble substrates near shore in water 3-10 feet deep (Minckley *et al.* 1991). There is an increased use of higher velocity waters in the spring, although this is countered by the movements into the warmer, shallower backwaters and inundated bottomlands in early summer (McAda and Wydoski 1980, Tyus and Karp 1989, Osmundson and Kaeding 1989). Spawning habitat is most commonly over mixed cobble and gravel bars on or adjacent to riffles (Minckley *et al.* 1991).

Habitat needs of larval and juvenile razorback suckers are reasonably well known. In reservoirs, larvae are found in shallow backwater coves or inlets (U.S. Fish and Wildlife Service 1998). In riverine habitats, captures have occurred in backwaters, creek mouths, and wetlands. These environments provide quiet, warm water where there is a potential for increased food availability. During higher flows, flooded bottomland and tributary mouths may provide these types of habitats.

Razorback suckers are somewhat sedentary; however, considerable movement over a year has been noted in several studies (U.S. Fish and Wildlife Service 1998). Spawning migrations have been observed or inferred in several locales (Jordan 1891, Minckley 1973, Osmundson and Kaeding 1989, Bestgen 1990, Tyus and Karp 1990). During the spring spawning season, razorbacks may travel long distances in both lacustrine and riverine environments, and exhibit some fidelity to specific spawning areas (U.S. Fish and Wildlife Service 1998).

Range-wide, the status of razorback sucker is exceedingly poor due to lack of significant recruitment, ongoing habitat loss, and continuing pressure from nonnative species. The range-wide trend for the razorback sucker is a continued decrease in wild populations due to a lack of sufficient recruitment and the loss of old adults due to natural mortality. U.S. Fish and Wildlife

Service recovery efforts under the Recovery Implementation Program are working towards the goals of replacing the aging population in Lake Mohave, restoring the Lake Havasu population, and increasing the lower river populations. Stocking efforts in the Upper Colorado River Basin, and in lakes Mohave and Havasu and the lower Colorado River Basin below Parker Dam are ongoing, with the 30,000-fish replacement for Lake Havasu completed in 2001. The most critical of these efforts is the replacement of the Lake Mohave population using wild-caught larvae from the lake. By the end of 2001, the initial goal to stock 50,000 sub-adult fish into Lake Mohave was reached (Tom Burke Bureau of Reclamation pers. comm.). The Lake Mohave efforts will continue to meet the second goal, which is to establish a population of 50,000 adults.

#### *Razorback Sucker Critical Habitat*

Critical habitat was designated in 15 river reaches in the historical range of the razorback sucker on March 21, 1994, with an effective date of April 20, 1994. Critical habitat included portions of the Colorado, Duchesne, Green, Gunnison, San Juan, White, and Yampa rivers in the Upper Colorado River Basin, and the Colorado, Gila, Salt, and Verde rivers in the Lower Colorado River Basin.

There are three areas that are considered primary constituent elements: water, physical habitat, and the biological environment (U.S. Fish and Wildlife Service 1998).

The water element refers to water quality and quantity. Water quality is defined by parameters such as temperature, dissolved oxygen, environmental contaminants, nutrients, turbidity, and others. Water quantity refers to the amount of water that must reach specific locations at a given time of year to maintain biological processes and to support the various life stages of the species. The physical habitat element includes areas of the Colorado River system that are or could be suitable habitat for spawning, nursery, rearing, and feeding, as well as corridors between such areas. Habitat types include bottomland, main and side channels, secondary channels, oxbows, backwaters, and other areas in the 100-year floodplain, which when inundated may provide habitat or corridors to habitat necessary for the feeding and nursery needs of the razorback sucker. The biological environment element includes living components of the food supply and interspecific interactions. Food supply is a function of nutrient supply, productivity, and availability to each life stage. Negative interactions include predation and competition with introduced nonnative fishes.

#### *Kanab Ambersnail*

The Kanab ambersnail (*Oxyloma haydeni kanabensis*), a land snail, was listed as an endangered species under the Act without critical habitat in 1992 (57 FR 13657). Two extant populations are known at two southwestern springs: one on private land near Kanab, Utah, and the other at Vaseys Paradise, 31.5 river miles downstream from Lees Ferry along the Colorado River. A third population near “the Greens,” a seep-fed marsh, was believed to be lost due to dewatering in the last decade (U.S. Fish and Wildlife Service 1995b). However, in August 1998, a meta-population of *Oxyloma haydeni* was discovered near the type locality (“the Greens”), in the Kanab Creek drainage near Kanab, Utah (Meretsky 2000). A taxonomic analysis of three collections from this group identified them as Kanab ambersnail. Information on the genetics is

not complete, but it appears that the individuals may be distinct. Preliminary genetic screening also indicates that the ambersnails at Vaseys are genetically distinct from those found in Utah (Miller *et al.* 1997).

In 1998 the AGFD, in conjunction with the NPS, introduced the Kanab ambersnail into three locations within Grand Canyon National Park. One of these sites, Upper Elves Chasm, has shown success including recruitment, overwinter survival, and increased density of snails (Sorenson and Nelson 2002). Although the area is small (77 square feet) it meets an important recovery goal for this species.

### *Desert Tortoise*

The desert tortoise is found in portions of California, Arizona, Nevada, and Utah. It also occurs in Sonora and Sinaloa, Mexico. The Mojave population of the desert tortoise includes those animals living north and west of the Colorado River in the Mojave Desert of California, Nevada, Arizona, southwestern Utah, and in the Colorado Desert in California. On August 4, 1989, the Fish and Wildlife Service published an emergency rule listing the Mojave population of the desert tortoise as endangered (54 FR 42270). On April 2, 1990, the Fish and Wildlife Service determined the Mojave population of the desert tortoise to be threatened (55 FR 12178). Reasons for the determination included loss of habitat from construction projects such as roads, housing and energy developments, and conversion of native habitat to agriculture. Grazing and off-highway vehicle (OHV) activity have degraded additional habitat. Also cited as threatening the desert tortoise's continuing existence were illegal collection by humans for pets or consumption, upper respiratory tract disease (URTD), predation on juvenile desert tortoises by common ravens (*Corvus corax*) and kit foxes (*Vulpes macrotis*), and collisions with vehicles on paved and unpaved roads. Fire is an increasingly important threat to desert tortoise habitat. Over 500,000 acres of desert lands burned in the Mojave Desert in the 1980s. Fires in Mojave desert scrub degrade or eliminate habitat for desert tortoises (Appendix D of U.S. Fish and Wildlife Service 1994a).

Desert tortoises are most active during the spring and early summer when annual plants are most common. Additional activity occurs during warmer fall months and occasionally after summer rain storms. Desert tortoises spend the remainder of the year in burrows, escaping the extreme conditions of the desert. The size of desert tortoise home ranges vary with respect to location and year. Females have long-term home ranges that are approximately half that of the average male, which range from 25 to 200 acres (Berry 1986). Over its lifetime, each desert tortoise may require more than 1.5 square miles of habitat and make forays of more than 7 miles at a time (Berry 1986). In drought years, the ability of tortoises to drink while surface water is available following rains may be crucial for tortoise survival. During droughts, tortoises forage over larger areas, increasing the likelihood of encounters with sources of injury or mortality including humans and other predators. Desert tortoises possess a combination of life history and reproductive characteristics that affect the ability of populations to survive external threats. Tortoises may require 20 years to reach sexual maturity (Turner *et al.* 1984; Bury 1987).

The desert tortoise is most commonly found within the desert scrub vegetation type, primarily in creosote bush scrub. In addition, it is found in succulent scrub, cheesebush scrub, blackbrush

scrub, hopsage scrub, shadscale scrub, microphyll woodland, Mojave saltbush-allscale scrub, and scrub-steppe vegetation types of the desert and semidesert grassland complex (U.S. Fish and Wildlife Service 1994a). Within these vegetation types, desert tortoises potentially can survive and reproduce where their basic habitat requirements are met. These requirements include a sufficient amount and quality of forage species; shelter sites for protection from predators and environmental extremes; suitable substrates for burrowing, nesting, and overwintering; various plants for shelter; and adequate area for movement, dispersal, and gene flow. Throughout most of the Mojave Region, tortoises occur most commonly on gently sloping terrain with soils ranging from sand to sandy-gravel and with scattered shrubs, and where there is abundant inter-shrub space for growth of herbaceous plants. Throughout their range, however, tortoises can be found in steeper, rockier areas. In Arizona, tortoises are considered to be active from approximately March 15 through October 15. Further information on the range, biology, and ecology of the desert tortoise can be found in Berry and Burge (1984); Burge (1978); Burge and Bradley (1976); Bury et al. (1994); Germano et al. 1994; Hovik and Hardenbrook (1989); Karl (1981, 1983a, 1983b); Luckenbach (1982); U.S. Fish and Wildlife Service (1994a); and Weinstein et al. (1987).

## **ENVIRONMENTAL BASELINE**

The environmental baseline includes past and present impacts of all Federal, State, or 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 consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

### **A. STATUS OF THE SPECIES WITHIN THE ACTION AREA**

#### *Bald Eagle*

The abundance and distribution of wintering bald eagles along the Colorado River were unknown before 1963 (James 2005). Post-dam construction winter surveys suggest that eagles were not present immediately after construction of Glen Canyon Dam. Commercial river guides on the Colorado River first noted winter bald eagle concentrations on the southern Colorado Plateau below Glen Canyon Dam at Nankoweap Creek in the early 1980s. Wintering bald eagles increased in numbers along the Colorado River in GRCA, evidently in response to trout availability in Nankoweap Creek and in the river. By 1988, the mouth of Nankoweap Creek (RM 52) was a concentration point for eagle activity due to the apparent ease with which eagles could forage on spawning trout in the shallow, exposed creek channel. Eagles have also been located in other areas above the confluence of the Little Colorado River. Wintering bald eagles are present each year along the upper half of the Colorado River corridor from late fall (October-November) through early spring (March-April). Wintering eagles also occur at Lake Mead. During surveys conducted between 1989-1994 in GRCA, eagles were observed during every aerial survey with numbers ranging from 2 to 23. Eagles were found to be distributed evenly along the river corridor when conditions were suitable and rainbow trout were spawning in tributaries except in January and February when the birds concentrated at small tributaries.

Three sites in GRCA have been identified as winter roost areas: (1) Nankoweap Creek near its confluence with the Colorado River (approximately RM 52); (2) Bright Angel Creek near Phantom Ranch (RM 87.8); and (3) near Twin Overlooks along East Rim Drive on the South Rim. During the winter peak of occurrence (late February - early March), bald eagles have been observed to range in number from 13 to 24 birds between Glen Canyon Dam and the confluence with the Little Colorado River. A concentration of eagles occurred at the mouth of Nankoweap Creek in the late 1980s and early 1990s, but in 1995 Nankoweap experienced a flash-flood which altered the delta and the spawning habitat of trout at that location. Subsequently, the winter population of bald eagles at that location has been less concentrated.

Although the winter population of bald eagles in GRCA has not been formally monitored since 1995, opportunistic monitoring has occurred. For example, during the winter of 2003-04, a total of 24 bald eagles were observed scattered among a total of 18 locations along the river corridor from Lees Ferry to RM 132 (Table 2).

### *California Condor*

Many of the condors in northern Arizona are fitted with radio transmitters allowing field biologists to monitor their movements. Monitoring indicates condors are using habitat throughout GRCA, with concentration areas in Marble Canyon, Desert View to the Village on the South Rim, the Village to Hermits Rest, and Bright Angel Point on the North Rim (James 2005).

Condors of all ages, but especially older birds, travel throughout the Grand Canyon complex and along the Colorado River corridor (Arizona Condor Review Team 2002). Condors have been known to occur at river level at various portions of the Colorado River in GRCA. One consistent location is the upper portion of Marble Canyon at and just below Lees Ferry. An increasing number of condors typically begin visiting the Marble Canyon portion of the Colorado River corridor in February, March, and April. Condors have been observed at Phantom Ranch. The presence of river runners in the river corridor may attract some condors, especially younger condors. Temporary removal of condors from the wild due to negative interactions with humans has occurred during reintroduction efforts in Arizona.

Peregrine Fund records include an occurrence of a condor in the Quartermaster Canyon area for about three hours on April 25, 2004 (Michele James pers. comm. 2005). Tracking also indicates some condor use at Pearce Ferry at Lake Mead just west of the project area.

### *Mexican Spotted Owl*

Mexican spotted owls have been reported in GRCA since the 1920s (James 2005). The presence of MSO within GRCA was confirmed in 1992 through surveys of approximately 6,000 acres of suitable habitat on the North and South rims and in canyons extending up from the Colorado River. Surveys were also conducted on the South Rim in 1994 and 1995, and in 1998 and 1999 on the North Rim; no owls were confirmed during these surveys. In 1999, additional surveys were conducted in side canyon habitat along the Colorado River corridor and MSO were

detected at six locations. Additional surveys were conducted in 2001 along the river corridor and 15 new MSO territories were located. A second year of survey in the river corridor was conducted in 2002 and 13 new territories were found, and 13 of the owl sites located in 2001 were visited to determine occupancy and nesting status. Surveys in 2001 and 2002 in Grand Canyon resulted in 34 previously-unknown MSO territories. Limited monitoring of known territories took place in 2003.

Canyon habitat for the MSO is scattered throughout Grand Canyon below the rims. Predicted owl breeding habitat occurs within steep-walled canyons and mixed-conifer forest, including much of the Red Wall formation and steep forest on the North Rim. Predicted habitat in GRCA has been spatially defined through a geographic information system (GIS) model and is described as cool canyon habitat having low thermal intensity, short thermal duration, and steep slopes. The coolness and short thermal duration is generally the result of vertical rock cliffs, cliff wall, and aspect, and is seldom due to dense vegetative canopy cover. Modeling of MSO canyon habitat has resulted in an estimate of 3,127 acres within GRCA. The results of the habitat modeling have directed recent MSO survey efforts.

All known breeding sites in GRCA have been located below the canyon rims within steep-walled sandstone canyons (James 2005). In these locations, the owl is associated with steep sandstone canyons with relatively open Great Basin or Mojave Desert scrub or Great Basin Conifer Woodland vegetation communities.

A MSO radio telemetry study began in 2004 and will continue through 2006. Six MSO, each from different territories, were instrumented with telemetry equipment in 2004. This study may provide useful information in determining movements of owls from territories located within the river corridor.

The size and extent of the MSO population at GCRA is currently unknown. As a result of the surveys to date, GRCA has found approximately 60 MSO individuals and has designated 40 MSO PACs. An additional PAC was designated in 2004 for the Bright Angel territory. The average size of the designated PACs is 762 acres. These PACs are below the rims of the Grand Canyon. Because the MSO in GRCA are generally located in very rugged topography, very little is known about the occupancy or reproductive success within these PACs. Three nesting pairs and one pair with 2 owlets were reported in 2001, but no nesting was observed in 2002. At least two nests were known in 2004, both containing triplets. As of June 15, 2005, the Boucher PAC had three young (one of which was found dead below the nest), the Cremation PAC had two young, and the Bright Angel PAC had two young.

It is possible that the GRCA population of MSO may be a source population for other smaller canyonland subpopulations in the Colorado Plateau Recovery Unit. MSO surveys have covered approximately half of the rugged suitable habitat predicted to be within GRCA. A population of over 200 spotted owls could be present within GRCA given the current occupancy rates.

No PACs are designated within GRCA within the Lower Gorge. However, unsurveyed habitat occurs in that area. Table 3 is a summary of the MSO PACS that could be affected by the proposed action.

### *Southwestern Willow Flycatcher*

Flycatcher territories in the Grand Canyon are generally located in the tamarisk-dominated riparian vegetation along the river corridor but not in the mesquite-acacia and hackberry-dominated habitats higher on the slopes (James 2005). However, two sites occupied by the flycatcher in 2004 (RM 259.5 and RM 274.5) are described as containing Gooding willow as well as tamarisk. The Burnt Springs site (RM 259.5) contains 700 meters of mature Gooding willow. The flycatcher's nesting habitat is dynamic in that it varies in occupancy, suitability, and location over time. Because river channels, river flows, and floodplains are varied and can change, the location and quality of nesting habitat may also change over time. Tables 4 and 5 summarize historical and recent territories, nesting sites, and habitat in GRCA.

#### Lees Ferry to Diamond Creek

Southwestern willow flycatchers have consistently nested along the Colorado River in the Grand Canyon in recent years (James 2005). Suitable habitat is extremely disjunct through the river corridor from approximately RM 28.3 to RM 274. Surveys conducted between 1992 and 2004 indicate a very small resident breeding population between Lees Ferry and Diamond Creek.

Since 1993, flycatchers have consistently been present during the breeding season at RM 50.5-51.5. Since 2003, the area around RM 28-29 has been occupied. Another area of importance in the mid-1990s was RM 71-71.5. However, that area does not appear to have been occupied for the last 10 years.

In 2004, GRCA implemented an emergency closure at two sites. The closure was in effect from May 1 to July 15 and included closure to visitor use including hiking, camping, and river landings at RM 28.1-28.5 (river left) and RM 50.2-50.6 (river left). Closures at RM 28 and RM 50 have been implemented in the past. Closure at Cardenas (RM 70) was instituted in the early and mid-1990s.

#### Lower Gorge

Newly-developed habitat supporting a relatively large breeding population at the Colorado River inflow to Lake Mead was recently inundated, and flycatchers no longer breed at that site (James 2005). The Colorado River in Grand Canyon downstream of Separation Canyon is strongly influenced by water levels in Lake Mead. Potential willow flycatcher habitat in the area has changed dramatically in the last three years as the result of a 27 meter drop in the level of Lake Mead since 2000. Areas that were inundated in the late 1990s are now well above the current water level and the existing riparian vegetation in many of these areas is dead or dying.

In 2002 and 2003, the Lower Gorge area of Grand Canyon (RM 246-272) had no resident flycatchers. That result represented a decrease from 12 territories in 2001 and the second consecutive year without residents since surveys began in 1997. In 2003, surveys were conducted in the Lower Gorge at locations surveyed during previous years of willow flycatcher studies on the lower Colorado (roughly Spencer Canyon [RM 246] to the western boundary of

GRCA [RM 276]). No southwestern willow flycatchers were detected in the Lower Gorge within GRCA in 2003. Surveys in 2004 in the Lower Gorge located a single resident southwestern willow flycatcher at Burnt Springs (RM 259.5) and a single nesting pair (with three fledglings) at RM 274.5.

#### *Brown Pelican*

Brown pelicans were observed along the Colorado River corridor in GRCA in mid- to late-June 2004 (James 2005). These individuals were thought to be immature pelicans moving upstream from areas such as Lake Mohave. Reports included an aggressive pelican at Phantom Ranch near the boat docking area. A pelican was observed fishing around the Hermit area and approaching boats. There was also a report of a possible dead pelican at Lava Chuar in late June 2004. It is not known if these reports were of different individuals.

#### *Humpback Chub*

Within the Grand Canyon, the majority of humpback chub are associated with the lower 14.9 km of the Little Colorado River, and the adjacent 13.5 km of the main stem (6.9 km upstream and 6.6 km downstream of the LCR inflow) (James 2005). Consistent successful reproduction appears to occur only in the Little Colorado River, with insignificant reproduction in other major tributaries (e.g., Bright Angel Creek, Shinumo Creek, Kanab Creek) in Grand Canyon. The consistently low recruitment of humpback chub in the Lower Colorado River Basin is resulting in a decline in the overall population. In 2002, humpback chub abundance was estimated to be between 2,000 and 4,700 adults.

#### *Humpback Chub Critical Habitat*

Critical habitat is designated for the species in the project area from river mile 8 of the Little Colorado River to its confluence with the Colorado River, and from Nautiloid Canyon to Granite Park along the Colorado River. This represents approximately 28 percent of the historical habitat for the species (U.S. Fish and Wildlife Service 1994b). Primary constituent elements include water, physical habitat, and biological environment as required for each particular life stage of the species.

The warmer water of the Little Colorado River at its confluence with the Colorado River is a critical element in the successful spawning and survival of young humpback chub. None of the humpback chub aggregations outside the Little Colorado River region have enough adults to form viable populations without input from the Little Colorado River population. The present population of humpback chub in Grand Canyon is almost entirely dependent upon production at the Little Colorado River. Humpback chub spawn between March and May, and chub from the main stem usually stage at the mouth of the Little Colorado in March and move variable distances upstream during April to June to spawn.

### *Razorback Sucker*

The Lake Mead population of razorback sucker is estimated at 100-2000 individuals (not including some stocked fish) (James 2005). While none of the populations are confirmed to be self-sustaining, recent recruitment of wild-bred young are only documented in the Lake Mead population. The two known spawning areas for the razorback sucker in Lake Mead are both in immediate proximity to a developed marina. The Blackbird Point area is across the channel from Las Vegas Marina, and the Echo Bay site is upstream of Echo Bay Marina within the Bay. Telemetry studies indicate that adult razorback suckers use the spawning areas intensively during the November to April spawning period and may also be found in the area during the non-spawning period. Ongoing research is investigating dispersal of stocked fish into the system, habitat preferences and use, spawning at Lake Mead, and the reasons for successful recruitment to that population.

A small number of razorback larvae were captured in upper Lake Mead near Pearce Ferry Bay in 2000, and in 2001 they were found further downstream near Driftwood Island Bay. Recently, extensive netting efforts were conducted in this area in an attempt to find adults, but none were detected. Four sonic-tagged adult razorbacks were planted in that area of Lake Mead in the hope that they would congregate with adults that may be in the area, but those attempts failed. The presence of larvae led to the conclusion that some adults were in the general area (or farther up river in GRCA) as recently as 2001.

There are few historical records of razorback suckers in the Grand and Marble canyons, possibly due to lack of historical sampling in these inaccessible whitewater canyons. Although the species has been extirpated from its historical riverine habitats in the lower Colorado River basin, the species may never have been common in whitewater canyons there.

### *Razorback Sucker Critical Habitat*

Critical habitat is designated for the species in the project area along the Colorado River from its confluence with the Paria River to Hoover Dam including Lake Mead to the full pool elevation. Primary constituent elements include water, physical habitat, and biological environment as required for each particular life stage of the species.

### *Kanab Ambersnail*

Kanab ambersnail habitat at Vaseys Paradise is characterized by large patches of mixed vegetation composed primarily of native crimson monkeyflower, non-native watercress, and native water sedge. Within this habitat, they are often found in the dead and decaying monkeyflower litter, and on live watercress stems and leaves (James 2005).

Estimates of the Kanab ambersnail population at Vaseys Paradise have ranged from 18,476 individuals in March 1995 to 104,004 individuals in September 1995. These estimates are subject to possible error since various sampling methods were used and habitat area measurements were not refined. Standardized techniques were used in 1997 and 1998 and the Vaseys Paradise population was estimated to be between 26,129 and 40,553 snails. Monitoring

of the species at Vaseys Paradise below the 100,000 cubic feet per second (cfs) stage height occurred quarterly starting in March 1995 and changed to biannually starting in 2001.

A translocated population of Kanab ambersnail is at Upper Elves Chasm at approximately RM 116.6. The habitat at this site is predominately composed of monkeyflower and maidenhair fern, and to a lesser extent sedges, rushes, cattails, watercress, helleborine orchids, and grasses. A perennial seep flows through the release area and drains into a large pool at the base of the vegetated bench. The release area is located above a sawgrass patch, next to a large pool at the base of the vegetated bench. A lightly used visitor trail is located on the other side of the pool. The site is accessible only from the river corridor and requires climbing to access it.

Two seep/spring sites (the upper drainage of Stone Creek and the spring at RM 148.1) within the river corridor contain habitat suitable for Kanab ambersnail. The ease of river runner accessibility to these areas is not known, but if translocation efforts continue in GRCA and include these areas in the future, a review of potential recreational impacts should be conducted at that time.

### *Desert Tortoise*

The Mohave population of this species was not known or suspected in GRCA until recently (James 2005). In May 2004, biologists from Lake Mead National Recreation Area and GRCA discovered desert tortoise scat in GRCA below the rim on the trail along Whitmore Canyon on the north side of the River (approximately RM 188). Follow-up surveys conducted in July 2004 discovered a desert tortoise burrow approximately 1.8 kilometers from the GRCA boundary on LAME. Surveys of the rim area near the confluence of Whitmore Canyon and the Colorado River (trailhead area) found no sign of desert tortoise. However, in a small wash just east of the trailhead/camping area, desert tortoise scat was found in two locations. The scat was located just above the rim, approximately 1,000-1,500 feet above the river. The trail up Whitmore Canyon from the river is well-established and the scat was located within 50-100 meters of the trail in a small wash. In late August 2004, the University of Reno confirmed that the scat collected from the Whitmore Wash was from a desert tortoise of the Mohave population.

The number of tortoise present in this area is unknown. It is not clear how they came to be in this area (e.g., naturally occurring and never previously located or perhaps transplanted into the area from areas of known populations to the west). In addition to the trail in the area, a road is present in the adjacent LAME that provides access to vehicles to the rim and there is a large bare area where camping takes place. Off-highway vehicle use (OHV) use has been observed in this area.

## **B. FACTORS AFFECTING SPECIES' ENVIRONMENT WITHIN THE ACTION AREA**

### *Bald Eagle*

Bald eagles may be affected by the special flight rules (overflights) that may overlap a portion of the CRMP project area. In the biological opinion (02-21-97-F-0085) developed for the special

flight rules, we anticipated an unquantifiable incidental take in the form of harassment due to disturbance, flushing, or displacement of eagles. Additional take in the form of kill, estimated at one bird in five years, was anticipated from collisions.

Bald eagles in the project area were affected by experimental releases from Glen Canyon Dam and removal of non-native fish (formal consultations 02-21-03-F-0016, 02-21-03-F-0016-R1, 02-21-03-F-0016-R2, and 02-21-03-F-0016-R3). The consultations conducted for those actions found that the removal of trout may affect the local abundant food resources for wintering bald eagles. Incidental take of bald eagles was not anticipated.

Bald eagles in the project area were affected by a Bright Angel trout reduction project (02-21-04-F-0109). The consultation found that the food supply and normal behavior of wintering bald eagles would be affected by the action. Incidental take of bald eagles was not anticipated.

Unlike other wintering populations of bald eagles, those in Grand Canyon are sensitive to humans, flushing at >0.5 km from approaching boats or hikers (James 2005). Bald eagle distribution in Grand and Glen Canyons appears to be negatively related to human disturbance. The high intensity of recreation in the upper reaches of Grand Canyon may be responsible for the general rarity of bald eagles in this area. Recreational fishing at Nankoweap Creek may disturb eagles.

#### *California Condor*

California condors may be affected by the special flight rules (overflights) that may overlap a portion of the CRMP project area. In the biological opinion (02-21-97-F-0085) developed for the special flight rules, we anticipated that an unquantifiable number of condors would be affected by the special flight rules. Take was expected to be in the form of harassment or accidental displacement when startled individuals are flushed from a perch site by the proposed low-level flights. Additional take in the form of kill, estimated at one bird in five years, was anticipated from collisions.

California condors may be affected by the GRCA fire use program that could be conducted in a portion of the CRMP project area. In the biological opinion (02-21-02-F-0118) developed for the fire use program, we anticipated that incidental take of up to one condor could occur due to interactions with humans on the ground, collision with aircraft, or inundation of a nest site by smoke.

#### *Mexican Spotted Owl*

Mexican spotted owls may be affected by the special flight rules (overflights) that may overlap a portion of the CRMP project area. In the biological opinion (02-21-97-F-0085) developed for the special flight rules, we anticipated that the incidental take is unquantifiable, but is expected to be in the form of harassment. The biological opinion cited the presence of owls as well as a significant amount of unsurveyed potential habitat present under the overflight routes.

Mexican spotted owls may be affected by the GRCA fire use program that could be conducted in a portion of the CRMP project area. In the biological opinion (02-21-02-F-0118) developed for the fire use program, we anticipated that incidental take of up to two adults and associated eggs/juveniles could occur in the form of death, injury, harm, or harassment. Surrogates for determining occurrence of incidental take depended on effects to known PACs or 100-acre core areas.

Table 3 includes a summary of the various factors that are relevant to the designated PACs that may be adversely affected by implementation of Preferred Alternative H.

Because of potential sound impacts to MSO from overflights, GRCA is initiating a study to collect sound information at known MSO locations and at potential MSO habitat as predicted by GRCA GIS modeling (James 2005). The Overflights Program at GRCA expects to start this work in the 2006 season. After the initial study in 2006, GRCA will look at the need and possibility of monitoring these sites and tracing acoustic trends, statistical acceptance of methods/results, and/or the need to make adjustments to the methodology or protocol used to gather the data. If there is a need for a longer term study, GRCA will actively seek the funding to accomplish such work. We do not know if the study will include portions of this project area that experience overflights.

#### *Southwestern Willow Flycatcher*

GRCA determined, and we concurred (02-21-01-I-0127), that an eradication plan for tamarisk in tributaries of the Colorado River in GRCA is not likely to adversely affect southwestern willow flycatchers. The plan was designed to not apply control on tamarisk that occurred in identified suitable southwestern willow flycatcher habitat.

#### *Brown Pelican*

No previous consultations regarding projects with major effects to the species have been conducted. Major factors anticipated to affect the species in the project area remain those associated with recreation.

#### *Humpback Chub*

The 1994 biological opinion for the preferred alternative on the operations of Glen Canyon Dam concluded that the action was likely to jeopardize the continued existence of the species and adversely modify its critical habitat. Several reasonable and prudent alternatives were provided to avoid jeopardy and adverse modification. Other experimental flows have occurred in the project area including a beach building flow (1996), habitat maintenance flows (1997), and low steady flows (2000). Although some temporary adverse effects to the humpback chub occurred, the flows also benefited the species and its habitat.

Humpback chub in the project area were affected by a non-native fish sampling near the Little Colorado River confluence area (02-21-02-F-0269). We anticipated that 500 humpback chub

would be taken as a result of the action in the form of collection and harassment, and 3 adult and 10 juveniles would be killed.

Humpback chub in the project area were affected by experimental releases from Glen Canyon Dam and removal of non-native fish (formal consultations 02-21-03-F-0016, 02-21-03-F-0016-R1, 02-21-03-F-0016-R2, and 02-21-03-F-0016-R3). The consultations conducted for those actions found that up to 800 humpback chub could be captured via hoop netting or electroshocked. We anticipated that 20 humpback chub would be killed as a result of the action.

At least ten section 7 consultations have been conducted regarding issuance of research and collection permits to several entities conducting activities on the Colorado River in GRCA. Limited information exists on the effects of the total research and monitoring effort in Grand Canyon that would allow us to effectively assess the effects of this action with other ongoing efforts. We do know that the numbers of humpback chub continue to decline. There have been multiple agencies and contractors engaged in research and monitoring in the Colorado River and its riparian communities. For example, the number of times that humpback chub are estimated to be handled is of great concern. With the number of different agencies and organizations conducting these activities, assessment of the combined effects is problematic.

The FWS provided recommendations for the conservation of endangered and native fishes in the Grand Canyon (Gorman 1997), in which we identified the need to protect key tributary confluences for native fishes (James 2005). Humpback chub have been collected (both adults and young of the year) at the confluences of the Little Colorado River and Paria, Bright Angel, Shinumo, Kanab, and Havasu creeks. The tributary confluences provide some of the most productive and warm habitat for native fishes in the Grand Canyon. The FWS stressed that management strategies to enhance or stabilize native fish populations must include tributary confluences. Some of these tributaries (in particular the Little Colorado, Bright Angel, Shinumo, and Havasu) are heavily affected by human activities during summer months, including destruction of benthic communities, building dams, and disposal of human wastes. At present, the long-term effects of perturbation of these environments on native fishes are not known (Gorman 1997). We recommended protecting the tributary confluences from undue disturbance during spring and summer months to minimize impacts on spawning and rearing life stages of native fishes. As an interim measure, we recommended that the lower 500 meters of the Little Colorado River and the lower 200 meters of other tributaries be protected during the period February – July. This period encompasses the spawning season and early life history stages of native fishes. These recommendations conclude by stating that at other times of the year the amount of traffic and activities of tourists should be controlled to minimize impacts.

#### *Humpback Chub Critical Habitat*

Previous consultations regarding effects to humpback chub critical habitat have addressed the operation of Glen Canyon Dam and experimental flows and trout removal, as discussed in the section on the species above. The presence and operation of Glen Canyon Dam remain the primary factors affecting humpback chub critical habitat in the project area.

### *Razorback Sucker*

The decline of razorback suckers corresponds to major changes in their physical, chemical, and biological environment (James 2005). Physical changes were the result of the construction and operation of the many dams and diversions in the Colorado River Basin since 1905. Changes in water quality have occurred since human presence has increased and the introduction of contaminants that can exist at levels high enough to harm the species. In many areas, the introduction of non-native fishes is the most significant threat to the survival of the razorback sucker (U.S. Fish and Wildlife Service 1998).

### *Razorback Sucker Critical Habitat*

The primary factors affecting razorback sucker critical habitat remain the presence and operation of dams (physical habitat), the presence of non-native fishes (biological environment), and environmental contaminants affecting water quality.

### *Kanab Ambersnail*

In a 1995 biological opinion issued to the Bureau of Reclamation on the preferred alternative on the operations of Glen Canyon Dam, we determined incidental take of Kanab ambersnails would be exceeded if more than 10 percent of the occupied habitat in Grand Canyon was inundated by high flows or a controlled flood. In a 2000 amendment (02-21-93-F-0167), the amount of anticipated take was modified to as much as 17 percent of the occupied habitat.

Kanab ambersnails in the project area were affected by experimental releases from Glen Canyon Dam and removal of non-native fish (formal consultations 02-21-03-F-0016, 02-21-03-F-0016-R1, 02-21-03-F-0016-R2, and 02-21-03-F-0016-R3). The consultations conducted for those actions found that the experimental releases would inundate and scour habitat at Vaseys Paradise. A surrogate measure of incidental take of up to 119 square meters of Kanab ambersnail habitat was anticipated for the releases.

Flash floods from the talus slopes above Vaseys Paradise also contribute to habitat loss and direct mortality, as does potential overland flow from the talus slope located directly above the spring. Bighorn sheep grazing may also affect ambersnail habitat at Vaseys Paradise.

### *Desert Tortoise*

Desert tortoise sign was recently discovered in GRCA. No previous consultations regarding major actions that may affect the species have been conducted. A well-established and short trail (less than 1 mile in length) provides recreational access to the area where desert tortoise scat has been found.

## **EFFECTS OF THE ACTION**

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated and interdependent with

that action, that will be added to the environmental baseline. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

### *Bald Eagle*

River-runner activity (e.g., boats and the noise associated with them, hiking) may impact wintering bald eagles by disturbing feeding activities and roosting (James 2005). Flushing due to human intrusion has been shown to interrupt feeding activities and can displace eagles. Steidl and Anthony (1995) studied the effects of non-motorized recreational boating on non-breeding bald eagles in Alaska and found that 50% flushed in response to rafts approaching.

Wintering eagles are primarily concentrated in the portion of the canyon between Lees Ferry and Diamond Creek. During January through March, bald eagles congregate in the upper portions of the river corridor at the mouths of creeks to feed upon trout. Eagles also concentrate during winter at Lake Mead and it is possible that some eagles may move up the river corridor into GRCA to forage. River or hiking traffic in the morning hours and evening hours are most likely to flush perched or foraging eagles. River-running traffic during this time period can harass foraging and roosting eagles and disrupt feeding.

In Modified Preferred Alternative H, the number of river runners will be relatively low between January and the end of March when no motors are permitted. No commercial launches will occur in the winter season (November through March). A maximum of one trip launch per day will be permitted in the winter (November-February) and two noncommercial launches per day in March. Commercial use begins in April with three launches per day in the first half of April, and 3.5 permitted from April 16-30. The likelihood of river runners harassing wintering eagles increases in March due to a doubling of the number of boats that will pass foraging/roosting sites on any given day, but the boats will be non-motorized.

### *California Condor*

The CRMP will affect California condors primarily in two ways. First, condor-human interactions with recreationists at river level have occurred in the past and the interactions are likely to continue to occur. Second, condors that fly in the vicinity of Whitmore and Quartermaster Canyons are vulnerable to condor-aircraft interactions including collisions.

Like many scavengers, California condors are exceptionally curious (Arizona Condor Review Team 2002). Curiosity and associated play behavior are most likely adaptive traits that developed over the condor's evolutionary history and may have helped ensure its survival (perhaps enhancing learning and memory in a long-lived species). In a human-dominated world, such curiosity can be manifested as an overall fearlessness of humans. Historical accounts suggest that some wild condors were unwary and sometimes even drawn to human activity. In released condors, excessive curiosity and unwariness can be undesirable when it places the birds

at risk or results in the destruction of human property. Despite being extremely gregarious, condors exhibit individual personalities and show varying degrees of curiosity and wariness.

During the first five years of release in Arizona, the majority of released condors exhibited acceptably curious behaviors, while only a few individuals showed unacceptable levels of curiosity (Arizona Condor Review Team 2002). On rare occasions (i.e., five times in 2000 and at least three times in 2001), free-flying condors engaged in destructive behavior, such as tugging on and ripping tents at unattended back-country campsites. Unacceptably curious birds would place themselves in situations of increasing vulnerability, perching in dangerous areas with no escape routes, and either initiating or allowing human contact. Such birds appeared to have no awareness for their own safety.

Condor-human interactions associated with CRMP could include humans approaching condors for a variety of reasons including curiosity, photography, feeding, or otherwise directly interacting with the individual birds at very close range, and chasing the birds away from equipment or belongings. Condors could be attracted to human gatherings at or near river level, including boat landings, camps, and attractions where river runners commonly stop. Such attraction and curiosity on the part of condors increase the likelihood of adverse condor-human interaction. If the interactions are not handled correctly, they could result in injury to either humans or condors.

Air safety is of considerable importance to the condor recovery program. As the Grand Canyon Ecoregion serves as a high-density tourist area for sight-seeing flights, every precaution to eliminate near misses and collisions with tour and administrative flights must be addressed (Arizona Condor Review Team 2002).

No collisions or near-misses of condors and aircraft are known in GRCA. However, several flight-path diversions of GRCA administrative helicopter flights have occurred due to the presence of condors in the air space (Arizona Condor Review Team 2002). In addition, one incident regarding the harassment of condors by aircraft occurred which resulted in a fine to a helicopter operator. As stated in Factors Affecting Specie's Environment Within the Action Area" section for California condors above, we have anticipated that helicopter-condor collisions could occur from other aircraft operations in the GRCA. The Arizona Condor Review Team recommended that a review with air tour operators should be conducted on an annual basis to ensure compliance with the Airborne Hunting Statute and potential violation of the Endangered Species Act.

A very high number of helicopter flights occur in the Whitmore Canyon and Quartermaster Canyon areas. Flights associated with CRMP are used primarily to exchange passengers to and from points above the rims and watercraft at river level. Under CRMP Lower Gorge Modified Preferred Alternative 4, helicopter use associated with river recreation would be limited to Hualapai River Runners (HRR) exchanges and pontoon passenger access/egress in the Quartermaster area (RM 262-263). A helicopter flight is considered a one-way trip from rim to river or river to rim. GRCA estimates that the number of pontoon-related helicopter flights will be 240 per day. HRR-associated flights are estimated at 62 per day. Alternative 4 states that there are no limits on helicopter use for passengers on the Hualapai Reservation and that because helicopter operations in the Quartermaster area take off and land on sovereign tribal lands, the

Park Service does not regulate helicopter use in this area. While a predicted number of flights in the Quartermaster area are not known under Alternative 4, flights in the Quartermaster area will be concentrated in a small area. This concentration in use may increase the chance of condor-helicopter collision.

Under Modified Alternative H, passenger exchanges by helicopter in the Whitmore Canyon area would be allowed during the mixed use season (April 1 through September 15). Trips launching during the mixed-use season would also be allowed to exchange passengers at Whitmore even if the exchange occurs during the nonmotorized season (e.g., commercial motorized trips launching on September 15 could have their passengers exchange at Whitmore on September 25). Exchanges must be completed by 10:00 am local time each day (with exceptions for safety reasons). Exchanges of commercial passengers would only be allowed by commercial companies currently conducting Whitmore exchanges at rates similar to current passenger ratios. Although the NPS has no authority over transportation outside the park boundary, this analysis assumes that commercial companies currently offering passenger exchanges at Whitmore would continue to be transported by helicopter between Hualapai tribal land and Bar Ten Ranch. For passengers beginning their river trips at Whitmore, it is assumed that approximately 3,635 passengers would be transported in by helicopter and an estimated 400 would hike in. Using the same rate of exchanges by trip as actually occurred during 1998-2003, this would result in 5,715 passengers exiting and 4,035 passengers entering their river trips at Whitmore. A flight is considered a one-way pass from Bar Ten to Whitmore helipad or from Whitmore helipad to Bar Ten. Based on the assumption that there are five passengers per flight and operators would carry a maximum number of people on every flight, a total of 2,286 flights would occur at this exchange location annually.

Condors in the Arizona population continue to explore and occupy areas some distance away from the original release site. At least one condor is known to have used the Quartermaster area in April 2004. The stated lifespan of the CRMP is ten years. In that time, it is possible that condors may exhibit additional use of the Whitmore and Quartermaster areas. Due to the concentrated use of helicopters at Quartermaster and Whitmore and inherent curiosity of condors that attract them to human activities, condors using these areas may be disturbed by helicopters, including possible helicopter-condor collisions, during the ten-year lifespan of the CRMP.

#### *Mexican Spotted Owl*

Nine designated PACs (Table 3) within GRCA may be negatively affected by river recreation as outlined in Preferred Alternative H (James 2005). The determination by GRCA of possible effects to these nine PACs was based upon a combination of several factors: 1) proximity of the PAC to the river; 2) known trails that provide access up side canyons where MSO have been located; and 3) impact ratings at sites within the river corridor proximate to the relevant side canyon. Limitations exist with the method used to determine potential effects, but GRCA attempted to provide a reasonable estimate of the specific PACs that have the most likelihood of potential negative effects caused by river runners.

Effects would result largely from recreational hiking by river runners in side canyons where MSO are located. These side canyon hikes likely result in the most significant impacts to MSO

in terms of disturbance during sensitive time periods and trampling of vegetation. The potential for negative effects caused by hiking in these side canyons is highest during the MSO breeding season (March 1 – August 31) which largely coincides with the peak season of river running activity (March through October). The highest numbers of river runners are present during this time period and, therefore, the potential for recreationists to negatively impact MSO in side canyons is highest during the time period when MSO are most sensitive to disturbance. Disturbance to nesting MSO, nestlings, or fledglings during this time period may result in lowered fitness of these owls, nest abandonment, or lowered productivity.

MSO and their habitat may be affected by recreation through disturbances to the nest, roost, or foraging sites, and through alteration of habitat caused by trampling. Recreation may cause nest or territory abandonment, reduced productivity (through increased mortality of young by reduced ability to provide food to nestlings, increased predation, or increased nestling exposure), egg loss, and/or disrupted nesting, roosting, or foraging behavior. Disturbances at foraging sites may influence MSO ability to capture food and this in turn may lead to reduced fitness of adults, which in turn may lead to lessened egg production, and lower nestling and/or adult survival. Although MSO are predominantly nocturnal hunters, they have been observed hunting during the day during the breeding season. Both adult and fledged young are known to drink from small seeps and creeks, and recreation in side canyons during crepuscular periods may impact access to the small pools of water that may be present in the side canyons within GRCA.

Flushing of MSO from roost or nest sites can cause the expenditure of energy and can create increased exposure of birds to predators. The potential for hikers to disturb owls is probably greatest where hiking is concentrated in narrow canyon bottoms occupied by nesting or roosting owls. Raptors are generally most sensitive to disturbances near the nest site during the breeding season. Disturbance effects will vary depending on the type of disturbance, time of year, and nesting status of the birds.

No studies have been undertaken in Grand Canyon to measure the disturbance effects on MSO or other avian species in the canyon environment. Swarthout and Steidl (2001, 2003) conducted research in the slickrock canyons of the Colorado Plateau on responses of MSO to a single hiker. They found that 95% of both adult and juvenile MSO became alert to an approaching hiker at distances of  $\leq 55$  meters. In addition, they found that 95% of adult MSO flushed at  $\leq 9$  meters from the hiker. Ninety-five percent of juveniles flushed at  $\leq 6$  meters from the hiker. Perch height was an important factor in determining flush response and flushing decreased with increasing perch height. However, females in nests highest above hiking trails showed the strongest response in decreasing their handling of prey, suggesting that a higher vantage point may expose these owls to disturbance from hikers for a longer period of time. Activity budgets of owls did not change markedly when hikers were near nests. However, during hiking treatments females decreased the amount of time they handled prey by 57% and decreased the amount of time they performed maintenance behaviors by 30%.

Hikers caused both males and females to increase the frequency of contact and vocalizations, increased vocalization occurred when hikers were present during the evening periods. These effects, caused by the presence of hikers, could adversely affect the reproductive success of MSO. In particular, females apportioned less time to handling prey when hikers were present.

Because females attend nests almost exclusively, egg and nestling survival depend largely upon their behavior; hatching failure or reduced energy intake may result and juveniles may be more susceptible to predation and starvation.

Within GRCA, most hiking would be done in groups of up to 32 passengers per raft in the summer. MSO may be more likely to flush in the presence of large groups. Energetic demands of avoidance flights increase heat production, which may be exacerbated by flying during the day, and this could increase heat-related stress. Flushing potentially exposes owls to predation from diurnal predators. Swarthout and Steidl (2001, 2003) recommend buffers for occupied MSO territories in high-use canyons, which are defined as both those receiving  $\geq 2$  hikers per hour or  $> 48$  hiking groups/day. Within GRCA, hiking groups would likely visit side canyons at rates of less than one group per hour (with the exception of popular canyons) but the number of hikers would be far greater than two.

Effects of hiking include trampling caused by hikers or by camping which can affect the vegetative structure of the area and tend to simplify the habitat. These effects may lead to loss of vegetation and increased soil erosion, and in turn may negatively affect MSO prey species resulting in loss of food sources and foraging opportunities.

#### Unsurveyed Habitat

While some of the modeled potential MSO canyon habitat (Daniel Spotskey and David Willey pers. comm. 2000) within GRCA is located within designated PACs, the vast majority of the canyon habitat is unsurveyed or surveyed only once due to limitations in funding and access (GRCA pers. comm. 2005). A review of the model predicting potential nesting habitat in GRCA indicates that some of this habitat is located proximate to the river corridor. Of particular concern is the significant amount of predicted nesting habitat in and near Havasu Canyon on Havasupai Tribal land. Havasu Canyon (RM 157) is a very popular hiking attraction for river runners, and GRCA data indicate that this canyon receives a high impact rating and a high-intensity use rating. If MSO are present in this canyon they are likely to be affected by river runner hiking originating from the river. Unsurveyed predicted habitat is present in the greatest densities within the river corridor above RM 225. Some predicted habitat is also present in the Lower Gorge.

Flight paths of helicopters in the Quartermaster Canyon area are over unsurveyed predicted MSO canyon habitat. Approximately 302 helicopter flights occur in that area per day (see the estimate of helicopter use in the California condor effects section above).

As outlined in the January 26, 2000, Biological Opinion for New Flight Rules in the Vicinity of Grand Canyon National Park, these helicopter flights could directly affect MSO through noise disturbance associated with the continued use of daily overflight routes. Noise disturbance caused by overflight activities over and within 1/4 mile (0.4 km) of nest/roost sites during the breeding season (March 1- August 31) could affect breeding through either disrupting the breeding attempt altogether or displacing a nesting female, and thus causing mortality to eggs and chicks.

Delaney *et al.* (1999) found that MSO decreased prey delivery rates after disturbance from helicopters and chainsaw-related noise, and the effect was stronger when stimuli approached more closely. Helicopters typically became audible at approximately 2000 meters. MSO exhibited no alert response when helicopters were more than 600 meters distant and alert responses were exhibited to helicopters at 403 (+/- 148) meters. Delaney *et al.* (1999) concluded that the mean alert response threshold they observed corroborates a regional FWS policy that recommends a 400-meter (or 0.25 mile) buffer zone around spotted owl nest sites. However, Delaney *et al.* (1999) caution against using their findings to infer how MSO would respond under different circumstances that were not directly tested, such as spotted owl responses during early courtship and incubation, responses to more than 1 helicopter or overflight, or responses in different nesting habitat or under different foraging conditions. This study was conducted in mixed conifer forested habitat in mountainous terrain, whereas MSO habitat in the project area consists of steep walled canyons at fairly low elevations. Impacts in steep walled canyons such as those in GRCA may be more significant due to the fact that sound persists at higher intensities and longer durations in steep-walled canyons than in forested areas where sound waves are buffered by vegetation. Thus, if MSO are present in unsurveyed habitat in the Quartermaster area, they may be negatively affected by helicopter flights.

A review of the habitat modeling completed for GRCA indicates other areas of potential nesting habitat that have not been surveyed to date. For example, surveys in the area near Vaseys Paradise are warranted. A MSO was reported at RM 31.8 (just downstream from Vaseys Paradise), on May 7, 2003, in an alcove (sighted from river raft during daylight hours). The area is not proximate to any known PACs. However, due to lack of funding, GRCA has been unable to follow up on this report to determine occupancy. Vaseys Paradise is a heavily visited site, and if MSO are nesting in proximity to this area they could be disturbed by river runners at the site.

Although no MSO are known from the Lower Gorge area, unsurveyed potential habitat is present. Recreational hiking by river runners may directly and indirectly affect MSO if they are present in side canyons in the Lower Gorge, affecting foraging, early courtship activity, and potentially nesting activity.

#### *Southwestern Willow Flycatcher*

Recreational access, as outlined in Modified Preferred Alternatives H and 4, has the potential to impact the southwestern willow flycatcher through disturbance during the nesting period and impact its habitat through trampling and soil erosion and compaction.

Human disturbance of the flycatcher's breeding areas in GRCA is possible because these areas are usually adjacent to sandy beaches, which are often popular camping sites (James 2005). Flycatchers bred for at least 10 years within about 100 meters of popular camping areas such as the RM 71 site, suggesting that they may be tolerant of low-level human activity that is not directly adjacent to or within the breeding territory. However, the literature indicates that there may be a direct correlation between recreational activity and decreased riparian bird abundance (Taylor 1986, Blakesley and Reese 1988).

The potential for recreational activity to produce negative impacts depends on the frequency, intensity, location, and type of use. For example, a hiking trail placed outside of suitable habitat is less likely to impact willow flycatchers than a trail and campground placed within suitable habitat. A trail that receives daily use is likely to result in greater habitat damage and impacts to local wildlife than one that receives occasional use.

As the frequency and intensity of use increase, concomitant increases in multiple trailing, soil compaction, vegetation loss, erosion, trash and human waste (which could attract scavengers and predators), pollution, and noise disturbance can be expected. Current recreation may be preventing suitable flycatcher habitat from developing where trampling and soil compaction are impeding regeneration.

Construction of three new campsites under Modified Preferred Alternative 4 are mentioned in the BA. The creation of these campsites may require removal of suitable or potential flycatcher habitat, but will only take place if and when HRR overnight trips increase and these additional campsites are needed. If additional camps are needed, the creation of the campsites will be phased-in over time and section 7 consultation will occur at that time. However, the location of these sites has not yet been selected and GRCA will coordinate closely with the FWS to determine the exact locations of these campsites. The new campsites are not considered to be part of this proposed action, and thus any possible effects to flycatcher habitat are not considered here (Michele James pers. comm. 2005).

#### *Brown Pelican*

The CRMP may affect brown pelicans primarily through pelican-human interactions with recreationists at river level. While pelicans are rare along the river corridor in GRCA, they may be present during the river-running season (James 2005). Reports from 2004 indicate that interactions with river runners are possible when pelicans are within the corridor (see the Status of the Species and Environmental Baseline sections above). The reported interactions were in the form of pelicans occurring at landing sites and either being in the way of, and/or approaching, recreationists. Pelican-human interactions associated with CRMP could also include humans approaching pelicans for a variety of reasons including curiosity, photography, feeding, or otherwise directly interacting with the individual birds at very close range, and chasing the birds away from equipment or belongings. If the interactions are not handled correctly, they could result in injury to either humans or pelicans.

#### *Humpback Chub*

Recreational use (river crossings, swimming, and other water play) of the lower reaches of the LCR is high between mid-April and mid-October (James 2005). Recreational use in the lower Little Colorado and at the confluence by river runners may be negatively affecting spawning potential and successful reproduction and survival of humpback chub in this area. Recreation in the LCR could affect adult chub, young-of-the-year, and eggs. The presence of river runners in the LCR may alter the staging of adult chubs, their spawning, and feeding activities. It is possible that the activity of recreationists at the confluence and in the lower reaches of the LCR may result in humpback chub avoidance of this area. Recreationists may indirectly affect

nearshore habitats and introduce suntan lotion and other chemicals into the water. In addition, while the lower end of the LCR is currently closed to fishing, anglers may catch humpback chub when fishing for trout elsewhere in the Colorado River.

#### *Humpback Chub Critical Habitat*

The proposed action could affect the water (quality) element through environmental contaminants as discussed above. The project could also directly affect the physical habitat and biological environment elements through disturbance of the physical environment due to river runner activity (river crossings, swimming, and other water play) in the LCR confluence area and other side channels and backwaters. The effects on these primary constituent elements could result in impacts to important spawning, rearing, or feeding habitat components of the humpback chub life cycle.

#### *Razorback Sucker*

Modified preferred alternatives H and 4 could affect water quality by introducing environmental contaminants and affect physical habitat elements for the razorback sucker. Effects to physical habitat could include river runner activities (boating, swimming, and other water play) in side channels and backwaters that result in impacts to the spawning, rearing, or feeding components of the razorback sucker life cycle.

While the razorback sucker is known to occur only rarely within the Lower Gorge of GRCA, larvae were located in 2000 and 2001 in the vicinity of Pearce Ferry in Lake Mead near the GRCA/Lake Mead interface (James 2005). It is possible that the adults associated with those larvae could have come from within GRCA boundaries. Boats take out from GRCA at South Cove within Lake Mead. South Cove is located downstream of Pearce Ferry, thus boats that have run the river within GRCA traverse through potentially occupied razorback habitat within the far western edge of GRCA, the interface between GRCA and Lake Mead, and within Lake Mead to the take-out at South Cove. Effects to razorbacks, if present in these areas, is likely to be from boat noise, fuel and other pollutants, and reduction in undisturbed shoreline habitats. If razorback spawning is or may be occurring at South Cove, concentrated use of this area during the spawning period of November – April may result in disruption of spawning. Effects to razorback suckers present in Lake Mead, the west end of GRCA, and along the GRCA/Lake Mead interface may occur due to the use of motorized rafts and the use of jet boats. The use of motors in GRCA for 5.5 months each year above Diamond Creek and year-round in the Lower Gorge brings with it the potential for oil and gas contamination within the river corridor. In addition, in the Lower Gorge, jet boats can be used up Separation Rapid at RM 240. These disturbance effects will be minimized by surveying for spawning activity and avoiding areas that are found to be used for spawning. The contamination effects will be minimized by conservation measures addressing water quality (see the Description of the Proposed Action section) that include a hazardous material plan, removal of all petrochemical storage facilities from floodplains and riparian zones, implementation of a monitoring and treatment program to collect baseline data for basic water quality parameters, implementation of a spill prevention control plan, and placement of toilets out of the flood plain.

### *Razorback Sucker Critical Habitat*

Designated critical habitat occurs within the entire river corridor within GRCA (James 2005). The proposed action could affect the water (quality) element through environmental contamination as discussed above. The project could also directly affect the physical habitat and biological environment elements for the razorback sucker. Direct effects to physical habitat and the biological environment could include disturbance due to river runner activities (boating, swimming, and other water play) in side channels and backwaters that result in impacts to important spawning, rearing, or feeding habitat components of the razorback sucker's life cycle

### *Kanab Ambersnail*

Direct impacts to Kanab ambersnails and their habitat at Vaseys Paradise are possible due to ease of river runner access to the site and the popularity of the site as an attraction (James 2005). The area of potential and occupied habitat at Vaseys Paradise is estimated to be between 850 and 900 square meters. Adverse impacts could include trampling of habitat and individuals which could result in loss of habitat and population decline. Only the lower band of habitat at Vaseys is generally accessible by visitors due to the remainder of habitat being surrounded by poison ivy. GRCA believes that the cause of reduced streamflow at Vaseys Paradise is caused by drought and not by recreational use of the spring caves. River runner access to the Upper Elves Chasm site is possible although the number of visitors is limited due to required climbing.

### *Desert Tortoise*

Desert tortoises in the project area may be adversely affected by river runner use of the foot trail at Whitmore Canyon (James 2005). GRCA estimates that 400 hikers use the trail during the peak-use season. Such use could result in negative tortoise-human interactions through direct contact and indirectly through ingestion of inadvertently discarded refuse. While non-consumptive recreational use such as hiking, photography, and bird watching are generally considered compatible with recovery of desert tortoise, human presence does present threats to the tortoise including harassment and the consumption of refuse left by recreationists. Tortoises are known to eat foreign objects, such as rocks, balloons, plastic, and other garbage. Such objects can become lodged in the gastrointestinal tract or entangle heads and legs causing death. Metal foil and glass chips have been found in scat of wild desert tortoise. Deposition of such refuse can easily occur in remote areas and is likely wherever humans are present. Accumulation of trash may also attract potential predators to the area.

Desert tortoises may be negatively affected by the practice of passenger helicopter exchanges at Whitmore helipad which is located across the river from the recently discovered tortoise scat. A total of 2,286 helicopter flights occur in the Whitmore Canyon area in a given year (see the estimate of helicopter use in the California condor effects section above). These effects would be primarily from repeated and long-term exposure to noise.

An important and perhaps least-studied effect of noise is masking, which occurs when human-made noise obscures an important natural sound for a significant portion of time (Bowles 1998). Desert tortoises are one of several species of tortoise that have acoustic social signals and are

known to react to meaningful sounds in their environments (Bowles et al. 1998b). Desert tortoises use eleven different classes of vocalizations in a variety of social encounters (U.S. Fish and Wildlife Service 1994a). The masking effect of human-induced sources of noise such as that created by helicopters and jets that correspond closely to the frequency bandwidth of tortoise vocalizations may damage hearing or significantly alter an individual's ability to effectively communicate or respond in appropriate ways. For example, masking of incidental sounds made by approaching predators may decrease the ability of tortoise to avoid capture by a predator (Bowles *et al.* 1998a; Bowles 1995; U.S. Fish and Wildlife Service 1994a). Species-typical defensive responses of tortoise to the approach of danger include startling, running, diving underwater, wedging the shell into a crevice, urinating and defecating on an attacker, producing threatening sounds, freezing, and withdrawing into the shell (Bowles et al. 1998b).

In a study that examined the effects of simulated sonic booms and low-altitude aircraft noise on desert tortoise, Bowles *et al.* (1998b) found that exposure to simulated jet overflights produced a typical reptilian defensive response known as "freezing." Freezing to initial exposures was abrupt, with head and appendages often left extended. During or after the exposures to the noise of jet overflights, tortoises frequently became quiescent (totally immobile) for periods of up to 113 minutes; tortoises investigating their habitat stopped walking and eating tortoises stopped eating (Bowles *et al.* 1998b). Recovery occurred within 2-4 hours of the exposure.

## **CUMULATIVE EFFECTS**

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Some of the Hualapai Tribe helicopter operations that utilize Grand Canyon West airport and/or aircraft landing sites within the canyon on tribal lands outside of the park (i.e., those which are not associated with the CRMP) are not part of the proposed action. Helicopters used for passenger exchanges/shuttles at Whitmore and Quartermaster are controlled by the Hualapai Tribe, not the NPS. In the case of Quartermaster, the Hualapai Tribe has indicated that approximately the same number of helicopter flights will occur in that area independent of the alternatives and independent of whether any of the helicopter passengers are also river passengers.

The primary activities with the potential to cumulatively affect the natural soundscape and related values are the impacts from aircraft overflights not associated with river recreation. Such flights are numerous over parts of the park, but they occur completely independent of the proposed action. Commercial air tours and their support operations, high altitude commercial jet traffic, military aircraft, general aviation, and most administrative aircraft activities are not considered directly associated with the CRMP. In 2003, the total number of flights (fixed wing and helicopter that do not descend into the canyon) was 21,326.

## CONCLUSION

The conclusions of this biological opinion are based on the project as described in the “Description of the Proposed Action” section of this document. Conservation measures incorporated into this project as implemented will further reduce project effects, including the conservation measures that are incorporated into the project design. After reviewing the current status of the bald eagle, California condor, Mexican spotted owl, southwestern willow flycatcher, brown pelican, humpback chub, humpback chub critical habitat, razorback sucker, razorback sucker critical habitat, Kanab ambersnail, and desert tortoise, the environmental baseline for the action area, the effects of the proposed actions and the cumulative effects, it is the FWS's biological opinion that the Colorado River Management plan is not likely to jeopardize the continued existence of those species, and is not likely to destroy or adversely modify designated humpback chub or razorback sucker critical habitat. We note that this biological opinion does not rely on the regulatory definition of “destruction or adverse modification” of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statute and the August 6, 2004, Ninth Circuit Court of Appeals decision in *Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service* (No. 03-35279) to complete the following analysis with respect to critical habitat.

We present these conclusions for the following reasons:

### *Bald Eagle*

Bald eagles winter in GRCA and no breeding is known to occur in the project area. Although a few individual eagles may be disturbed by recreation activity of the proposed action, conservation measures for the species adequately address the anticipated disturbance through avoidance of recreation at a known wintering bald eagle site, education of recreationists regarding their interactions with eagles, recording and reporting locations of eagles in the project area, and monitoring of eagles at a known location to determine the extent of recreational impacts.

### *California Condor*

Direct adverse interactions of individual California condors and recreationists have occurred in the past in the project area and may increase in the future as the condor population increases and disperses through the GRCA. However, the number of known interactions at river level has been relatively low. Condors do occur in the areas where helicopter use is part of the proposed action, but condor use of these areas is low compared to other areas where they occur. Conservation measures for the species adequately address the anticipated disturbance and interactions through education of recreationists regarding their interactions with condors, determination of condor use in areas of helicopter traffic, and training of aircraft operators regarding watching for and avoiding condors.

### *Mexican Spotted Owl*

Up to nine MSO PACs may be adversely affected by disturbance from recreation originating at the river level. We estimate that unsurveyed MSO habitat that could support up to two MSO

territories occurs under helicopter flight routes, and these birds could be adversely affected by helicopters. Conservation measures for the species adequately address disturbance through restricting access of recreationists to PACs accessible from the river, monitoring of PACs to determine recreation impacts to MSO habitat components, research regarding the impact of human disturbance on MSO, determining the feasibility of conducting surveys of MSO habitat, and determining the feasibility of adjusting helicopter routes.

#### *Southwestern Willow Flycatcher*

Several flycatcher territories are known within the project area, and the resident individuals may be disturbed by recreation activity. However, the number of territories in GRCA is a relatively small proportion of the entire population of the species. A conservation measure for the species adequately addresses the anticipated disturbance through annual surveys and nest monitoring, and emergency closures at nest sites.

#### *Brown Pelican*

Brown pelicans are occasional visitors to GRCA. While there may be direct pelican-human interactions associated with the proposed action, the number of those interactions is very low relative to the entire population of the species. A conservation measure for the species adequately addresses the anticipated disturbance through education of recreationists regarding their interactions with pelicans and reporting observations of pelicans.

#### *Humpback Chub*

The majority of impacts to this species are associated with the presence and operation of Glen Canyon Dam. The extent of effects of recreation, especially at the confluence of the Little Colorado River and the Colorado River, are largely unknown. However, recreation does occur in areas where the species congregates and breeds. Effects are expected to be in the form of disturbance to individuals and contamination of habitat. Conservation measures for the species minimize the anticipated effects through restrictions on recreation at the confluence of the Little Colorado River and the Colorado River, and if funded, investigation of levels of potential toxic chemicals (pharmaceuticals and personal care products) in representative biota, research to examine behavioral changes of humpback chub in response to recreation, and research to determine recreational impacts to native fish habitat.

#### *Humpback Chub Critical Habitat*

Approximately 181 miles (48%) of the total 379 river miles of designated critical habitat could be affected by the proposed action. Primary constituent elements of humpback chub critical habitat affected include water quality and aspects of the physical habitat and biological environment that are required for each particular life stage of the species. Conservation measures that restrict recreation at the confluence of the LCR and Colorado River and possible studies minimize the effects to critical habitat.

### *Razorback Sucker*

Several known spawning areas of the species are downstream of the project area. It is possible that recreational activities of the proposed action may occur in unknown spawning areas within the project area. Such unknown areas are anticipated to constitute a relatively small proportion of total spawning area. A conservation measure for the species adequately addresses this anticipated disturbance through surveys of potential spawning areas where CRMP activities occur and avoiding areas that are found to be spawning areas. Contaminants generated by project activities could also affect individuals and the quality of habitat of the species. Conservation measures for water quality adequately address the anticipated contamination through development of plans for the transport and storage of petroleum and petrochemicals, implementing a monitoring program to collect data regarding water quality parameters, implementing a spill prevention plan, and locating toilets above the high water mark.

### *Razorback Sucker Critical Habitat*

Less than 241 miles (16%) of the total 1724 river miles of designated critical habitat could be affected by the proposed action. Primary constituent elements of razorback sucker critical habitat include water, physical habitat, and biological environment as required for each particular life stage of the species. The above conclusion for the species also applies to its critical habitat.

### *Kanab Ambersnail*

Recreational activities at the locations where this species occurs can result in loss of habitat and individuals. Difficulty of access to the sites limits those impacts to an unknown degree. Conservation measures for the species adequately address the anticipated loss of habitat and individuals through education of recreationists regarding protection of the species, seasonal closure of one site, logistical support of a monitoring program, and possibly funding of research to determine recreational impacts at one site.

### *Desert Tortoise*

Desert tortoises were recently discovered in a portion of the project area, and disturbance of the tortoises by recreationists and helicopters is possible. Direct adverse tortoise-human interactions are expected to be relatively few in number. A conservation measure for the species adequately addresses the anticipated disturbance through education of recreationists, annual surveys and nest monitoring, and emergency closures at nest sites.

## **INCIDENTAL TAKE STATEMENT**

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is defined (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is

defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. “Incidental take” is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

### **AMOUNT OR EXTENT OF TAKE**

We recognize that some flexibility is built into, and some uncertainty is inherent in, some of the conservation measures that are part of the proposed action. We included consideration of that flexibility and uncertainty into our analysis in determining the amount of incidental take that we anticipate for each species.

#### *Bald Eagle*

Due to the limited scope of adverse effects and implementation of the conservation measures of the proposed action for this species, we do not anticipate that the proposed action will result in incidental take of bald eagles.

#### *California Condor*

Because condors that occur in the project area are known and are monitored, determining take (particularly death, injury, and harm) of individuals will be more straightforward to determine than for almost any other species. Therefore, we expect that the death or injury of one condor as a result of the project will be detectable. The death of even one individual would represent a significant loss to recovery of California condors; if such take occurs the project should be immediately re-evaluated. We anticipate incidental take of up to one California condor in the form of injury, harm, and/or harassment resulting from interaction with recreationists along the river corridor, or in the form of harm, harassment, injury or death due to interactions with aircraft including collisions.

#### *Mexican Spotted Owl*

Up to nine PACs may be adversely affected by disturbance from recreation originating at river-level. The conservation recommendations for this species include a commitment by GRCA to close access to PACs that can be affected by visitation from the river during the breeding season, which would be sufficient to avoid any take within these PACs. Based on the extent of the unsurveyed MSO habitat in the canyon, we estimate that there are up to two MSO territories under helicopter flight routes that would be subject to continued disturbance. Therefore, we anticipate the incidental take of up to two MSO in the form of harassment from helicopter flights.

*Southwestern Willow Flycatcher*

Due to the limited scope of adverse effects and implementation of the conservation measures of the proposed action for this species, we do not anticipate that the proposed action will result in incidental take of southwestern willow flycatchers.

*Brown Pelican*

Due to the limited scope of adverse effects and implementation of the conservation measures of the proposed action for this species, we do not anticipate that the proposed action will result in incidental take of brown pelicans.

*Humpback Chub*

Due to the nature of the anticipated adverse effects from recreational activity on humpback chub and the low likelihood of detecting take of individuals resulting from the activity, it is not possible to determine the number of individuals that could be taken. We anticipate that incidental take of humpback chub could occur as a result of recreation at the LCR confluence and possibly other congregation and spawning areas. We anticipate that the congregation and spawning area in the LCR at the confluence could be disturbed by recreational activity resulting in the disturbance of normal behavior of humpback chub including disruption of spawning. The incidental take is expected to be in the form of harassment resulting from recreational activity in the water of the LCR. We do not anticipate this take to rise to the level of physical injury or mortality. Anticipated incidental take will be considered to be exceeded if any detected injury or mortality of humpback chub can be attributed to recreational activity.

*Razorback Sucker*

Due to the limited scope of adverse effects and implementation of the conservation measures of the proposed action for this species, we do not anticipate that the proposed action will result in incidental take of razorback suckers.

*Kanab Ambersnail*

Due to the nature of the anticipated adverse effects from recreational activity on Kanab ambersnail and the low likelihood of detecting take of individuals resulting from the activity, it is not possible to determine a number of individuals that could be taken. However, it is possible to derive an estimated measure of incidental take using habitat anticipated to be affected by recreation. Observations obtained during monitoring of other effects on ambersnail habitat at Vaseys Paradise indicate that up to 10 square meters are trampled per year by recreationists (Jeff Sorenson pers. comm. 2005). Due to the pattern of recreational activity at Vaseys Paradise, the amount of habitat affected is likely to be essentially the same 10 square meters each year. However, because there may be variations in patterns of visitor use, the estimated amount of affected habitat may extend beyond the same 10 square meters. Thus, we anticipate that up to 10 square meters of Kanab ambersnail habitat at Vaseys Paradise will be affected by recreationists each year, resulting in harm, injury, or death of ambersnails.

*Desert Tortoise*

Due to the limited scope of adverse effects and implementation of the conservation measures of the proposed action for the species, we do not anticipate that the proposed action will result in incidental take of desert tortoise.

## EFFECT OF THE TAKE

In this biological opinion, we have determined that this level of anticipated take is not likely to result in jeopardy to these species or destruction or adverse modification of critical habitat.

## REASONABLE AND PRUDENT MEASURES WITH TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, GRCA must comply with the following terms and conditions, which implement the reasonable and prudent measures and outline reporting/monitoring requirements. The terms and conditions are non-discretionary.

*California Condor*

Due to the implementation of the conservation measures of the proposed action for this species, no reasonable and prudent measures are necessary or appropriate.

*Mexican Spotted Owl*

Due to the implementation of the conservation measures of the proposed action for this species, no reasonable and prudent measures are necessary or appropriate.

*Humpback Chub*

The following reasonable and prudent measure and term and condition are necessary and appropriate to minimize take of humpback chub.

1. GRCA will take measures to determine the actual impact of CRMP recreation activities on the humpback chub:
  - A. GRCA will fund and/or conduct a research program designed to determine the actual effects of CRMP recreation activities on the humpback chub. The research should focus on the effects of recreation on humpback chub (e.g., disturbance of normal essential behavior) and their habitat at the confluence of the LCR and the Colorado River. The research program will be initiated no later than three years after implementation of the CRMP, and GRCA will include us in the development of its design. Research results regarding the extent of the effects of recreation will be used to develop appropriate protective measures and/or develop a long-term monitoring program.

### *Kanab Ambersnail*

The following reasonable and prudent measure and term and condition are necessary and appropriate to minimize take of Kanab ambersnail.

1. GRCA will take measures to determine the actual impact of CRMP recreation activities on the Kanab ambersnail.

A. GRCA will fund and/or conduct a research program designed to determine the actual effects of CRMP recreation activities on the Kanab ambersnail. The research should focus on the effects of recreation on Kanab ambersnails (e.g., injury and mortality) and their habitat (e.g., loss of habitat) at Vaseys Paradise. The research program will be initiated no later than three years after implementation of the CRMP, and GRCA will include us in the development of its design. Research results regarding the extent of the effects of recreation will be used to develop appropriate protective measures and/or develop a long-term monitoring program.

### **Disposition of Dead or Injured Listed Species**

Upon locating a dead, injured, or sick listed species initial notification must be made to the FWS's Law Enforcement Office, 2450 W. Broadway Rd, Suite 113, Mesa, Arizona, 85202, telephone: 480/967-7900) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to this office. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve the biological material in the best possible state.

### **CONSERVATION RECOMMENDATIONS**

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

- 1) Some of the conservation measures that are part of the proposed action are contingent upon available funding. We recommend that GRCA fully fund all conservation measures that are part of the proposed action.
- 2) We recommend that a review of potential recreational impacts be conducted for sites considered in the future for translocation of Kanab ambersnails.

In order for the FWS to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

## REINITIATION NOTICE

This concludes formal consultation on the action(s) outlined in the request. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

We appreciate Grand Canyon National Park's efforts to identify and minimize effects to listed species from the proposed action. For further information please contact Bill Austin (x102) or Brenda Smith (x101) at (928) 226-0614.

/s/ Steven L. Spangle

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## TABLES

Table 1. Consultation history for the Colorado River Management Plan.

<i>Date</i>	<i>Event</i>
June 2003	We received a scoping letter regarding the preparation of the CRMP.
October 21, 2003	We issued a species list letter for the proposed action.
March 23, 2004	We received a request for review of a CRMP Administrative Draft Environmental Impact Statement and a request for a list of species that should be included in a biological assessment of the proposed action.
April 29, 2004	We issued a species list with comments on the proposed action.
July 14, 2004	We and GRCA reviewed and discussed species to be included in the BA.
October 27, 2004	We received a draft environmental impact statement (EIS) for the proposed action.
January 31, 2005	We issued a comment letter on the draft EIS.
May 10, 2005	We and GRCA discussed informal review of a draft BA prior to the request for formal consultation.
May 16, 2005	We received a draft BA for informal review.
June 9, 2005	We provided informal comments on the May 16, 2005 draft BA.
June 10, 2005	We and GRCA discussed the content of the June 9, 2005 informal comment letter.
June 14, 2005	We and GRCA discussed possible mitigation and monitoring measures for the humpback chub and its habitat.
June 23, 2005	We received a request for formal consultation on the proposed action.
July 22, 2005	We issued a thirty-day letter initiating formal consultation on the proposed action.
August 24, 2005	We met with GRCA to discuss several aspects of the proposed action.
November 2, 2005	We issued a draft biological opinion for review.
December 15, 2005	We received comments on the draft biological opinion from GRCA

Table 2. Bald eagles observed in GRCA in winter 2003/2004 (from James 2005).

<i>Site</i>	<i>Date</i>	<i>Notes</i>
Bright Angel Campground	12/20/03	Single mature, evidence of prey remains
0.25 miles up Phantom Creek	12/20/03	Single mature
The Box	12/20/03	Single mature
Phantom Range Campground	1/10/04	Single mature
Phantom Ranch	1/24/04	Single mature
RM 3	1/24/04	Single mature (eating a fish)
RM 20	1/24/04	Single mature
RM 31	1/24/04	Single mature
RM 36	1/25/04	Single mature
RM 40	1/25/04	Single mature
RM 42	1/25/04	Single mature
RM 53	1/26/04	Single mature
RM 86	1/27/04	Single mature
RM 92	1/27/04	Single mature
RM 112	1/28/04	Single immature
RM 132	1/29/04	Single immature
Bright Angel Creek and C.G.	1/31/04	2 mature
Phantom Ranch	2/25/04	Single mature
Phantom Ranch	2/26/04	Single mature
Phantom Ranch	3/6/04	Single mature
River corridor (seen from Plateau Pt.)	3/7/04	Single immature
Phantom Creek delta	3/7/04	Single immature
Phantom Ranch	3/8/04	Single mature

Table 3. MSO PACs likely to be affected by the CRMP (adapted from James 2005).

<i>PAC Name and Size (Acres)</i>	<i>Notes</i>
Walthenberg Canyon (872)	MSO male heard 5/5/01. Roost site located approx. ½ mile up the canyon from the river and before a 100 ft dryfall. Monitoring 3/20/02 and 3/21/02 resulted in no MSO responses. GRCA files report that after 2002 monitoring attempt, it was noted that word had spread among the boatmen that Walthenberg was the roost site of an MSO, and the canyon had received an increasing volume of traffic because of this. No trail is noted on GRCA resource maps, but obviously access is occurring.
Bass (433)	Single MSO heard 4/27/02 at mouth of Bass Canyon (heard from across the River). PAC boundary is < ½ mile from River; MSO location is outside of designated PAC. Known trail up Bass Canyon & MSO is loc. adjacent to Bass Trail. This combination site on the River (camp, hiker) receives a high impact rating, and a medium impact rating as an (attraction, campsite, hiker) combination site.
Kanab (740)	PAC designated based on surveys conducted by Willey in 1995/1996. No MSO location information exists for this PAC. PAC boundary is approx. ½ mile up Kanab Canyon from River. Known trail up Kanab from River. Rated as medium impact combination site (campsite, attraction); medium intensity use rating.
150 Mile Canyon (762)	PAC designated based on surveys conducted by Willey in 1995/1996. No MSO location information for this PAC. PAC boundary is within ¼ mile of River; habitat located within ¼ mile of River. Rapid scouting site present on River. No known trails or campsites nearby.
Matkat (947)	PAC designated based on surveys conducted by Willey in 1995/1996. No MSO location information for this PAC. PAC boundary is ¼ mile from the River; habitat within ¼ mile of River. This is rated as medium impact “activity” site and receives a high intensity site use rating. Known trail traverses up side canyon for 3+ miles through PAC.
Tuckup East (633)	Male MSO heard 3/20/01 and 7/3/01. PAC is within ¼ mile of River. Known trail up Tuckup Canyon for 5+ miles. Trail traverses off main canyon and into side canyon where MSO were heard, approx. 2 ½ miles up trail from River. Rated as medium use intensity.
Tuckup North (770)	Male and female MSO heard 3/20/01 and 7/2/01. PAC is 3 miles from River. Known trail (same as through Tuckup East PAC) traverses through this PAC.
Spring Canyon (956)	3 MSO heard (including a male and female) 3/25/02, at Spring Canyon and corresponding side canyon. PAC boundary is approx. 1 mile from River. Known trail up Spring Canyon. No attraction or campsites nearby.
209 Mile Canyon (643)	Male MSO located 6/23/02. PAC boundary is 2 miles from the river. Known trail up canyon and the area is rated as medium use intensity due to presence of cultural resources. No campground or attraction sites nearby.

Table 4. Historic and recent collection and nesting records of southwestern willow flycatchers in GRCA below Lees Ferry (from James 2005).

<i>River Mile/Location</i>	<i>Year</i>	<i>Notes</i>
RM 0 (Lees Ferry)	1909	Single male collected
RM 0	1933	Specimen collected
RM 0	1935	Used nest collected
RM 0	1961	2 male, 1 female, 1 unknown sex collected
Lava Canyon	1931	
Little Colorado	1953	
RM 0	1987	
RM 46	1987	
RM 51.5-50.5	1993	1 territory
RM 71.3-71	1993	1 territory
RM 277-274	1993	1 territory
RM 51.5-50.5	1994	4 territories
RM 65.3	1994	1 territory
RM 71	1994	
RM 51.5-50.5	1995	1 territory
RM 65.3	1995	1 territory
Lake Mead Delta	1995	1 territory
RM 51.5-50.5	1996	3 territories
Lake Mead Delta	1996	6 territories
RM 51.5-50.5	1997	2 territories
RM 270-168	1997	2 territories (1 presumed nesting @RM 252.9)
Lake Mead Delta	1997	6 territories/3 nesting pairs
RM 51.5-50.5	1998	1 territory
RM 246	1998	2 territories
RM 254 (Spencer Canyon)	1998	2 territories
RM 265-263.5	1998	1 territory
RM 268-264	1998	1 territory
RM 268-265	1998	5 territories
RM 270-268	1998	1 territory
RM 272-268	1998	2 territories
RM 273-270	1998	2 territories
RM 277-273	1998	1 territory
RM 51.5-50.5	1999	1 territory
RM 246	1999	3 territories
RM 254 (Spencer Canyon)	1999	2 territories, 3 yg. Fledged
RM 259.5	1999	1 territory (McKernan and Braden report 2)
RM 266-262.5	1999	1 territory
RM 268-265	1999	5 territories
RM 272-268	1999	1 territory
RM 276	1999	1 territory
RM 51.5-50.5	2000	1 territory

RM 246	2000	2 territories
RM 257.5-257	2000	1 territory
RM 259.5	2000	1 territory
RM 266-262.5	2000	1 territory
RM 268-265	2000	1 territory
RM 51.5-50.5	2001	1 territory
RM 246	2001	3 territories
RM 254	2001	3 pairs
RM 257.5	2001	1 pair
RM 259.5	2001	2 territories
RM 262.5-259.5	2001	1 territory/2 nests
RM 263.5-262.5	2001	1 territory
RM 268-265	2001	3 territories
RM 272-268	2001	2 territories
RM 276	2001	2 SWWF, no nest confirmed
RM 51.5-50.5	2002	1 territory
RM 28-29	2003	1 pair
RM 50.5-51.5	2003	1 pair
RM 28.3	2004	1 pair
RM 50.4	2004	Female (June)
RM 274.5	2004	1 pair nesting (3 nestlings)

Table 5. Southwestern willow flycatcher habitat identified in the Lower Gorge during surveys in 2003 (from James 2005).

<i>River Mile</i>	<i>Location</i>	<i>Area (hectares)</i>
239.5	Separation Canyon	8
243		1.8
246	Spencer Canyon	5.5
249	Clay Tank Canyon	0.5
252	Reference Point Creek	4.4
257		7.1
259.5	Burnt Springs	11
260	Quartermaster Canyon	2.8
260.5		3.4
262.5		12.8
268		7.2
274.5	Columbine Falls	7.2 and 4.5

## APPENDIX A – CONCURRENCE

This appendix contains our concurrences with your “may affect, not likely to adversely affect” determinations for Mexican spotted owl critical habitat, razorback sucker critical habitat, and Yuma clapper rail.

### Mexican spotted owl (*Strix occidentalis lucida*) critical habitat

We concur with your determination that the proposed action may affect, but is not likely to adversely affect, Mexican spotted owl critical habitat. We base this concurrence on the following:

- 1) Effects from CRMP to the species are anticipated to be primarily a result of disturbance as opposed to habitat modification. The primary constituent elements of designated canyon MSO critical habitat are not likely to be affected by the activities of recreationists.
- 2) Implementation of the following conservation measures for the species that are part of the CRMP will adequately address any potential effects.
  - As resources allow, GRCA will continue to survey MSO habitat accessible by recreationists from the river.
  - Contingent upon availability of funding, GRCA will conduct regularly-scheduled vegetative monitoring in a representative number of accessible side canyons in which PACs have been designated (and an equal number of “control” canyons which are not considered easily accessible to river runners) to determine if recreational impacts are negatively affecting vegetation and critical habitat primary constituent elements.
  - Contingent upon availability of funding, GRCA will conduct a study of the impact of human disturbance on MSO within the Grand Canyon.

### Yuma clapper rail (*Rallus longirostris yumanensis*)

We concur with your determination that the proposed action may affect, but is not likely to adversely affect, the Yuma clapper rail. We base this concurrence on the following:

- 1) Yuma clapper rails have been recorded in the project area twice during the breeding season, and habitat sufficient for nesting may be present. However, the nature of rail habitat render disturbance of the species by recreationists a low probability.
- 2) Implementation of the following conservation measures for the species that are part of the CRMP will adequately address any potential effects.
  - Contingent upon availability of funding, GRCA will conduct surveys for the Yuma clapper rail in the Lower Gorge. Such surveys may be combined with surveys for

breeding birds and/or southwestern willow flycatchers. Clapper rail surveys should be conducted once every three years for the life of the CRMP.

- If Yuma clapper rails are found in GRCA during the breeding season or if nests are located and these sites are determined by the GRCA wildlife biologist to be impacted by river recreationists' activities, GRCA will establish a closure of suitable breeding habitat at specific sites, with an appropriate buffer, during the length of the breeding season. In addition, any previously known Yuma clapper rail nest sites that are not surveyed or monitored, and that are likely to be impacted by recreation activity, will also be closed.

## APPENDIX B – PREFERRED ALTERNATIVES

### LEES FERRY MODIFIED PREFERRED ALTERNATIVE H

Lees Ferry Modified Preferred Alternative H is a mixed motor/non-motor alternative that would divide the year into a 5.5- and 6.5-month periods, with mixed use from April 1 through September 15, and non-motorized use from September 16 through March 31. It is characterized by lower group sizes and fewer daily launches except during the winter months. This alternative would allow for a moderate increase in estimated yearly passenger totals (from 22,461 to 24,657). Passenger exchanges at Whitmore would be allowed at existing levels for commercial trips launching during the motor season, with a time-of-day restriction.

#### WHAT THIS ALTERNATIVE ACCOMPLISHES

##### *Carrying Capacity Standards*

- The maximum number of trips at one time would be reduced to 60 (from 70).
- The maximum number of people at one time would be reduced to 985 (from 1,095).
- Total user discretionary time in hours per year would be increased to 567,238 (from 355,081).

##### *March-to-October Overall Use*

- The number of estimated recreational passengers would be increased to 22,802 (from 22,143).
- The number of estimated trips launching would be increased to 981 (from 866).
- The number of estimated user-days would be increased to 194, 899 (from 164,974).

#### KEY TRIP VARIABLES

##### *Launches per Day*

- Launches per day would be decreased to a maximum of six (from nine). **Figure 2-1** (at end of this alternative) shows the launches per day by trip type for each month.

##### *Maximum Group Sizes (includes guides)*

- Commercial motor trip sizes would be reduced to 32 people in the summer and 24 people during the rest of the year (from 43).
- Commercial oar trip sizes would be reduced to 32 people in the summer and 24 people during the rest of the year (from 39).
- Noncommercial trip sizes would remain at the current level of 16 people (standard), and a new group size of 8 (small) would be offered to better distribute groups along the river.

##### *Maximum Trip Lengths (in number of days)*

- The maximum trip length for commercial motor trips would be reduced to 10 days in summer and 12 days in the shoulder seasons (spring and fall) (from 18); there would be no winter commercial motor trips (from 30 days currently).

- The maximum trip length for commercial oar trips would be reduced to 16 days in summer (from 18), and 18 days in the shoulder seasons (from 21); there would be no winter commercial oar trips (from 30 days currently).
- The maximum noncommercial oar trip length would be reduced to 16 days in summer (from 30), 18 days September 1-15 (from 21), 21 days in the remainder of the shoulder seasons (from 21), and 25 days in winter (from 30). Noncommercial motor trips would be reduced to 12 days in summer (from 18), 12 days in the shoulder seasons (from 21), and no motor trips would be allowed in winter.

#### *March-to-October User-Day Limits*

- Commercial motorized use is expected to increase to an estimated 76,913 user-days.
- Commercial overall use would be capped at the current 115,500 user-days.
- Noncommercial use would not be capped, increasing to 79,399 user-days (from an average of 51,891).

#### *Winter Use*

- Winter use would increase to accommodate approximately 1,855 people per year (from 318).

### OTHER ISSUES

#### *Mixed Use / Non-motorized Seasonal Use*

- The mixed-use season would decrease to 5.5 months (April 1 through September 15).
- The non-motorized use season would increase to 6.5 months (September 16 through March 31).

#### *Whitmore Exchanges*

- The NPS has the authority to regulate passenger exchanges, but it has no authority over transportation outside the park boundary, including helicopter flights on Hualapai lands. Passenger exchanges would be allowed at Whitmore during the motorized season (April 1 through September 15) with a time-of-day restriction (i.e., all exchanges must be completed by 10:00 AM local time each day). Exchanges in the nonmotorized period would only be allowed for those trips launching during the mixed-use period. Exchanges of commercial passengers would only be allowed by companies currently conducting Whitmore exchanges (i.e., grandfather clause in contracts). It is assumed that all passengers exiting their trips at Whitmore would continue to be transported by helicopter similar to today. At current exchange ratios, the number of passengers out is estimated to be 5,715. It is assumed that 3,635 of the passengers beginning their river trips at Whitmore would be transported in by helicopter, and that an additional 400 would hike in.
- All Whitmore passenger exchanges must take place by 10:00 AM local time.

#### *Whitmore Helicopters*

For Modified Alternative H, Whitmore passenger exchanges would be allowed during the motorized season from April 1 through September 15; in addition, trips launching during the motorized season would also be allowed to exchange passengers at Whitmore even if the exchange date occurs during the nonmotorized season. While the NPS has no authority over transportation means that visitors may choose outside the park boundary, for this analysis it is assumed that 5,715 visitors would end their trips at Whitmore with a helicopter flight, that 3,635 visitors would begin their trips at Whitmore with a helicopter flight, and that 400 would begin their trips at Whitmore by hiking to the river (hikers are assumed to not affect the noise analysis). Assuming that there are five passengers per flight, and that operators would carry the maximum number of people on every flight, a total of 2,286 flights would occur from this exchange location over the course of a year (i.e., 727 flights for 3,635 passengers in, plus 727 flights for 3,635 passengers out, plus 416 flights for the remaining 2,080 passengers out, plus 416 flights coming in empty to pick up those 2,080 passengers).

Because Modified Alternative H evens out the launch patterns, as many as three groups of 32 passengers each could need helicopter shuttles before 10:00 am during many summer days. This would correspond to up to 40 flights per day (20 in and 20 out for the 96 passengers), and at 3 to 3.5 minutes audibility per flight would result in 120 to 140 minutes of helicopter audibility on many days. Because the requirement to complete exchanges by 10:00 am leaves only 3 hours of the 12 hour day (7:00 am to 7:00 pm) in which exchanges could occur, helicopter shuttles would be concentrated during those 3 hours but not audible at all during the rest of the day. When helicopter exchanges occur, noise-free intervals would be less than 10 minutes. Helicopters exchanging river trip passengers at Whitmore have been measured at up to 83 dBA at a distance of 200 feet from the source. This is almost 50 dBA above existing natural ambient levels (34 dBA or less). On the many days of heavy helicopter use, moderate to major adverse impacts would occur to the natural soundscape localized in the Whitmore area, with helicopter shuttles audible about 20% of the 12-hour day, and during about 2 of the 3 morning hours before 10:00 am. With generally the same number of motor launches per day, there would be few days during summer months of low or no helicopter use. It should be noted that such flights are authorized by Public Law 100-91.

### Non-Peak Periods

In terms of soundscape impacts, peak use under Modified Alternative H would be from May through August, followed by April, then September 1-15. Helicopters exchanges at Whitmore and motorized use on the river would be possible from April through September. Compared to Alternative A, the October–March period would have greater use levels so would be expected to have greater soundscape impacts. However, this would be offset by smaller group sizes, and more nonmotorized months under Modified Alternative H.

### Flight patterns

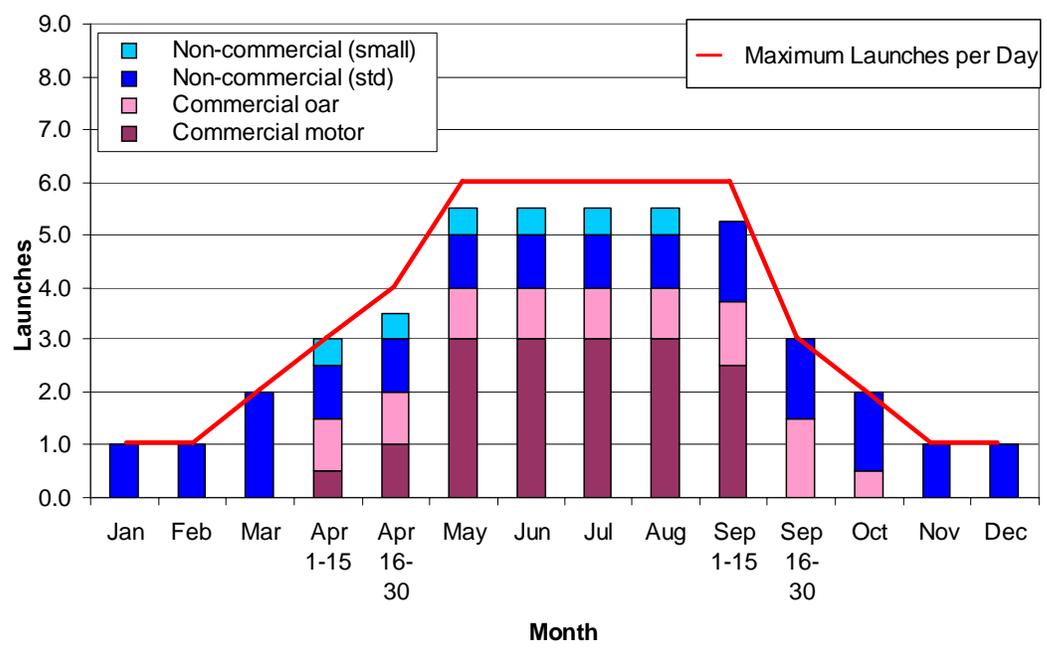
Helicopters take off from the Bar 10 air strip outside of the park on the North rim and head directly over the rim and down into the canyon to the Whitmore helipad located on the south bank of the river on Hualapai land. Helicopters flying to and from the Whitmore helipad may

deviate by up to one-mile upriver or down river in order to avoid mid-air collisions with other helicopters involved with river passenger transport. In general, helicopters are flying directly from the air strip to the inner canyon helipad and back along a straight line to maximize efficiency of passenger transport.

*Minimum Trip Length to Phantom Ranch*

- The minimum trip length from Lees Ferry to Phantom Ranch for this alternative will be two nights and part of three days for only those commercial operators who have been conducting such trips (grandfather clause); for all others, the minimum will be three nights and part of four days.

**FIGURE 2-1: AVERAGE AND MAXIMUM LAUNCHES PER DAY BY TRIP TYPE — MODIFIED ALTERNATIVE H**



## SUMMARY OF PROBABLE YEARLY USE — MODIFIED PREFERRED ALTERNATIVE H

Modified Preferred Alternative H		Commercial			Noncommercial			
		Motor	Non-Motor	Total	Standard	Small	Total	
User-Days	Total	Summer	67,448	24,602	92,050	26,751	5,190	31,940
		Shoulder	9,465	13,985	23,450	45,348	1,450	46,798
		Winter	0	0	0	33,418	0	33,418
		Full Year	76,913	38,587	115,500	105,517	6,639	112,156
Trips Launching	Total	Summer	369	105	474	123	62	185
		Shoulder	60	63	123	184	15	199
		Winter	0	0	0	120	0	120
		Full Year	429	168	597	427	77	503
Recreational Passengers	Total	Summer	11,904	2,960	14,863	1,898	368	2,267
		Shoulder	1,466	1,306	2,771	2,822	90	2,912
		Winter	0	0	0	1,914	0	1,914
		Full Year	13,369	4,266	17,635	6,635	458	7,093

NOTE: These are nearest whole numbers. Totals reflect cumulative fractional differences.

## LOWER GORGE MODIFIED PREFERRED ALTERNATIVE 4

Modified Alternative 4 is the NPS preferred alternative for the Lower Gorge. It is characterized by a redistribution of HRR operations and represents a consensus between Grand Canyon National Park and the Hualapai Tribe on levels of HRR use and other uses originating at Diamond Creek. This alternative, however, presents the NPS's preference for lower levels of pontoon boat use in the Quartermaster area compared to levels proposed by the Hualapai Tribe. Pontoon use levels in this alternative allow for economic growth within the constraints of resource protection. HRR daily passenger totals during the peak season would be limited to 96 with group sizes (including guides) not to exceed 40. No limits would be placed on trips per day in the peak season. This would offer HRR managers increased flexibility in scheduling launches while encouraging booking of smaller trips. Two trips of 35 people (including guides) would be permitted daily during the non-peak season. For HRR overnight trips, three trips per day of 20 people (including guides) would be allowed in the peak season, and one trip of 20 people (including guides) in the non-peak season. Pontoon operations would continue with six boats in the Quartermaster area, with a preliminary maximum daily capacity of 480 passengers. Maximum daily pontoon passengers could be increased to 600 per day based on favorable performance reviews of concession operations and resource monitoring data. Upriver trip takeouts would be allowed based on continuation trip needs with a maximum of four take outs per day. A floating, formal dock would be allowed at RM 262.5, contingent on environmental compliance and removal of the informal docks at RM 262 and 263. The dock would be appropriately sized to safely accommodate HRR and pontoon use.

## WHAT THIS ALTERNATIVE ACCOMPLISHES

### *Carrying Capacity Standards*

- Overall HRR operations would be increased, while reducing group size for all HRR trips (both day and overnight trips).
- The number of pontoon boats in the Quartermaster area would be increased to six, however a maximum of five would be allowed to operate at any one time.

- The number of pontoon passengers would be preliminarily capped at 480 per day. Maximum daily pontoon passengers could be increased to 580 per day based upon favorable performance reviews of concession operations and resource monitoring data. Both caps represent an increase from the current daily average.
- Three additional campsites would be created, contingent upon environmental compliance, primarily for the use by HRR overnight trips. Manipulation of the area would be restricted to the removal of vegetation. The existing campsites would not be changed.

#### *Peak Season Overall Use*

- Recreational passengers per day would be increased. Pontoon boat use would remain constant throughout the year. Yearly HRR and pontoon passenger totals would have the potential to increase.
- Three HRR overnight trips and a variable number of HRR day trips (with a total passenger cap of 96) would be allowed to launch daily from Diamond Creek; noncommercial launches would remain the same as the no-action alternative (two launches per day with a maximum of 16 people each).

#### KEY TRIP VARIABLES

##### *Diamond Creek Launches (number per day)*

- HRR day trips would be unlimited during the peak season (aside from group size and daily passenger limits) and limited to two launches per day (of up to four boats) during the non-peak season.
- HRR overnight trips would be limited to three launches per day in the peak season and one launch per day in the non-peak season
- The maximum number of noncommercial daily launches would remain at two.

##### *Maximum Group Sizes (in numbers of people)*

- HRR day trips would be limited to 40 people (including guides) in the peak season and 35 in the non-peak season.
- HRR overnight trips would be limited to 20 people (including guides) year-round.
- Noncommercial trip group sizes would remain at 16 people per trip.

##### *Maximum Trip Lengths (in number of days)*

- During the peak season trips would be limited to three nights (one night between Diamond Creek and Separation Canyon, one night between Separation Canyon and RM 260, and one night between RM 260 and RM 277).
- During the non-peak season trips would be limited to five nights (one night between Diamond Creek and Separation Canyon, two nights between Separation Canyon and RM 260, and two nights between RM 260 and RM 277).

##### *Campsites*

- Three new campsites could be developed for HRR use (below Separation Canyon) with a low level of development (vegetation removal only).

##### *Upriver Travel*

- Motorized tow-outs would be allowed below. Separation Canyon (RM 240).
- Commercial pick-ups would be limited to four per day during the peak season and one per day during the non-peak season.
- No jetboat tours would be allowed.

## OTHER ISSUES

### *Helicopter Use*

- Helicopter use associated with river trips would be limited to HRR exchanges and pontoon passenger access and egress in the Quartermaster area. Helicopter operations in the Quartermaster area take off and land on sovereign tribal land; thus, the NPS does not regulate helicopter operations in this area.

### Quartermaster Area

Helicopter shuttles for pontoon boat passengers:

- Initial Maximum 480 passengers/day divided by 5 passengers/helicopter  $\times$  2 flights/passenger = 192 helicopters per day
- Initial Maximum 480 passengers/day divided by 5 passengers/helicopter  $\times$  2 flights/helicopter  $\times$  3 minutes/flight = 576 minutes audible/day

If the pontoon boat operations come under a concession contract and after one year these operations receive a favorable evaluation and resource monitoring results are favorable, then the number of passengers per day will rise to 600.

- Potential Maximum 600 passengers/day divided by 5 passengers/helicopter  $\times$  2 flights/passenger = 240 helicopters per day
- Potential Maximum 600 passengers/day divided by 5 passengers/helicopter  $\times$  2 flights/helicopter  $\times$  3 minutes/flight = 720 minutes audible/day

Helicopter shuttles for HRR passengers (Diamond to Quartermaster raft trips):

- Day trips: 96 passengers/day divided by 5 passengers/helicopter  $\times$  2 flights/helicopter = 38 helicopters per day
- Overnight trips: 60 passengers divided by 5 passengers/helicopter  $\times$  2 flights/helicopter = 24 helicopters per day

### Helicopter flight patterns:

The helicopters leave Grand Canyon West (GCW) and travel NW to Guano Point (where the Bat Tram tower is) then drop into the canyon and fly upstream 3-4 miles. During this time they descend to about 400 feet then down to 200 feet and then land at the various landing zones in the Quartermaster area. When they take off, they fly upstream to Quartermaster Canyon and then return to GCW above the rim.

### *Lunch Stops*

- Trips cannot combine lunch stops due to the limited physical capacity of nearshore areas.

### Pontoon Use

- There could be a maximum of six pontoon boats in the Quartermaster area.
- A maximum of five boats could operate at one time.
- The number of pontoon passengers would be preliminarily capped at 480 per day. Maximum daily pontoon passengers could be increased to 580 per day based upon favorable performance reviews of concession operations and resource monitoring data.
- A formal dock, sized to safely accommodate HRR and pontoon use, would be built at RM 262.5, contingent upon environmental compliance and removal of existing docks.

### SUMMARY OF USE — MODIFIED ALTERNATIVE 4

Diamond Creek Launches (Maximum Group Size, Including Guides)			Available Campsites	Pontoon Trips* (Maximum Daily Passengers)	Upriver Travel from Lake Mead
Noncommercial Trips	HRR Day Trips	HRR Overnight Trips			
Maximum of two trips per day (16 people each)	Peak season: variable (40 people per trip), not to exceed 96 passengers per day Non-peak season: two trips per day (35 people per trip)	Peak season: three trips per day (20 people per trip) Non-peak season: one trip per day (20 people)	15+3**	480 (up to 580 based upon favorable performance reviews and resource monitoring data )	Commercial pick-ups: peak season — four per day; non-peak season — one per day. Tow-outs allowed below RM 240. No jetboat tours.

\* Passenger access and egress by means of helicopter.

\*\* Allows for vegetation removal only to develop three HRR campsites on river left.