# United States Department of the Interior
**U.S. Fish and Wildlife Service**
**Arizona Ecological Services Office**
**2321 West Royal Palm Road, Suite 103**
**Phoenix, Arizona 85021-4951**
**Telephone: (602) 242-0210 FAX: (602) 242-2513**


In Reply Refer To:
AESO/SE

AZ File No. 22410-2011-F-0519
AZ File No. 22410-2002-F-0509
NV File No. 1-5-04-F-519

December 1, 2011

Memorandum

To: Superintendent, Lake Mead National Recreation Area, National Park Service, Boulder City, Nevada

From: Field Supervisor

Subject: Biological Opinion for the Lake Mead National Recreation Area Fire Management Plan

Thank you for your August 3, 2011, memorandum and accompanying information requesting our concurrence that our 2004 Biological Opinion (AZ File No. 22410-2002-F-0509 and NV File No. 1-5-04-F-519) remains in effect for the updated Fire Management Plan for Lake Mead National Recreation Area and the National Park Service managed portions of Grand Canyon-Parashant National Monument. We received your memorandum and accompanying information on August 8, 2011, and in accordance with the Endangered Species Act (16 U.S.C. 1531-1544), as amended (ESA), we are issuing a new Biological Opinion (BO), incorporating by reference the 2004 BO whenever possible. At issue are impacts that may result from the National Park Service's (NPS) proposed updated Fire Management Plan (FMP) for Lake Mead National Recreation Area (LMNRA) and the National Park Service managed portions of Grand Canyon-Parashant National Monument located in Mohave County, Arizona, and Clark County, Nevada, on the threatened Mojave (Agassiz's) desert tortoise (*Gopherus agassizii*) (herein Mojave desert tortoise), and its designated critical habitat. You also requested that we address effects to the candidate Sonoran (Morafka's) desert tortoise (herein Sonoran desert tortoise) similar to the Mojave desert tortoise since both tortoise species occur in LMNRA and both species may be exposed to the same effects of fire suppression tactics. Although the ESA does not require consultation for candidate species, this BO assumes that all effects to the Mojave desert tortoise may also occur in a similar fashion and extent to the Sonoran desert tortoise and its habitat.

In your memorandum and accompanying information, you requested our concurrence that the proposed action is not likely to adversely affect the endangered southwestern willow flycatcher (*Empidonax traillii extimus*), the endangered Yuma clapper rail (*Rallus longirostris yumanensis*), the endangered California condor (*Gymnogyps californianus*), the endangered razorback sucker (*Xyrauchen texanus*), and the endangered bonytail (*Gila elegans*). In our 2004 BO, we determined that the threatened Mexican spotted owl (*Strix occidentalis lucida*) would be

adversely affected by the proposed action. In analyzing recent data and the proposed action, you have determined that the proposed action is not likely to adversely affect the Mexican spotted owl. We concur that the proposed action is not likely to adversely affect those species for the reasons stated in Appendix A of this biological opinion.

Your memorandum and biological assessment also requested our concurrence with your determination that the proposed action may affect, but is not likely to adversely affect, the relict leopard frog (*Rana onca*) and yellow-billed cuckoo (*Coccyzus americanus occidentalis*). Federal agencies are not required to consult with us under section 7 of the ESA in the event activities they authorize, fund or carry out affect species of concern that are not listed or proposed for listing. However, as a result of the 2004 consultation and at your request, we reviewed the proposed action for possible impacts to these species and provided voluntary recommendations in the form of technical assistance in a memorandum dated March 29, 2004. Since the proposed action has not changed significantly in relation to effects to these two species, we refer you to the conservation recommendations included in our 2004 technical assistance memorandum, which are attached as Appendix B. In order for us to be kept informed of actions minimizing or avoiding adverse impacts, or benefiting sensitive species or their habitats, we request notification of the implementation of any of the recommendations.

This biological opinion is based on information provided in your December 23, 2003, memorandum and accompanying biological assessment, your July 29, 2004, environmental assessment, your August 3, 2011 memorandum and accompanying information, telephone conversations, meetings, and other sources of information. Literature cited in this biological opinion does not represent a complete bibliography of literature available on the species involved, or on other subjects considered in this biological opinion. A complete administrative record of this consultation is on file at this office and the Southern Nevada Field Office.

**Consultation History**

Please refer to our September 22, 2004 BO for a complete consultation history prior to the issuance of that BO.

- September 22, 2004 – We provided you a biological opinion for the original Fire Management Plan.

- April 29, 2010 – You contacted our office to discuss reinitiating consultation of the 2004 BO, based on expected updates to the current Fire Management Plan.

- July 12, 2011 – We provided you comments on a draft biological assessment.

- August 8, 2011 – We received your August, 3, 2011, memorandum requesting that the 2004 BO be reissued.

- October 27, 2004 – We provided the draft biological opinion.

# BIOLOGICAL OPINION

## DESCRIPTION OF THE PROPOSED ACTION

Most of the information in this section is derived from the project description provided in the December 23, 2003, biological assessment (BA; NPS 2003a), July 29, 2004, environmental assessment (NPS 2004), our September 22, 2004 BO, and your August 3, 2011 memorandum. As much as practical, we will incorporate by reference the 2004 BO. The goal of the proposed 10-year FMP is to restore fire to the ecosystem, where appropriate, through hazardous fuels reduction treatments, prescribed fires, and managing unplanned ignitions (naturally-ignited and human-caused fires) for resource benefit (herein referred to as "unplanned ignitions" as opposed to "wildfire"). Both naturally-ignited and human-caused fires in appropriate habitat may be considered for management if they will meet resource management objectives in that fire management unit. Unplanned ignitions will be suppressed in areas of LMNRA where fire would not meet resource management objectives. Suppression responses may include deployment of ground personnel with hand tools, staging of personnel at temporary sites or camps, use of fire engines and other motorized vehicles on or off roads, aerial application of retardant or water, setting of backfires, and use of heavy equipment to construct fire lines, where appropriate.

Until 1992, when a prescribed fire program was initiated, all wildfires that occurred within LMNRA were suppressed whenever possible. Since that time the LMNRA fire program has grown and today includes wildfire suppression, prescribed fire, wildland fire use, and mechanical and chemical hazardous fuels treatments.

The three Fire Management Units (FMUs) described in the 2004 BO will remain the same and are described in detail in that BO. The updated FMP includes the interface unit (FMU1), the desert below 6,000 feet (FMU2), and the Shivwits Plateau (FMU3). These units remain differentiated by management objectives, fuels, political boundaries, and values that need protection.

The two significant updates to the FMP that require our analysis include the incorporation of new firefighting guidelines for working in the Mojave Desert, "Managing Wildfires in the Mojave Desert Priorities and Guidance for Incident Commanders", as developed by the Mojave Desert Initiative (MDI Guidelines) (Appendix C), and the revised fuels treatment plan. Most of the conservation measures described in the 2004 BO will still apply; however, more aggressive suppression tactics associated with the MDI guidelines will require updated conservation measures to minimize impacts to desert tortoises (Mojave and Sonoran) and critical habitat for the Mojave desert tortoise. A detailed comparison of the conservation measures from the 2004 BO and the updated FMP can be found in Appendix D. In general, including the MDI Guidelines allows fire managers to use more aggressive fire suppression tactics in desert tortoise habitat with the intent being to keep wildfires from growing large. Appendix E contains a summary of updated fuels treatments proposed within each FMU.

## STATUS OF THE SPECIES

### Mojave Desert Tortoise and Critical Habitat

The desert tortoise populations north and west of the Colorado River in Arizona and Utah (excluding the Beaver Dam slope population) were listed as endangered under an emergency rule on August 4, 1989 (54 FR 42270). Subsequently, the entire Mojave population of the desert tortoise west of the Colorado River in California and Nevada, and north of the river in Arizona and Utah, including the Beaver Dam slope, was listed as a threatened species on April 2, 1990 (55 FR 12178). Critical habitat was designated in 1994 (59 FR 5820-5846, also see corrections at 59 FR 9032-9036). The Desert Tortoise (Mojave Population) Recovery Plan (Recovery Plan) (USFWS 1994) was signed on June 28, 1994; however, a Revised Recovery Plan was published in 2011 (USFWS 2011).

The desert tortoise is an arid land reptile associated with desert scrub vegetation types, primarily creosote bush (*Larrea tridentata*) flats, washes, and hillside slopes or bajadas. A robust herbaceous component to the shrubs and cacti of the creosote bush vegetation type is an important component of suitable habitat. Within these vegetation types, desert tortoises potentially can survive and reproduce where their basic habitat requirements are met: a sufficient amount and quality of forage species; shelter sites for protection from predators and environmental extremes; suitable substrates for burrowing, nesting, and over-wintering; various plants for shelter; and adequate area for movement, dispersal, and gene flow. Further information on the range, biology, and ecology of the desert tortoise can be found in the Revised Recovery Plan (USFWS 2011).

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. In Arizona, tortoises are considered to be active from approximately March 15 through October 15. Desert tortoises spend the remainder of the year in burrows, escaping the extreme conditions of the desert.

Desert tortoise home range sizes vary with respect to location and year. Over its lifetime, each desert tortoise may require more than 1.5 square miles of habitat and make forays of more than seven miles at a time (Berry 1986). During droughts, tortoises forage over larger areas, increasing the likelihood of injury or mortality through encounters with humans and predators. Direct loss of tortoises has occurred from 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. Other threats affecting the desert tortoise include 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) activities have degraded additional habitat. Fire is an increasingly important threat because it degrades or eliminates habitat (Appendix A of USFWS 2011). Following wildfire, native plant species are often replaced by invasive, non-native species such as red brome (*Bromus rubens*) and cheat grass (*Bromus tectorum*), resulting in long-term habitat degradation or loss. Over 500,000 acres of desert lands burned in the Mojave Desert in the 1980s and approximately 500,000 acres burned in the northeastern Mojave Desert in 2005.

Over 20,000 acres of Mojave Desert burned on the Arizona Strip in 2006. The years 2007 through 2010 had only small fires with very little Mojave Desert burning on the Arizona Strip. In 2011, approximately 20,000 acres burned in Mojave Desert, including hundreds of acres of desert tortoise habitat.

The 1994 Recovery Plan divided the range of the desert tortoise into six recovery units (RUs), distinct geographic units that are individually necessary to conserve the diversity necessary for long-term sustainability of the entire listed population. The 1994 Recovery Plan recommended establishment of 14 Desert Wildlife Management Areas (DWMAs) throughout the RUs. DWMAs have been designated as ACECs by the BLM through development or modification of their land use plans in Arizona, Nevada, Utah, and parts of California.

Permanent plots were established in the 1970s to monitor tortoise populations, and some of these plots were surveyed through 2002. However, surveys in the Northeastern Mojave RU (Nevada, Utah, and Arizona) and some other RUs detected too few live tortoises to determine a population trend. Line distance sampling was used to monitor populations across the range of the desert tortoise from 2001 through 2005. Tortoise populations have declined significantly in the Western Mojave and appear to be declining in the Eastern Mojave RUs in California (Tracy *et al.* 2004).

In 2003, the U.S. Fish and Wildlife Service convened the Desert Tortoise Recovery Plan Assessment Committee (DTRPAC) to scientifically assess the Desert Tortoise Recovery Plan. The DTRPAC Report (Tracy *et al.* 2004) produced a number of findings and recommendations that served as the basis for revision of the 1994 Recovery Plan. In particular, this report recognized that threats to the desert tortoise have cumulative, synergistic, and interactive effects, and that tortoise recovery depends on managing multiple threats. Threats facing desert tortoises have been increasing since the 1994 Recovery Plan, including in the Northeastern Mojave RU, and recovery actions have not been fully implemented. The DTRPAC Report also recognized that tortoise populations may be distributed in metapopulations rather than single, large populations in RUs. In addition to reducing multiple threats within management areas, it is important to protect the corridors among habitat patches. For recovery, tortoise metapopulations require areas of suitable habitat, but these areas may be periodically vacant of tortoises.

As a result of the DTRPAC Report, the Revised Plan now has five RUs, combining the Northern and Eastern Colorado RUs into one RU, the Colorado Desert RU. The threats and recovery guidelines of the Revised Plan are consistent with the 1994 Recovery Plan. The Revised Plan is, in fact, a synergistic plan, allowing for adaptive management and, eventually, the formation and implementation of Recovery Implementation Teams (RITs). RITs will be comprised of a group of stakeholders to design and implement Recovery Action Plans over a five-year period that are intended to help speed recovery of the desert tortoise. The Revised Plan also recognizes those areas of suitable tortoise habitat outside of critical habitat units (corridors, other suitable habitat, etc.) and includes all suitable tortoise habitat (NPS land, critical habitat, corridors, other suitable habitat) as Conservation Areas that should be managed as important to the recovery of the species.

*Critical Habitat*

Twelve areas in Arizona, California, Nevada, and Utah were designated as critical habitat in 1994. Critical habitat units (CHUs) were based on recommendations for DWMAs outlined in the draft Recovery Plan (USFWS 1993a). These DWMAs are also identified as desert tortoise areas of critical environmental concern (ACECs) by the BLM. Some critical habitat units extend across state lines and are listed below for each state in which they occur. The units are:

- Arizona: Beaver Dam Slope, Gold Butte-Pakoon
- California: Fremont-Kramer, Superior-Cronese, Ord-Rodman, Chuckwalla, Pinto Mountain, Chemehuevi, Ivanpah, Piute-Eldorado
- Nevada: Piute-Eldorado, Mormon Mesa, Gold Butte-Pakoon, Beaver Dam Slope
- Utah: Beaver Dam Slope, Upper Virgin River

Because the CHU boundaries were drawn to optimize reserve design, the CHU may contain both "suitable" and "unsuitable" habitat. Suitable habitat can be generally defined as areas that provide the primary constituent elements of desert tortoise critical habitat:

- Sufficient space to support viable populations within each of the six recovery units and provide for movements, dispersal, and gene flow;
- Sufficient quantity and quality of forage species and the proper soil conditions to provide for the growth of such species;
- Suitable substrates for burrowing, nesting, and overwintering;
- Burrows, caliche caves, and other shelter sites;
- Sufficient vegetation for shelter from temperature extremes and predators; and
- Habitat protected from disturbance and human-caused mortality.

At the time of CHU designation, all lands in the CHUs had been impacted by past land management activities to some degree. Appendix A of the Revised Recovery Plan (USFWS 2011) discusses the types of human actions that occurred in desert tortoise habitat before and after the designation of critical habitat that have had effects to the physical habitat components of critical habitat. Designation of most CHUs as DWMAs/ACECs has aided in protection of these areas, particularly by limiting off-highway vehicle use and other ground-disturbing activities, and reducing or eliminating wild burros and livestock grazing in many units.

The year 2005 was a particularly bad wildfire year for desert tortoises. That year, much of the Southwest received nearly twice the average annual winter-spring precipitation. This resulted in lush vegetative growth during spring and summer. Large wildfires occurred across southwestern Utah, southern Nevada, and northwestern Arizona during summer 2005 and again in 2006. In

the Northeastern Mojave RU, wildfires burned 124,782 acres of critical habitat, approximately 11 percent of the critical habitat in this unit. Most vegetation was burned off during these fires, with a loss of forage available for Mojave desert tortoise and loss of shrubs to provide shelter from temperature extremes and predators. Many of the primary constituent elements for critical habitat were severely impacted by these fires. Hundreds more acres of critical habitat for the desert tortoise burned in the Mojave Desert in 2011.

Section 7 consultations since 1994 on various human actions have addressed the effects of those actions on the conservation value of the critical habitat units. The most recent major consultations on the Mojave desert tortoise in California have involved large-scale solar energy projects, all of which contain a summary of the status of the species and its critical habitat in California. In Nevada, consultations with three BLM offices (Las Vegas, Ely, and Battle Mountain) addressed most impacts to tortoises and designated critical habitat from land management practices.

Mojave desert tortoise management in Arizona is covered by the Arizona Strip Resource Management Plan for BLM lands in northern Arizona (file number 22410-2002-F-0277), which also considered the effects of BLM actions on the conservation value of critical habitat. The Mojave desert tortoise is the primary species covered by the Clark County Multiple Species Habitat Conservation Plan (HCP) in Clark County, Nevada (Regional Environmental Consultants 2000) and critical habitat units in Clark County were evaluated in the analysis for that permit. The Washington County HCP in Utah was completed prior to critical habitat designation; however, consultations for Federal actions in that area consider the effects to critical habitat. Effects to critical habitat areas for Mojave desert tortoise are fully included either by existing section 7 consultations or by the existing HCPs. Conservation actions for the species include protection for individuals and habitat.

A full description of the Status of the Species for the Mojave desert tortoise and critical habitat can be found in the administrative record for this consultation.

## 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

### Mojave Desert Tortoise and Critical Habitat

The majority of LMNRA is characterized by generally north-south trending mountain ranges and shallow valleys. Desert tortoise habitat is most often associated with well-drained sandy loam soils of plains, alluvial fans, and bajadas. Soils in the area are gravelly with desert pavement with patches of gypsiferous soils. Most Mojave desert tortoise burrows are dug under creosote bush (*Larrea tridentata*) or white bursage (*Ambrosia dumosa*) shrubs, which are the dominant vegetation identified in the BA.

Desert tortoises and tortoise critical habitat occur within FMU2. The proposed FMP on LMNRA would involve both the Northeastern and Eastern Mojave recovery units. A total of 338,700 acres in Arizona and 1.2 million acres in Nevada were designated as critical habitat. A total of 151,200 acres of desert tortoise critical habitat occurs within the Piute-Eldorado and Gold Butte-Pakoon DWMAs in LMNRA (59 FR 5820-5846, also see corrections at 59 FR 9032-9036).

Several projects have been completed to protect desert tortoise habitat within LMNRA. Please refer to the 2004 BO for a list of the projects that were in progress and have been completed. As stated in the 2004 BO, based on the information collected during the activities described in the 2004 BO, LMNRA determined that the overall abundance of desert tortoises on LMNRA-administered lands is low (less than 45 tortoises per square mile). Since the 2004 BO was issued, several projects have been carried out on the Nevada side of LMNRA, including road reconstructions, powerline replacements, a water intake for Southern Nevada Water Authority, a Low-Water Amendment to the LMNRA General Management Plan, and a wastewater treatment system expansion in Callville Bay. All desert tortoise monitoring associated with these projects has been specific to the action areas for these projects, but it continues to support previous data collected that concludes that overall desert tortoise densities are low in LMNRA.

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

### Mojave desert tortoise and Critical Habitat

The factors affecting the Mojave desert tortoise and its critical habitat within LMNRA have not changed since the issuance of our 2004 BO. Please refer to that BO for a complete description of the factors affecting the tortoise and its critical habitat within the action area.

## 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.

Both general and species-specific conservation measures have been developed as part of the proposed action to minimize effects. In the case of fire suppression of unplanned ignitions, these conservation measures will be followed unless the protection of human health and safety outweighs the need to protect other resources. Our analysis of effects of fire suppression activities assumes the conservation measures will be implemented. If a situation warrants suppression actions outside of the scope of these measures and a federally-listed species is affected, LMNRA will consult on their actions on an emergency basis.

### Mojave Desert Tortoise and Critical Habitat

The proposed action includes fire suppression activities that could directly and indirectly affect the desert tortoise and its suitable and designated critical habitat. These activities are limited by

implementation of conservation measures. Other fire management activities (hazardous fuels reduction treatments, prescribed fires, and managing unplanned ignitions for resource benefit) would not occur in or near desert tortoise habitat, and would not affect the species or its critical habitat.

Effects of Wildfire and Wildfire Suppression on the Desert Tortoise and Critical Habitat

Wildfire is an increasingly important threat to desert tortoise suitable and designated critical habitat. Over 500,000 acres of desert lands burned in the Mojave Desert in the 1980s (Appendix A of USFWS 2011). In 2005 and 2006, 124,782 acres of critical habitat burned in the Northeast Mojave RU. Approximately 30,000 acres of desert tortoise habitat burned in Arizona, Nevada, and Utah in 2011, with most of those acres burning in Arizona. Neither desert tortoises nor their habitat are ecologically adapted to wildfire; tortoises can be killed by wildfires if trapped above ground (Lovich and Bainbridge 1999). Wildfires can eliminate the shrubs on which desert tortoises depend for shelter and convert tortoise habitat into non-native grasslands that do not contain the necessary diversity of plant species to support viable populations of desert tortoises. BLM's California Desert District averaged 175 wildfires per year in the 10 years prior to 1992 (Lovich and Bainbridge 1999). The area affected by these wildfires annually ranged from 1,500 to 85,000 acres, with an average of approximately 27,000 acres per year. Although at least portions of the areas that burned were not desert tortoise habitat, wildfires have affected some areas of suitable habitat. Within the Northern and Eastern Colorado planning area, approximately 920 acres of critical habitat have burned (BLM and California Department of Fish and Game 2002).

Wildfires have the potential to drastically alter landscapes, reduce the ability of habitats to support wildlife, and kill wildlife directly by exposure to smoke and excessive heat. Mojave Desert shrubs burn readily and may take years to recover. The loss of shrubs can stress desert tortoises because shrubs protect tortoises from excessive exposure to sunlight and predators. Desert wildfires may be followed by an invasion of alien annual grasses, which burn more easily and, therefore, more frequently than desert shrub communities. Wildfire in desert tortoise habitat may remove dry and live forage plants, and cause short-term fragmentation of habitat by creating patches of unsuitable areas. Soils may become less stable and result in increased erosion following a wildfire. Vegetation for shelter, forage plants, unfragmented habitat, and undisturbed habitat are all primary constituent elements of critical habitat that are considered essential to the recovery of the tortoise. Wildfires that remove four of the six primary constituent elements are anticipated to impede the recovery of the species.

Fire suppression is intended to safely and effectively minimize wildfire size and impacts of wildfires to desert tortoises from suppression activities (Duck *et al*. 1994). Additionally, suppression activities will similarly minimize effects of wildfire on the primary constituent elements of critical habitat. Failure to rapidly implement fire suppression or unsuccessful suppression efforts may increase the size and intensity of fires, increasing risk of death or injury to desert tortoises, the amount of habitat burned, and damage to suitable and critical habitat by a wildfire. Prior to, and throughout the 2005 and 2006 wildfires, fire managers and land management agencies were reluctant to use retardant/surfactant, drive vehicles off road, or use heavy equipment such as dozers to stop wildfires in tortoise habitat because of concern about of these suppression actions on tortoises and critical habitat. By taking less aggressive suppression actions, fire managers unintentionally allowed the wildfires to grow much larger and, therefore, burn more tortoise habitat. As a result of the 2005 and 2006 wildfire season, the Mojave Desert

Initiative formed and developed the MDI Guidelines to suppress wildfires faster and more aggressively in desert tortoise habitat, including critical habitat. Specifically, the MDI guidelines encourage local fire management officials to use more aggressive suppression tactics, including driving engines off road, using heavy equipment, using burnout operations, and using retardant and/or surfactant when necessary to reduce total acres burned, while also minimizing impacts from their suppression actions.

Although the MDI Guidelines are intended to keep the fires small and minimize habitat loss due to wildfires, the aggressive suppression actions themselves can have adverse effects on both tortoises and the primary constituent elements of critical habitat. The effects of chemical fire retardants on the desert tortoise and its suitable and critical habitat have not been well-studied. Retardant drops may land on desert tortoises and their habitat. Fire management agencies no longer use fire retardants that degrade into cyanide, which has been harmful to aquatic species including amphibians (Ingalsbee 2004). Common components of fire retardant include clay and fertilizer (L. Nelson, FWS, pers. comm. 2004). Retardant can persist in the environment following the wildfire and may facilitate establishment of alien plant species that are harmful to desert tortoises and outcompete the vegetation that comprise the primary constituent elements of critical habitat related to forage and shelter. Alien annual species have altered plant communities throughout the Mojave Desert by reducing the abundance of native annuals and perennials and increasing that of alien annual grasses. These alien species, which often persist in a more woody form than many natives, have increased the ability of desert communities to carry fire. Consequently, at least some desert plant communities are now more capable of carrying fire than they were previously. The ability of these desert plant communities to carry fire also has the ability to degrade the primary constituent elements of critical habitat associated with unfragmented habitat. Historically, the limited biomass and large distances between shrubs in these native desert communities were factors that reduced the frequency of wildfire (Humphrey 1974, O'Leary and Minnich 1981, Minnich 1983, Brown and Minnich 1986 in Lovich and Bainbridge 1999).

Negative effects to the desert tortoise and its suitable and critical habitat associated with fire suppression activities include tortoise-vehicle encounters and creation of vehicle tracks that persist and become OHV trails. The use of motorized vehicles within habitat of the desert tortoise may result in the crushing of animals, disturbance of annual and perennial plants that were not directly affected by wildfire, and disturbance of soils that may later facilitate the colonization of invasive, alien plant species. Construction of fire breaks could impact desert tortoise habitat and potentially any desert tortoises present in the area. Further, both vegetation removal and soil disturbance by wildfire and suppression activities may create ideal conditions for the spread of invasive weeds, which can significantly alter the native species composition of ecosystems, and in some cases can change the natural fire regime to a more fire-prone condition. Wildfire in desert tortoise habitat may remove dry and live forage plants and cause short-term fragmentation of habitat by creating patches of unsuitable areas. Soils may become less stable and result in increased erosion following a wildfire. Firefighters' activities and their vehicles can be vectors for transporting invasive weed seeds deep into uninfested areas. All of these actions and their associated effects have the ability to negatively impact all of the primary constituent elements of critical habitat by removing forage species and vegetation used for shelter, crushing burrows, and degrading soil quality. Despite the negative effects that these suppression actions can have on the primary constituent elements of critical habitat, they are not expected to impede the ability of critical habitat to recover the species due to their typically narrow, linear, and limited nature.

Burnout operations may ultimately minimize the extent of a fire; however they have the potential to degrade or destroy tortoise habitat and kill or injure tortoises in the path of the backfire. Tortoises may be killed or injured due to direct contact with flames, exposure to high temperatures, and smoke inhalation. Additionally, burnout operations can completely remove the primary constituent elements of critical habitat associated with shelter, forage, soil quality, and unfragmented habitat, further exposing tortoises in the area to increased stress and, possibly, mortality. If kept small, burnout operations are not likely to impede the ability of critical habitat to recover the species; however, if they are large enough and burn large amounts of critical habitat, burnout operations could impede tortoise recovery at the local population level.

Trash accumulation at crew camps or staging areas may attract and concentrate predators such as ravens, coyotes, and kit fox, which may result in increased predation of desert tortoises. Natural predation in undisturbed, healthy ecosystems is generally not an issue of concern. However, predation rates may be altered when natural habitats are disturbed or modified. Raven populations in the California deserts have increased ten-fold from 1968 to 1992 in response to expanding human use of the desert (Boarman and Berry 1995). Because ravens make frequent use of food, water, and nest site structures provided by humans, their population increases can be tied to this increase in food and water sources, such as landfills and septic ponds (Boarman 2002; USFWS 2011). Ravens may be attracted to landfills or project sites if trash is accessible by scavengers (Berry 1985; BLM 1990; Boarman 2002). Ravens were very scarce in the Mojave Desert prior to 1940, so we assume that the current level of raven predation on juvenile desert tortoises is an unnatural occurrence (BLM 1990).

Fire suppression likely results in some low level deleterious effects to the desert tortoise, its suitable habitat, and the primary constituent elements of critical habitat. However, implementing the more aggressive suppression tactics associated with the MDI Guidelines in suppressing wildfires in tortoise habitat should benefit the species because they are anticipated to stop the spread of the fire faster than less aggressive suppression techniques. Stopping wildfires faster in desert tortoise habitat and critical habitat will likely slow or prevent the conversion of desert scrub communities into grasslands and minimize habitat loss and tortoise mortality, which are direct impacts of wildfire. Although the more aggressive suppression tactics associated with the MDI Guidelines are anticipated to cause more adverse effects to tortoises, tortoise habitat, and the primary constituent elements of critical habitat, the long term benefit of keeping the fires smaller is expected to outweigh the short-term negative effects. Ultimately, this will aid in the recovery of the species and improve the ability of critical habitat to recover the species when compared to the less aggressive suppression tactics that often allowed wildfires to grow larger.

Conservation measures proposed by LMNRA should minimize many of the effects of wildfire suppression on the desert tortoise and its critical habitat (See Appendix D for a list of conservation measures). These conservation measures are anticipated to help minimize the effects of the more aggressive suppression actions described in the MDI Guidelines and, when used in conjunction with the MDI Guidelines, promote the recovery of desert tortoises and ensure the ability of critical habitat to aid in recovery of desert tortoises.

## 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 BO. 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 ESA.

The cumulative effects previously described in the 2004 BO have not changed. Please refer to that BO for a complete description of the cumulative effects.

## CONCLUSION

The conclusions of this BO are based on full implementation of the action as described in the Description of the Proposed Action section of this document, including the Conservation Measures that were incorporated into the project design.

After reviewing the current status of the Mojave desert tortoise, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Mojave desert tortoise and is not likely to destroy or adversely modify desert tortoise critical habitat.

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 statutory provisions of the Act to complete our analysis with respect to critical habitat.

We base these conclusions on the following:

1. When needed, aggressive wildfire suppression would provide a net conservation benefit to the desert tortoise.

2. Measures have been proposed by LMNRA to substantially minimize the effects of the proposed action.

3. Desert tortoise densities are generally low in LMNRA. Only a small number of desert tortoises are anticipated to be adversely affected by the proposed action.

## 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 further 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.

The measures described below are non-discretionary, and must be undertaken by the NPS so that they become binding conditions of any future action proposed under the aegis of the proposed FMP, as appropriate, for the exemption in section 7(o)(2) to apply. The NPS has a continuing duty to regulate the activity covered by this incidental take statement. If the NPS: (1) fails to assume and implement the terms and conditions; or (2) fails to require an applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the NPS must report the progress of the action and its impact on the species to the FWS as specified in the incidental take statement (50 CFR §402.14(i)(3)).

**AMOUNT OR EXTENT OF TAKE**

Based on our review of the changes in the proposed action, the environmental baseline, and our effects analysis regarding the inclusion of the MDI Guidelines, we do not anticipate that the amount or extent of take will change from what we originally anticipated in the 2004 BO. The following is from that BO.

> We anticipate that incidental take of tortoises could occur as a result of fire suppression activities. Although the specifics and details of future wildfires are unknown, based on protective measures proposed by LMNRA and the previous history of fire suppression activities in desert tortoise habitat, we estimate that no more than one desert tortoise per calendar year may be incidentally injured or killed by the following activities: (1) operation of vehicles and equipment, (2) construction of fire lines, (3) use of retardants, and (4) setting of backfires. If two or more desert tortoises are found dead or injured during any calendar year due to fire suppression actions, activities should proceed, however LMNRA shall contact the FWS once the fire is under control to reinitiate consultation. This threshold is intended to determine whether certain activities or circumstances may be affecting desert tortoises more than we anticipated.
>
> All desert tortoises found in harm's way during fire suppression activities may be harassed by capture and removal. Based on encounter rates on previous wildfires on LMNRA, we estimate that no more than five desert tortoises may be harassed by capture and removal during fire suppression activities, per calendar year.
>
> No desert tortoise eggs are anticipated to be destroyed during project activities.
>
> We do not anticipate the proposed hazardous fuels reduction treatments, prescribed fires, and management of unplanned ignitions for resource will incidentally take any Mojave desert tortoises. These activities will not be conducted within suitable, occupied, or designated desert tortoise critical habitat.
>
> To ensure that the protective measures are effective and are being properly implemented, LMNRA shall contact the FWS immediately if a desert tortoise is killed or injured as a result of wildfire suppression activities. Upon locating a dead or injured desert tortoise

within the action area, notification must be made to the Ecological Services Division of the FWS at the following numbers: In Nevada, contact the Southern Nevada Field Office at (702) 515-5230; and in Arizona contact the Arizona Ecological Services Flagstaff Suboffice at (928) 226-0614. At that time, the FWS and LMNRA shall review the circumstances surrounding the incident to determine whether additional protective measures are required.

**EFFECT OF THE TAKE**

In this biological opinion we determined that this level of anticipated take is not likely to result in jeopardy to the Mojave desert tortoise or result in destruction or adverse modification of critical habitat for the Mojave desert tortoise.

**REASONABLE AND PRUDENT MEASURES WITH TERMS AND CONDITIONS**

The FWS believes that the reasonable and prudent measures (RPMs), and their accompanying terms and conditions (T&Cs) as described in our 2004 BO are still applicable and, therefore, are necessary and appropriate to minimize take of Mojave desert tortoise. In order to be exempt from the prohibitions of section 9 of the ESA, you must comply with the RPMs and their accompanying T&Cs. These T&Cs are non-discretionary.

The following is from the 2004 BO.

1. LMNRA shall implement desert tortoise education and monitoring programs.

   A. Before the beginning of each fire season, a desert tortoise education program will be presented to all personnel anticipated to be onsite during wildfire suppression activities. This program will contain information concerning the biology and distribution of the desert tortoise, its legal status and occurrence in the proposed project area, the definition of take and associated penalties, measures designed to minimize the effects of construction activities, the means by which employees can facilitate this process, and reporting requirements to be implemented when tortoises are encountered. Following training of project staff, each trained individual will sign a completion sheet to be placed on file at LMNRA.

   B. Resource Advisors designated to coordinate desert tortoise and other resource concerns during wildfire suppression activities shall be trained as monitors. Both Resource Advisors and monitors shall be designated to oversee wildfire suppression activities; to ensure protective measures endorsed by the Incident Commander are implemented; to survey prospective campsites, aircraft landing and fueling sites; and to perform other duties necessary to ensure adverse effects to desert tortoises and their habitat are minimized.

   C. LMNRA shall conduct post-wildfire suppression surveys to identify desert tortoise mortalities along the vehicle travel routes. The Resource Advisor will record each observation of desert tortoise handled. Information will include the following: Location, date and time of observation, whether tortoise was handled,

general health and whether it voided its bladder, location tortoise was moved from and location moved to, and unique physical characteristics of each tortoise.

2. LMNRA shall move tortoises out of harm's way as needed to avoid injury or mortality to tortoises.

A. If a desert tortoise is found in harm's way, it shall be moved by an authorized biologist and released in the closest suitable habitat that removes the tortoise from potential harm, but within 2 miles from the point of collection. The tortoise shall be handled in accordance with FWS-approved protocol (Desert Tortoise Council 1994, revised 1999). If the tortoise cannot be released safely, the Resource Advisor shall contact the FWS's Arizona Ecological Services Flagstaff Suboffice if in Arizona at (928) 226-0614 or if in Nevada, the FWS's Southern Nevada Field Office at (702) 515-5230, for instructions.

B. Any tortoise found within one hour before nightfall or under circumstances that would not allow the tortoise to be safely moved and released, will be placed in a separate clean cardboard box and held in a cool, predator-free location. The box will be covered and kept upright at all times to minimize stress to the tortoise. Each box will be used once and then disposed of properly. The tortoise will be released the next day in a safe location nearest to the point of capture as possible. Each tortoise will be handled with new disposable latex gloves. After use, the gloves will be properly discarded and a fresh set used for each subsequent tortoise handling. All desert tortoises will be handled in accordance with FWS-approved protocol, which was prepared by the Desert Tortoise Council (1994, revised 1999).

3. To the degree possible, LMNRA shall locate activities away from desert tortoises and their burrows.

A. To the maximum extent practicable, campsites, aircraft landing and fueling areas, and staging areas shall be located outside of desert tortoise habitat, or in locations that are previously disturbed, in consultation with the designated Resource Advisor. If areas of such activity must be located in desert tortoise habitat, 100-percent coverage surveys of the site shall be conducted by an authorized biologist or qualified Resource Advisor. Any tortoise found shall be handled and moved in accordance with T&C 2.B. above.

B. If a desert tortoise burrow is found in a potential impact area, efforts shall be taken to avoid the burrow. If disturbance to the burrow is unavoidable, it shall be excavated. If a desert tortoise or nest is found, it shall be relocated by an authorized biologist in accordance with FWS approved protocol (Desert Tortoise Council 1994, as revised).

C. If off-road vehicle travel in tortoise habitat is necessary, potential impacts to the desert tortoise shall be avoided to the maximum extent possible by directing vehicles around tortoise burrows. If impacts cannot be avoided, any desert tortoise in the path of the vehicle shall be moved from harm's way in accordance with T&C 2.B.

D. Fire-related vehicles shall drive slow enough to ensure that tortoises on the roads or in the path of the vehicle can be identified and avoided.

4. LMNRA shall reduce desert tortoise habitat destruction and/or modification.

A. The Resource Advisor may authorize the limited use of tracked vehicles or similar equipment in desert tortoise habitat if he/she believes that the wildfire is serious enough that direct mortality of desert tortoise and habitat loss would result from the wildfire, and other means of control will not effectively prevent spread of wildfire.

B. LMNRA shall ensure that, to the extent possible, vehicle tracks made during wildfire suppression activities, especially those of tracked vehicles, are obliterated and appropriate measures are taken to minimize the potential access and use of these tracks by the public, which may include placement of large material at potential entry points.

C. Revegetation conducted during any burned area rehabilitation shall occur using native species from genetic stocks originating in LMNRA, which would replace plants lost as a result of the wildfire or are representative of plant species adjacent to the burned area. Revegetation shall attempt to reconstruct the natural spacing, abundance, and diversity of native plant species. No imported topsoil or hay bales shall be used during revegetation, in an effort to avoid introduction of non-native plant species or inappropriate genetic stock of native plant species.

D. All firefighting vehicles and equipment shall be pressure washed and/or steam cleaned to ensure that they are free of alien plant materials before entering LMNRA, except where doing so would slow the response to a wildfire.

**Review Requirement**

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. If, during the course of the action, the level of incidental take is exceeded, such incidental take would represent new information requiring review of the reasonable and prudent measures provided. LMNRA must immediately provide an explanation of the causes of the taking and review with us the need for possible modification of the reasonable and prudent measures.

**Disposition of dead or injured listed species**

Arizona

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., Suite113, 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.

Nevada

Upon locating a dead, injured, or sick listed species, initial notification must be made to the FWS's Division of Law Enforcement in Las Vegas, Nevada, at (702) 388-6380.

Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve biological material in the best possible state for later analysis of cause of death. In conjunction with the care of sick or injured listed species or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by FWS Law Enforcement to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed. All deaths, injuries, and illnesses of listed species, whether associated with project activities or not, will be summarized in the annual report.

The following actions should be taken for injured or dead tortoises if directed by FWS Law Enforcement:

> Injured desert tortoises shall be delivered to any qualified veterinarian for appropriate treatment or disposal. Dead desert tortoises suitable for preparation as museum specimens shall be frozen immediately and provided to an institution holding appropriate Federal and State permits per their instructions. Should no institutions want the desert tortoise specimens, or if it is determined that they are too damaged (crushed, spoiled, etc.) for preparation as a museum specimen, then they may be buried away from the project area or cremated, upon authorization by FWS Law Enforcement. LMNRA or the project proponent shall bear the cost of any required treatment of injured desert tortoises, euthanasia of sick desert tortoises, or cremation of dead desert tortoises. Should sick or injured desert tortoises be treated by a veterinarian and survive, they may be transferred as directed by the FWS.

## CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA 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.

We have no additional recommendations beyond the conservation recommendations we included in the 2004 BO. We recommend that you:

1. Collect data on the effects of fire retardant on the desert tortoise and its habitat if retardant is used on LMNRA.

2. Coordinate with Grand Canyon National Park to survey canyon areas within and adjacent to LMNRA that may contain suitable MSO habitat.

3. Coordinate all fire management activities that may affect the relict leopard frog (*Rana onca*) with the Relict Leopard Frog Conservation Team to avoid adverse impacts to current and future relict leopard frog sites.

4. Work towards restoring native riparian vegetation in sites that have the potential to support future breeding habitat for the southwestern willow flycatcher.

5. Consider recommendations included in Appendix K of the Southwestern Willow Flycatcher Recovery Plan (USFWS 2002) when conducting habitat restoration at tamarisk treatment sites.

6. Protect and improve potential and existing habitat for bald eagle population maintenance and expansion.

7. Determine essential habitat needed for the continued existence of the southwestern bald eagle; including non-nesting habitat, maintain suitable habitat, and upgrade potential habitat.

8. Continue supporting and participating in listed and sensitive species survey and monitoring efforts on LMNRA-administered lands.

9. Continue to actively participate in the recovery of listed species.

10. Educate employees and your public users about listed and sensitive species.

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

## REINITIATION NOTICE

This concludes formal consultation on the action(s) outlined in your 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 your efforts to identify and minimize effects to listed and sensitive species from this project. For further information please contact Brian Wooldridge (x105) or Brenda Smith (x101) of my staff at (928) 226-0614, or Michael Burroughs of the FWS Southern Nevada Field Office at (702) 515-5230. Please refer to the consultation number in future correspondence concerning this project; Arizona file number 22410-2011-F-0519, Nevada file number 1-5-04-F-519.

/s/ Brenda Smith for Steven L. Spangle

ccs:

Field Supervisor, Fish and Wildlife Service, Reno, NV
Assistant Field Supervisor, Fish and Wildlife Service, Las Vegas, NV
Assistant Field Supervisor, Fish and Wildlife Service, Flagstaff, AZ (Attn: Shaula Hedwall and Bill Austin)
Assistant Field Supervisor, Fish and Wildlife Service, Phoenix, AZ (Attn: Lesley Fitzpatrick and Greg Beatty)
Assistant Field Supervisor, Fish and Wildlife Service, Tucson, AZ (Attn: Jeff Servoss)
Superintendent, Grand Canyon-Parashant National Monument, St. George, UT
Superintendent, Grand Canyon National Park, Grand Canyon, AZ
Field Manager, Arizona Strip District, BLM, St. George, UT
Field Manager, Las Vegas Field Office, BLM, Las Vegas, NV
State Director, BLM, Phoenix, AZ
State Director, BLM, Reno, NV

Habitat Branch Chief, Arizona Game and Fish Department, Phoenix, AZ
Director, Nevada Department of Wildlife, Reno, NV
Supervisory Biologist – Habitat, Nevada Department of Wildlife, Las Vegas, NV

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# APPENDIX A – CONCURRENCE

This appendix contains our concurrences with your "may affect, not likely to adversely affect" determinations for Mexican Spotted owl, razorback sucker, bonytail chub, southwestern willow flycatcher, Yuma clapper rail, and California condor. If, in the future, new information is discovered on effects to listed species or their habitat not considered here, including changes in habitat distribution or condition, species distribution, or fire occurrence and the need for suppression actions, these findings may need to be revisited. If new information is discovered such as suppression activities occurring within either suitable listed species habitat or potential unsurveyed listed species habitat when listed species are present, LMNRA should contact the FWS immediately to determine whether emergency consultation and/or reinitiation should occur.

**Mexican Spotted Owl (*Strix occidentalis lucida*)**

- Surveys were conducted for the Mexican spotted owl on NPS-managed land of the Shivwits Plateau in 2003-2005 with no owls detected. Although surveys have not been conducted since 2005, no suitable nesting habitat occurs within the Shivwits FMU.

- Canyon habitat adjacent to the Shivwits FMU is the only potential nesting habitat in the vicinity of the proposed action, and no canyon habitat will be affected by fire management activities.

- Protected Activity Centers (PACs) located near the Shivwits FMU occur on Grand Canyon National Park and will not be directly affected by fire management activities on NPS lands administered the Grand Canyon-Parashant National Monument. Because of the distance between PACs and and fire management activities in the FMU (over a half mile), any disturbance effects to breeding owls from fire suppression actions (such as noise) would be insignificant.

- This project is consistent with the 1995 Recovery Plan for the Mexican Spotted Owl (USFWS 1995).

**Razorback Sucker (*Gymnogyps californianus*) and Bonytail Chub (*Gila elegans*) and Their Critical Habitat**

- Both of these fish only occur in the waters of Lake Mead and Lake Mohave and the associated grow-out ponds in FMU 1 and FMU 2. No treatments are planned along the banks of either lake; therefore, neither the fish nor their critical habitat will be affected by fire management activities.

- Prescribed burning of vegetation along the grow-out ponds will only occur when the ponds are devoid of fish and dry. No fish will be affected as a result of fire management activities associated with the grow-out ponds.

- Because the ponds are within the 100-year flood plain of the Colorado River, they are within designated critical habitat for both species. Prescribed fires to remove vegetation at the grow-out ponds is anticipated to benefit the fish by reducing the amount of vegetation, allowing the amount of dissolved oxygen in the water to increase as well as potentially increasing the overall nutrient availability when water is added to the ponds.

**Southwestern Willow Flycatcher (*Empidonax traillii extimus*)**

- The conservation measures included in the proposed action are anticipated to minimize effects of the proposed action.

- Wildfires and associated suppression actions are unlikely to occur within suitable southwestern willow flycatcher habitat that may develop within the life of the FMP.

- Suitable southwestern willow flycatcher habitat is not currently known to exist within LMNRA.

**Yuma Clapper Rail (*Rallus longirostris yumanensis*)**

- The conservation measures included in the proposed action are anticipated to minimize effects of the proposed action.

- Rails are not known to occur within LMNRA.

- It is uncertain that suitable rail habitat exists in LMNRA.

- Wildfires and associated suppression actions are unlikely to occur within suitable rail habitat that may be present or develop within the life of the FMP.

**California Condor (*Gymnogyps californianus*)**

- The conservation measures included in the proposed action are anticipated to minimize effects of the proposed action.

- Condors are known to only rarely occur within LMNRA, so it would be unlikely for them to be affected by or attracted to fire management activities.

## APPENDIX B – 2004 CONSERVATION RECOMMENDATIONS

### Relict Leopard Frog

The relict leopard frog inhabits permanent streams, springs, and spring-fed wetlands below approximately 2000 feet and is currently known to occur only in two general areas: near the Overton Arm of Lake Mead and in Black Canyon below Lake Mead.

Your BA indicated that pre-treatment surveys would occur within potential relict leopard frog habitat, and areas with known populations would not be burned. Instead of burning, the vegetation in these areas would be cut using hand tools and treated with a target-specific application of an herbicide approved for aquatic use if necessary. Pesticide applications involving the relict leopard frog should be based on the assumption that risk to the frog from pesticides can never be completely evaluated or necessarily eliminated. In particular, the use of surrogate animal species for estimating pesticide hazards may not always accurately predict all potential outcomes with respect to specific pesticide applications vs. sensitive species. Variability in pesticide operations (methods, equipment, etc.) also contributes to risk factors involved with pesticide applications.

We recommend the following voluntary measures to minimize potential adverse impacts to the relict leopard frog from pesticide treatments.

- Any treatments using aquatic pesticides (aquatic herbicides, etc.) should not occur within one mile of occupied or unsurveyed aquatic habitat of the relict leopard frog.

- No pesticide treatments should occur within occupied or unsurveyed aquatic habitat of the relict leopard frog.

- Treatments using pesticides (other than aquatic pesticides) rated as either Class 0 or Class 1 in both the Aquatic Amphibian toxicity group or the species' food toxicity groups should have a buffer zone of 50 feet when applied at the edge of occupied or unsurveyed habitat using liquid formations in a spot application. Spot applications include pesticide applications by hand-operated equipment or a spray gun that discharges pesticide in liquid streams from a spray tank. A buffer zone is the distance between the boundary of the area requiring protection and the closest point of the last spot application or application swath. Recommended buffer zones apply only to applications made under standard weather conditions: (1) wind speeds below ten miles per hour, (2) no temperature inversions, and (3) no rainfall for 24 hours after treatment. Recommended buffer zones should be used (1) in all of the habitat area, (2) for at least 300 feet downstream of the habitat area, and (3) for at least one mile upstream from the habitat area in any contributing channel, tributary, or springrun.

- Please contact us for additional information on recommended buffer zones if you intend to: (1) use pesticides that rate as Class 2 or greater in either the Aquatic Amphibian toxicity group or the species' food toxicity groups, (2) use application methods other than spot application, (3) use pesticide formations other than liquid formations, or (4) apply pesticides in weather conditions other than those considered standard as described above.

- All treatments in unsurveyed or occupied habitat should be timed to avoid the breeding season and other sensitive periods in the relict leopard frog's life history. Information on the breeding season of the frog is poorly represented in the literature; however, breeding has been documented in September, November, and late January through March. As more information is collected on the frog's life history, these sensitive periods should become better defined.

- In order to minimize potential adverse impacts to the relict leopard frog from hazardous fuels reduction/prescribed fire activities within or upstream of occupied or unsurveyed habitat, we recommend that you determine: (1) an appropriate number of acres and number of projects or phases of projects to occur per year that may impact individual patches of occupied or unsurveyed habitat, (2) an appropriately-sized buffer upstream of occupied or unsurveyed habitat in order to minimize sediment, ash, and elevated levels of phosphorus and nitrogen from entering the habitat, and (3) need for installing sediment traps upstream of occupied or unsurveyed relict leopard frog habitat in order to minimize the amount of ash and sediment entering the water.

- Except as needed in emergency situations to abate immediate fire threat or loss of life or property, we recommend that no water should be drafted for fire suppression from occupied or unsurveyed habitat of the relict leopard frog.

- Prioritize treatments at springs that are potential repatriation sites for the relict leopard frog.

**American peregrine falcon**

Within Lake Mead NRA, the peregrine falcon occupies steep cliffs or canyons near water, in open country with abundant prey. The park has identified 13 areas as potential peregrine falcon territories that are surveyed each year by both National Park Service and Nevada Division of Wildlife biologists to document pair occupancy and breeding. The park has ample potential habitat, and it is not known how many birds may use the area. Nesting has been recorded within the recreation area; however, none of the nest sites are located near treatment areas or areas identified for wildland fire use.

We recommend the following voluntary measures to minimize potential adverse impacts to the Peregrine falcon from the proposed action.

- If peregrine falcons are discovered nesting in an area identified for burning or treatment, we recommend you implement temporary closures to human access and project implementation within ½ mile of nest sites during the breeding season (March 1 to July 31).

- Burns should be managed to ensure nest sites are more than ½ mile from downwind smoke effects.

- No helicopter or aircraft activity or aerial retardant application should occur within ½ mile of peregrine falcon nest sites during the breeding season.

**Northern Goshawk**

Northern goshawk nesting has been recorded in coniferous forests on the Shivwits Plateau and on adjacent BLM-administered lands on the Arizona Strip. Surveys for goshawks were initiated in 2002 on the Shivwits Plateau within Lake Mead NRA. One nest site was found on the Shivwits Plateau in the Pine Valley area.

We recommend the following voluntary measures to minimize potential adverse impacts to the Northern goshawk from the proposed action.

- If goshawks are discovered nesting in an area proposed for burning or treatment, we recommend you implement temporary closures to human access and project implementation within ½ mile of nest sites during the breeding season (March 1 to September 30).

- Burns should be managed to ensure nest sites are more than ½ mile from downwind smoke effects.

- No helicopter or aircraft activity or aerial retardant application should occur within ½ mile of goshawk nest sites during the breeding season.

- To the extent possible, maintain habitat features necessary to support breeding populations of goshawks and review ongoing fire management activities for effects on essential habitat features needed by goshawks. Modify activities, where necessary, to sustain the overall suitability of the habitat for goshawks.

- Provide reasonable protective measures so fire prescription or fuels treatment will not consume dominant, large trees within ½ mile of known nest sites of goshawks. Pre-treatment efforts should provide reasonable protection of identified nesting trees. Retain hardwoods, large down logs, large trees, and snags. Emphasize a mix of size and age classes of trees. The mix should include large mature trees, vertical diversity, and other structural and floristic characteristics that typify natural forest conditions.

- Incorporate natural variation, such as irregular tree spacing and various stand/patch sizes, into management prescriptions and attempt to mimic natural disturbance patterns.

- Allow natural canopy gap processes to occur, thus producing horizontal variation in stand structure.

## APPENDIX C- MDI GUIDELINES

## MANAGING WILDFIRES IN THE MOJAVE DESERT
## PRIORITIES AND GUIDANCE FOR INCIDENT COMMANDERS
## SPRING 2011

During periods of high fuel loads and hot, dry, windy weather conditions, wildfires in the Mojave Desert have the potential to exhibit extreme fire behavior and grow large quickly. The Mojave Desert is not a fire-adapted ecosystem, but exotic vegetation can fuel fires that can drastically alter the landscape. Firefighters are encouraged to safely and aggressively suppress wildfires to reduce total acres burned, while minimizing impacts from their suppression actions. Agency administrators must provide guidance to incident commanders on resource values, goals, and constraints through preseason planning.

### MOJAVE DESERT PRIORITIES

1. ENSURE **SAFETY** OF FIREFIGHTERS AND THE PUBLIC
2. **MINIMIZE ACRES BURNED** (HABITAT LOSS) THROUGH RAPID FIRE SUPPRESSION
3. **MINIMIZE SUPPRESSION DAMAGE** TO RESOURCES

### DECISION MAKING

Protecting life and property is paramount in every decision and action. Consider the current and predicted weather, fire behavior, fuel loading, available suppression tools, and resources that are threatened by the fire, and implement appropriate firefighting methods that will minimize resource damage. Rapid and aggressive response may be warranted and can minimize acres burned. Resource damage occurs from both fire and some suppression actions, but burned desert is damaged desert. Use Best Management Practices to minimize resource damage.

Incident commanders should not wait for Resource Advisors before implementing all safe and aggressive suppression tactics necessary during Initial Attack:

- **Consider immediately the use of air attack resources to limit fire spread.**

- **Using backfires/burnouts, off- road driving or heavy equipment** to construct fireline may have substantial impacts, but may be justified in order to minimize acres burned. Use tactics appropriate for the area designation and administering agency.

  **For NPS lands the Resource Advisor must be consulted before use of heavy equipment or off-road driving. In designated wilderness, all motorized equipment usage must be approved by the appropriate agency administrator **.

- **Stop all habitat damaging tactics when they are no longer required** to prevent a larger or more severe fire. Constantly assess the fire situation and Mojave Desert priorities as they relate to your operations. Document actions to facilitate post-fire rehabilitation of suppression actions.

- **Avoid spreading non-native organisms** by following guidance such as *Operational Guidelines for Aquatic Invasive Species Prevention and Equipment Cleaning*.

- **Upon communication with the Resource Advisor**, incorporate his/her knowledge and advice into the Incident Operations in a safe and efficient manner.

STAY CALM, BE ALERT, THINK CLEARLY, ACT DECISIVELY

**APPENDIX D –**

**LAKE MEAD NRA AND GRAND CANYON-PARASHANT NATIONAL MONUMENT COMPARISON OF CONSERVATION MEASURES IDENTIFIED IN FIRE MANAGEMENT PLAN RELATIVE TO INTERESTS OF THE MOJAVE DESERT INITIATIVE**

| Tactic | 2004 Fire Management Plan Conservation Measures | 2010 revised Fire Management Plan *Proposed* Conservation Measures |
|---|---|---|
| **Retardant Use** | FMU1:<br>Low-level aircraft and retardant/surfactant use would be prohibited unless approved by the LMNRA Superintendent, and may not be allowed if listed or sensitive species are near the site. | FMUs 1, 2 (desert zone), and 3: Retardant use is allowed for direct attack (e.g. not for installing contingency lines) in this FMU if the following criteria can be met:<br>a. IC is local and has attended a pre-season values at risk training<br>b. READ recommends or concurs with the decision<br>c. No known springs, seeps, or other surface water resources will be affected by the delivery (distance away varies by delivery mechanism, terrain, etc)<br>d. READ or IC records the volume, formulation, and location of retardant use for follow-up on resource impacts, to greatest extent possible.<br>e. Any other use of retardant is subject to Superintendent authorization as per existing plan |
| | FMU 2, desert zone:<br>Low-level aircraft and retardant/surfactant use are authorized in this zone, but may not be allowed if listed or sensitive species are near the site. | |
| | FMU 3:<br>Low-level aircraft and retardant/surfactant use are authorized in this zone, and may not be allowed if listed or sensitive species are near the site. | |
| | FMU 2, tamarisk zone:<br>Helicopters may be used to assist with prescribed fire treatments on sites larger than 10 acres. They would be used for aerial ignition, cargo delivery (i.e. supplies to support ground crews), and water bucket drops for fire control purposes if necessary. They would not be used for herbicide treatments or to drop retardant or surfactant. Low-level airplanes may be used to drop water and may not be allowed if listed or sensitive species are near the site. Buffers would be established around known locations of listed or sensitive species. | No Change |

| Tactic | 2004 Fire Management Plan Conservation Measures | 2010 revised Fire Management Plan *Proposed* Conservation Measures |
|---|---|---|
| **Driving off road and Dozers - General** | All FMUs:<br>Use of bulldozers, graders, and off-road vehicle travel would be prohibited unless approved by the LMNRA Superintendent.<br><br>All FMUs:<br>In undeveloped areas of LMNRA, fire engines and other fire-related vehicles would not be driven off paved or unpaved roadways. | FMU 1 &2: Allow for mobile attack (off road driving) if the following conditions are met:<br>a) IC is local and has attended a pre-season values at risk training<br>b) A large acreage can be prevented from burning with a minimal amount of off-road travel and the fire has a reasonable potential for spread given fuel and weather conditions<br>c) It is safe to travel off-road and a spotter walks in front of the vehicle to look for both safety hazards and resources of concern (e.g. tortoises)<br>d) There is a reasonable chance of catching fire with the water available in engines or other equipment on scene<br>e) The distance traveled is generally less than ¼ mile off-road<br>f) Mobile attack is used during the first hour of the IC being on scene<br>g) There is no off-road travel for mop-up<br>h) Avoid tracks in the black<br>i) No dozers or graders unless approved by the Superintendent<br><br>FMU 3:<br>No off road vehicles will be used unless approved by the Superintendent.<br>No dozers or graders will be used unless approved by the Superintendent. |

| Tactic | 2004 Fire Management Plan Conservation Measures | 2010 revised Fire Management Plan *Proposed* Conservation Measures |
|---|---|---|
| **Driving off road and Dozers - tortoise** | Tortoise:<br>Off-road vehicle activity shall be kept to a minimum. Vehicles will be parked as close to roads as possible, and vehicles shall use wide spots in roads to turn around. If off-road travel is necessary, a biologist or crew person shall walk in front of the vehicle to direct the driver around tortoises and tortoise burrows. Whenever possible, local fire-fighting units should go off-road first because of their prior knowledge of the area. | FMU 1 & 2: Allow for mobile attack (off road driving) if the following conditions are met:<br>a) IC is local and has attended a pre-season values at risk training<br>b) A large acreage can be prevented from burning with a minimal amount of off-road travel and the fire has a reasonable potential for spread given fuel and weather conditions<br>c) It is safe to travel off-road and a spotter walks in front of the vehicle to look for both safety hazards and resources of concern (e.g. tortoises)<br>d) There is a reasonable chance of catching fire with the water available in engines or other equipment on scene<br>e) The distance traveled is generally less than ¼ mile off-road<br>f) Mobile attack is used during the first hour of the IC being on scene<br>g) There is no off-road travel for mop-up<br>h) Avoid tracks in the black<br>i) No dozers or graders unless approved by the Superintendent<br><br>FMU 3: Not Applicable |
| | Tortoise:<br>Use of tracked vehicles in desert tortoise habitat shall be restricted to improving roads or constructing lines where a short distance of line might save a large area from wildfire. Monitors shall walk in front of tracked vehicles to ensure minimal impacts to tortoises and their burrows. Equipment staging areas shall be surveyed for desert tortoises prior to use. | Any use of dozers, graders or tracked vehicles use must be approved by Superintendent. |

# APPENDIX E-

## LAKE MEAD NRA AND GRAND CANYON-PARASHANT NATIONAL MONUMENT PLANNED FUEL TREATMENTS 2011-2020

**Planned Fuels Treatments – Lake Mead NRA**

Planned treatments are actions undertaken by the NPS to meet specific desired outcomes using prescribed methods which may include either management ignited fire (aka prescribed fire), mechanical removal of fuels, or a combination of both. There are six treatments proposed to be implemented between 2011 and 2020 as shown on Table B1 for the purposes of hazard fuel management and ecological restoration/habitat maintenance. In addition, slash pile burning is proposed as a method for woody debris disposal after exotic species treatments are implemented.

**Table C1: Location of Proposed Fuel Treatments at Lake Mead NRA**

| Project | Acres | Latitude | Longitude |
|---|---|---|---|
| Rx Fire: St. Thomas Phase 2 | 200 | 36° 28’ 29” | 114° 22’ 54” |
| Rx fire: Aztec Wash South | 30 | 35° 38’ 45” | 114° 42’ 28” |
| Rx Fire: Razorback Sucker Ponds | 10 | 35° 24’ 56” | 114° 40’ 29” |
| Rx Fire: Blue Point Spring | 2 | 36° 22’ 48” | 114° 24’ 45” |
| Rx Fire: Las Vegas Wash | 25 | 36° 07’ 41” | 114° 52’ 35” |
| Rx Fire: Liberty Cove South | 20 | 35° 36’ 19” | 114° 40’ 58” |
| Slash piles (annually) | NA | Varies | Varies |

Hazard Fuel Management

Lake Mead NRA is a very popular destination for water based recreation, as evidenced by an annual visitation of 8 million visitors and the 5000 recreational boats per day routinely seen on park waters on summer weekends (NPS 2002). This intense boat use means that there is also intense shoreline use on both Lakes Mead and Mohave. There are literally hundreds of coves that provide shoreline use areas for boaters. In many cases the coves support vegetation, much of which is invasive saltcedar (also known as tamarisk (*Tamarix ramosissima*), athel (*Tamarix aphylla*) or hybrids (*Tamarix* spp). The low density saltcedar woodlands provide shade for boaters and serve as popular camping sites. The high density saltcedar creates a prickly thicket that is less hospitable for recreational use and poses a fire hazard when campfires are constructed close by. Prescribed fire can be used as a tool to treat thick saltcedar stands, which can then be followed by a foliar application of herbicide to reduce saltcedar density and provide for improved safety and recreational use of the site. Removal of the saltcedar also provides opportunities to restore native riparian vegetation (NPS 2005) either through passive restoration (e.g. natural colonization by quailbush and arrowweed) or active restoration (e.g. planting of willow and cottonwood) (NPS 2010). For efficiency in prescribed fire and herbicide treatment operations, several coves in close proximity can be treated at the same time. These treatments are proposed for Aztec Wash South, Las Vegas Wash, and Liberty Cove South.

St. Thomas is a 19$^{th}$ Century community in the Overton Arm of Lake Mead, formerly flooded by the reservoir and recently re-exposed due to lowered lake levels. Since its re-emergence the area

has been heavily invaded by saltcedar. The saltcedar fuel load poses a hazard fuel risk to burnable components of this historic resource. Nearby, some areas of the pre-historic sites of Lost City are also at risk of fire due to saltcedar. Fuel treatments are needed to mitigate these risks. The approximate treatment area is 200 acres and would involve mechanical removal of saltcedar (possibly tied in with cut stump herbicide treatment), either broadcast or pile burning of removed biomass, and follow up foliar herbicide treatment if the re-sprout. This area will need to be re-treated every few years.

Tassi Ranch is located within Parashant National Monument, but is included in the Desert FMU. It is a low elevation historic ranch property situated on a natural spring complex. Various historic restoration projects have resulted in brush piles that need to be burned, and it is expected that additional piles will need to be burned in the future as stabilization and cultural landscape work continues. There may be other forms of mechanical work needed to restore the cultural landscape and/or protect the structures and cultural elements from fire hazards.

Ecological Restoration/Habitat Maintenance

The relict leopard frog (*Rana onca*) requires riparian habitat with shallow open water and some open banks, which were previously maintained by natural hydrological processes but are now prone to overgrowth by riparian vegetation as a result of altered stream flow dynamics. Both prescribed fire and mechanical treatment can be used to maintain the appropriate amount of open water and open bank habitat for this species; however, because these habitats are fragile and geographically limited, both techniques require precision in planning and execution in cooperation with conservation biologists knowledgeable of frog biology and habitat requirements. It is expected that one or two treatments would need to be conducted each year in either late spring/early summer or late fall/winter. This project would need pre-treatment surveys and monitoring for archaeological resources, spring snails, and rare plants. This treatment is proposed for Blue Point Spring.

Lake Mead NRA is a partner in the conservation of the federally endangered razorback sucker (*Xyrauchen texanus*) and bonytail chub (*Gila elegans*), two of several imperiled fish native to the Lower Colorado River. In partnership with the Bureau of Reclamation, US Fish and Wildlife Service, and other partners, the Park hosts constructed grow-out ponds along the shores of Lake Mohave that are used to house the captive bred juvenile fish prior to their release in the wild. The ponds are being overgrown by cattails (*Typha* spp.) and other herbaceous vegetation which interferes with their function as grow-out ponds. The ponds are completely dried out September through December, providing a window to burn the remaining vegetation to reduce its density prior to the spring use as fish rearing ponds. All of the grow-out ponds are accessible by boat and a few are accessible by 4x4 road. As the grow-out ponds are small and surrounded by sparse, discontinuous desert fuels, it is expected that prescribed fire operations should be fairly minimal. Any mesquite, cottonwood, and willow should be protected from fire. Provided the grow-out ponds are completely dry and fire occurs in the fall season, there are no pre-treatment surveys needed. Ideally, the grow-out ponds should all be burned annually, starting in FY11.

Slash Burning

Slash pile burning is included every year to dispose of woody debris that results from invasive species control work along the shorelines of Lake Mead and Lake Mohave and at a few washes and spring sites. This work will be conducted by the Resource Management program using cut-stump methods. This will generate slash, either piled or broadcast, that will need to be burned on site for disposal.

**Planned Fuels Treatments – NPS Managed portions of Parashant National Monument**

Background:

Vegetation communities on the Parashant NM area have been severely altered from historical norms due to uncontrolled and extensive grazing from cattle, sheep, and goats during the late 1800's and early 1900's. Cattle grazing on NPS lands in the Monument, managed under a permit system, continues on 76,000 acres today. Grazing on the remaining 132,000 acres of the NPS lands was phased out beginning in the mid-1990's and permanently closed via completion of the General Management Plan in 2008. Fire exclusion and logging operations have also had a significant effect on the vegetation communities. The combination of grazing, fire suppression and logging have led to a decrease in native grass and herbaceous cover, an increase in pinyon-juniper densities and a change in composition of the Ponderosa Pine forests.

This plan is designed to realign the vegetation and the natural fire regime with historical norms while protecting Monument visitors and resources. By utilizing adaptive management and systemically organizing treatments with the help of the Resource Management Division, the objective is to achieve a state where the natural fire regime could maintain the desired plant communities. However, it should be noted that multiple treatment entries are usually required to return the vegetation to a point where natural disturbance will maintain the historical plant communities and biodiversity. Many of the proposed treatments are second entries which should strongly shift the Fire Regime Condition Class (FRCC, Table B2) of the vegetation towards 1 - Low.

**Table C2: Fire Regime Condition Classes (FRCC)**

| Condition Class | Condition Class Description |
|---|---|
| 1- Low | Vegetation composition, structure, and fuels are similar to those of the natural regime and do not predispose the system to risk of loss of key ecosystem components. Wildland fires are characteristic of the natural fire regime behavior, severity, and patterns. Disturbance agents, native species habitats, and hydrologic functions are within the natural range of variability. |
| 2- Moderate | Vegetation composition, structure, and fuels have moderate departure from the natural regime and predispose the system to risk of loss of key ecosystem components. Wildland fires are moderately uncharacteristic compared to the natural fire regime behavior, severity, and patterns. Disturbance agents, native species habitats, and hydrologic functions are outside the natural range of variability. |
| 3- High | Vegetation composition, structure, and fuels have high departure from the natural regime and predispose the system to high risk of loss of key ecosystem components. Wildland fires are highly uncharacteristic compared to the natural fire regime behavior, severity, and patterns. Disturbance agents, native species habitats, and hydrologic functions are substantially outside the natural range of variability. |

When this plan was conceptualized, it was created in a manner for future import into the Interagency Shivwits Plateau Vegetation Management Plan for the Parashant National Monument. Regional and local management have recognized and stressed the increasing importance of working with cooperators and adjoining agencies. Within this plan there are several proposed cooperative projects with the Arizona Strip Bureau of Land Management (BLM) who manage the BLM portion of the Parashant NM. The long term goal of creating a vegetation management plan for the Shivwits Plateau portion of Parashant NM should facilitate a coordinated effort to restore and retain the landscape of the Parashant NM. At whatever point in the future such as vegetation management plan is developed, it will supercede this fuels plan.

Explanation of each habitat type and treatment:

Ponderosa Pine (*Pinus ponderosa)*

From historical records and tree scar research we know that ponderosa pine stands typically had frequent, low intensity ground fires up until the late 1800's – early 1900's. This disturbance maintained stand health and gave the appearance of an "open park like stand". Due to an increase in livestock grazing and fire suppression, these open stands experienced recruitment of a large number of small trees with closed canopies limiting herbaceous understory diversity and a increase in potential fire severity. It is estimated that a typical fire return interval in this system would be 2-20 years. In the ponderosa pine areas, the prescribed fire program should focus on reducing the density of post settlement trees that have invaded grass/large old-growth tree dominated sites. The thinning will be done with chainsaws or a handheld brush cutter. All trees cut will be left on site to reduce soil disturbance and promote nutrient recycling during the burn. Because fuels are fairly evenly distributed in this forest type, a broadcast burn technique is often used to sweep fire across the unit from one side to the other allowing wind to carry the fire in a natural distribution.

Some of these units may also be seeded with native grasses/forbs after the burn. Observation of past prescribed fire treatments showed a dramatic increase in grass recruitment. Presettlement-aged, "old-growth" trees are an important feature of the Monument. These trees contain centuries of genetic diversity, provide important habitat for wildlife such as Goshawks, and are an important aesthetic feature. Due to their age (200-400 years), it would take longer to replace the old growth ponderosa than any other living feature of the ecosystem (Vance et al. 2001). For this reason, preserving a healthy population of old growth ponderosa pine is a long term management objective.

Pinyon-Juniper (*Pinus monophylla and Juniperus osteosperma)*

The encroachment of pinyon-juniper on what was once a grass/forb/shrub area is due, in part, from overgrazing and fire suppression. The understory provided biodiversity and carried fire in a regular return interval preventing encroachment by means of a natural disturbance. Grazing diminished competition created from native grasses and allowed the establishment of an even-aged monoculture of pinyon-juniper. As pinyon-juniper woodlands age, grass and herbaceous

surface vegetation will continue to decline as the canopy becomes closed. Reduction in the surface vegetation results in accelerated soil erosion. This is due to a lack of fibrous root mass (previously provided by perennial grasses) to hold soil in place. Juniper and brush will continue to dominate without some type of disturbance event or management action. Reducing the canopy density by mechanically treating pinyon-juniper with such a means as chainsaws or tree shearer could potentially allow the recruitment of native grasses and forbs while causing less immediate impacts to air quality. However, many native plants require fire to scarify seeds and prepare an adequate establishment site. In addition, without fire, nutrient cycling would continue to take centuries, gradually impoverishing the soil nutrient pool. Mechanical treatment may be utilized in conjunction with prescribed fire to manipulate vegetation arrangement to mimic historic fire intensity. This would also provide opportunities to apply prescribed fire under more favorable smoke dispersal conditions and with greater control. Prescribed fire, in part due to fire's historic role, is the most appropriate management action to facilitate the restoration of native vegetation and fire dependant ecosystems of the Shivwits Plateau. Because of the discontinuity in fuel distribution, a jack pot burning technique is often employed in prescribed fire in juniper fuel types where pockets of fuel are ignited but there is no attempt to carry fire through the entire unit.

The vegetation management program must focus on a long term goal of restoring plant communities to their historic pre-settlement norms. This plan is not suggesting wholesale removal of pinyon - juniper and it must be recognized that pinyon-juniper is a very important vegetation community that historically occupied expansive areas with rocky and shallow soils. In addition, a body of research is developing that suggests some pinyon-juniper woodlands are in natural, climax conditions. Conditions under which these communities are typified have yet to be clearly established. Resource and fire managers will track this research and its applicability to fire and fuels management over the course of life of this plan.

Sagebrush (*Artemisia tridentata*)

Sagebrush meadow areas have also been altered from grazing and fire suppression. Sagebrush does not usually immediately re-establish after a disturbance and must rely on a seed source for recruitment. After a prescribed fire treatment it can be expected the area will recover in grass. Periodic burning with either prescribed or natural ignition will maintain the delicate balance between grass and sagebrush and limit juniper encroachment.

Treatment Units

Prescribed fire units may vary in size but larger units are encouraged to promote landscape scale restoration. Prescribed fire unit boundaries should utilize the ample natural features (canyon rims and walls); natural fuel breaks (juniper with sparse ground fuels) and existing roads and trails for perimeter control. Construction of perimeter fire control lines should be discouraged due to impacts to natural and cultural resources. Perimeter control lines are also costly to construct and increase risk to fire fighter safety during holding operations. However, interior control lines and mechanical fuel treatments (primarily cutting woody vegetation with chainsaws and scattering the debris) may be necessary to protect sensitive cultural and natural features

within the burn unit.

Treatments may be adjusted between years to accommodate such variables as: prescription, fuel loading, fire severity, resource availability, funding, compliance, smoke concerns, and biological or cultural resource concerns. All of the treatments listed in Table B3 are proposed for implementation between 2011-2020.

Fire Regime Condition Class (FRCC) was determined by GIS layers created from satellite vegetation mapping in 2004. As with all satellite imagery, there is an element of inaccuracy in the mapping, and values need to be validated. This value will change as treatments are implemented and ground observations are made. Values for FRCC in the treatments below were derived from the National Fire Plan Operating and Reporting System (NFPORS).

**Table C3. Proposed fuel treatments for the NPS managed portion of Parashant NM.**

| Unit name | Size | FRCC % (1/2/3) | Fuel type | Treatment type | Latitude | Longitude | notes |
|---|---|---|---|---|---|---|---|
| Horse Valley | 67 acres | 22/3/75 | Ponderosa Pine | RX burn, broadcast | 36° 06' 33" | 113° 30' 41" | Re-entry. Burned in 1998. |
| Pine Valley Loop | 41 acres | 50/15/35 | Ponderosa Pine | RX burn, broadcast | 36° 06' 31" | 113° 27' 22" | Re-entry. Burned in 1999. |
| Pine Valley West | 170 acres | 23/3/75 | Ponderosa Pine | Rx Burn, broadcast | 36° 06' 22" | 113° 27' 28" | Re-entry. burned in 1999 |
| Pleasant Valley | 191 acres | 23/3/75 | Ponderosa Pine | Rx Burn, broadcast | 36° 08' 32" | 113° 29' 50" | Re-entry burned in 1999 |
| Pleasant Valley Meadow | 21 acres | 23/3/75 | Ponderosa Pine | Rx burn, broadcast | 36° 08' 29" | 113° 29' 44" | Re-entry |
| Kelly East | 2350 acres | 0/50/50 | Juniper | Rx burn, broadcast | 36° 04' 03" | 113° 27' 22" | First Entry |
| Fire Camp Complex | 89 acres | 20/5/75 | Ponderosa pine | Rx burn, broadcast | 36° 07' 50" | 113° 31' 50" | Re-entry, burned in 1997 |
| Green Springs | 70 acres | 93/5/2 | Ponderosa Pine | Rx burn, broadcast | 36° 05' 53" | 113° 28' 21" | Re-entry, burned in 1997 |
| Sawmill Meadow | 16 acres | 23/3/75 | Grass and Sagebrush | Rx burn, broadcast | 36 °7' 45 " | 113° 25 '09 " | Re-entry, burned in 2000 |
| Twin 2 | 1761 acres | 23/3/75 | Pinyon-Juniper | Rx burn, broadcast | 36° 04' 16 " | 113° 31' 34" | Re-entry, burned in 1996 |
| Pine Valley Ranch | 294 acres | 23/3/75 | Ponderosa Pine | Rx burn, broadcast | 36° 06' 21" | 113° 27' 06" | Re-entry, burned in 2002 |
| Green Springs East | 266 acres | 23/3/75 | Ponderosa Pine | Rx burn, broadcast | 35° 05' 40" | 113° 27' 43" | Re-entry burned in 2002 |
| Green Springs North | 741 acres | 23/3/75 | Ponderosa Pine | Rx burn | 36° 06' 10" | 113° 28' 10" | Re-entry, burned in 2003 |
| Pleasant Valley East | 146 acres | 23/3/75 | Ponderosa Pine | Rx burn, broadcast | 36° 08' 28" | 113° 29' 25" | Re-entry, burned in 2002 |
| Pine Valley East | 1214 acres | | Ponderosa Pine | Rx burn, broadcast | 36° 07' 06" | 113° 27' 05" | Re-entry, burned in 2002 |
| Pine Valley Meadow | 66 acres | 23/3/75 | Sagebrush, grass and forbs | Rx burn, broadcast | 36° 06' 43" | 113° 26' 58" | Re-entry, burned in 2003 |
| Boundary | 192 acres | 20/60/20 | Ponderosa Pine | Rx burn, broadcast | 36° 08' 09" | 113° 30' 57" | Re-entry from 2005, coordinate with AZ Strip BLM for a joint burn |
| Sawmill South | 82 acres | 25/60/15 | Ponderosa Pine | Rx burn, broadcast | 36° 07' 43" | 113° 30' 53" | Re-entry from 2005 |
| Halfway | 200 acres | 10/15/75 | Ponderosa Pine | Rx burn, broadcast | 36° 06' 32" | 113° 29' 03" | Re-entry from 2004 |
| Yellow John East | 340 acres | 10/10/80 | Ponderosa Pine | Rx burn, broadcast | 36° 08' 52" | 113° 27' 11" | Join burn with BLM; Re-entry from 2006 |
| Waring | 168 acres | 15/75/10 | Ponderosa Pine | Rx burn, broadcast | 36° 06' 41" | 113° 29' 58" | Re-entry from 2005 |
| Twin North | 1215 acres | 35/60/5 | Juniper | Rx burn, jack pot burn | 36° 05' 52" | 113° 35' 04" | Re-entry from 1997 |
| Twin I | 407 acres | 35/60/5 | Juniper | Rx burn, jack pot burn | 36° 04' 36" | 113° 38' 12" | Re-entry from 1995 |
| Ambush | 382 acres | 25/55/20 | Ponderosa Pine | Rx burn, broadcast | 36° 04' 31" | 113° 27' 18" | Re-entry from 2007 |
| Yellow John West | 287 acres | 15/15/70 | Ponderosa Pine | Rx Burn, broadcast | 36° 08' 53" | 113° 29' 32" | Joint burn with BLM; Re-entry from 2004 |
| Horse Valley Meadow | 211 acres | 10/40/50 | Sagebrush and grass | Rx Burn, broadcast | 36° 07' 10" | 113° 30' 33" | Unsuccessful attempt at burning in 2006 |
| Kelly West | 527 acres | 5/25/70 | Juniper | Rx burn, jack pot | 36° 05' 02" | 113° 28' 04" | First entry |
| Twin Mechanical South | 1359 acres | 5/25/70 | Juniper | Mechanical Thin/ RX burn, Jack pot | 36° 05' 04" | 113° 38' 08" | First entry |
| Andrus | 5839 acres | 10/30/60 | Sagebrush and grass | Rx burn, broadcast | 36° 13' 59" | 113° 22' 22" | Joint burn with BLM; Re-entry from 2007 |