Land Health Evaluation for the Pakoon Springs Allotment (04800)
and Pakoon Allotment (04802)

I. Introduction

The Pakoon Springs and Pakoon allotments land health evaluation was conducted in accordance with directions set forth in the Washington Office (WO) Instruction Memorandum (IM) No. 98-91 and Arizona State IM No. 99-012 for implementation of Standards for Rangeland Health and Guidelines for Grazing Administration (Standards and Guidelines). Additional guidance is provided in WO IM No. 2009-007.

The purpose of Standards and Guidelines is to ensure the health of public rangelands. Present rangeland health is the result of the interaction of many factors in addition to grazing by livestock. Other contributing factors may include, but are not limited to past land uses, land use restrictions, recreation, wildlife, rights-of-way, mining, fire, weather, and insects and disease. The standards are goals for the desired condition of the biological and physical components and characteristics of rangelands, such as adequate canopy and ground cover; guidelines are management approaches, methods, and practices that are intended to achieve a standard.

Background Information

Arizona's Standards for Rangeland Health and Guidelines for Grazing Administration were developed by the BLM State Standards and Guidelines Team and the Arizona Resource Advisory Council (RAC), a state level council appointed by the Secretary of the Interior. The Secretary of the Interior approved the Standards and Guidelines in April 1997. The Decision Record, signed by the BLM State Director (April 1997) provides for full implementation of the Standards and Guidelines in all Arizona land use plans. See Appendix D for a copy of the Arizona Standards and Guidelines.

The permittee, interested publics, state agencies, and other federal agencies were encouraged to provide the BLM with allotment-specific resource data for consideration in development of this land health evaluation. This assessment was then conducted by an interdisciplinary assessment team (IAT) of resource specialists with expertise in soils, vegetation, and wildlife biology from:

- BLM
- Natural Resource Conservation Service (NRCS)
- Arizona Game and Fish Department (AGFD)
- Mohave County Extension.

The IAT was assisted by the Rangeland Resource Team (RRT), a diverse group of local residents formed and appointed under the RAC charter (see Appendix E for a list of members on both teams). The RRT may provide informal advice to the BLM Monument Manager regarding implementation of Standards and Guidelines, and "will have opportunities to raise any matter of concern with the resource advisory council and ... to

provide information and options to the council for their consideration" as provided for by regulations at 43 CFR 1784.6-2(a)(2)(iv)(A).

The BLM/RAC Implementation Strategy for Arizona states that the RRT's primary role is to assist BLM managers in assuring the Standards and Guidelines are consistently applied. The IAT analyzed all available information in cooperation with the RRT. Based on field observations, team members made recommendations on whether rangeland conditions were meeting, progressing toward meeting, or not meeting the Standards for Rangeland Health.

The RRT, permittees and other interested parties were invited to attend an issue-scoping meeting with the IAT on February 26, 2008, and a field visit on October 21 & 22, 2008. At the conclusion of the field visit, the group that attended the allotment tour provided their opinions on the status of rangeland health in the Pakoon Springs and Pakoon Allotments. In February and May 2010, BLM resource staff and staff from the U.S. Fish and Wildlife Service (USFWS) made field visits to allotments within desert tortoise habitat (including this allotment) to assess resource conditions and discuss desired vegetative communities for the Mojave desert tortoise. The results of these discussions are incorporated into the desired plant community objectives developed for these allotments, as well as in making recommendations on whether resource conditions were meeting the standards for rangeland health. These recommendations on whether the standards for rangeland health are being met are detailed on pages 76-78 of this assessment report.

Technical recommendations from this land health evaluation will identify appropriate actions needed, which will inform the National Environmental Policy Act (NEPA) analysis, and provide the Field Manager the opportunity to consider all available information before making a final determination on achievement of standards. If the evaluation report documents that standards are not achieved in the assessment area, then the Monument Manager will determine significant causal factors for non-achievement. Causal factors can include current grazing practices, historical livestock use, drought, off-highway vehicle (OHV) use, fire, recreation, etc. If existing grazing management practices or levels of grazing use on public land are significant factors, then an appropriate action will be developed and implemented in accordance with 43 CFR subpart 4180.2(c) and direction contained within WO IM No. 2009-007.

II. Allotment Profile

A. Description

The Pakoon Springs and Pakoon allotments are located approximately 60 miles south of St. George, Utah on the Arizona Strip. The allotment is located within T. 34, 35 and 36 N., R. 14, and 15 W., in the Pakoon Basin. Elevations range from 2,000 feet in the desert shrub lands below the Lower Grand Wash Cliffs to 4,200 feet where vegetation is primarily dominated by creosote-bursage in the lower areas and Mohave mixed shrub on the Lower Grand Wash Cliffs.

Wildfires have burned several times over the past 30 years on both allotments. Fires burned approximately 6,007 acres in the Pakoon Springs Allotment in 2005 and 1,420 acres in

2006. In the Pakoon Allotment, 10,619 acres burned during 2005 and 817 acres during

2006. The areas that have burned in the past 30 years are shown on the map in Appendix B.

Pakoon Springs Allotment is categorized as an "improve" (I) allotment, which means that one or more of the following exists:

a) Present range condition is unsatisfactory;
b) The allotments have high to moderate resource production potential and are producing at low to moderate levels;
c) Serious resource-use conflicts/controversy exists;
d) Opportunities exist for positive economic return from public investments;
e) Present management appears unsatisfactory.

The Pakoon Allotment is categorized as a "maintain" (M) allotment. This means that:

a) Present range condition is satisfactory;
b) The allotment has high or moderate resource potential and are producing near their potential (or trend is moving in that direction);
c) No serious resource-use conflicts/controversy exists;
d) Opportunities may exist for positive economic return from public investments; and
e) Present management is satisfactory.

B. Acreage

The allotments contain the following acreages:

Pakoon Springs Allotment[1] (Please see Pakoons Springs Allotment Map in Appendix A)

***Portion unavailable for livestock grazing*:**

- 21,489 acres of federal land

Portion available for livestock grazing (these pastures have been reconfigured into the Mosby-Nay Allotment):

- 15,104 acres of federal land
- 641 acres of state land

Pakoon Allotment

- 55,938 acres of federal land
- 280 acres of state land

[1] The Pakoon Springs Allotment previously consisted of 4 pastures. On May 27, 1999, the BLM issued a decision closing a portion of the Mosby-Nay Allotment to grazing. The decision was appealed. In the early 2000s, the Pakoon Springs Allotment was relinquished to the BLM. In the mid 2000s, an agreement was reached between the operator of the Mosby-Nay Allotment and the BLM – if the operator dropped the appeal of the May 27, 1999 decision, the BLM would close a portion of the Mosby-Nay Allotment to grazing (as stated in the decision) and reconfigure the two northern pastures (Bench and Bighole) of the Pakoon Springs Allotment into the Mosby-Nay Allotment. The other two pastures of the Pakoon Springs Allotment remained unavailable to grazing. This was the decision which was later approved through the 2006 Mosby-Nay permit renewal process (EA-AZ-130-2006-0036). The Bench and Bighole pastures of the Pakoon Springs Allotment are now incorporated into the Mosby-Nay Allotment. The results and recommendations in this land health evaluation (for the two pastures available for grazing and formerly part of the Pakoon Springs Allotment) will be incorporated into the environmental analysis for the Mosby-Nay Allotment permit renewal. The Mosby-Nay Allotment's season of use is year round.

C. Permitted Use

1. Total grazing privileges

Pakoon Springs Allotment (that portion available for livestock grazing):

Active Grazing Use:	477 AUMs
Suspended Non-use:	0 AUMs
Total:	**477 AUMs**

Pakoon Springs Allotment (that portion unavailable for livestock grazing):

Suspended Non-use:	917 AUMs

Pakoon Allotment:

Active Grazing Use:	1,624 AUMs
Non-use:	223 AUMs
Total:	**1,847 AUMs**

(Note: An AUM, or Animal Unit Month, is a unit of measurement indicating how much forage is eaten by a cow/calf pair in one month.)

2. Season(s) of use

Pakoon Springs Allotment[2]:

- ***Bench and Bighole Pastures*** – now part of the Mosby-Nay Allotment
  44 cattle from March 1 to February 28
  1 cow from March 1 to October 31

- ***Remainder of allotment*** – unavailable for grazing

Pakoon Allotment:

240 cattle from January 1 to May 15
103 cattle from November 29 to May 15
6 horses from March 1 to March 31

3. Kind and class of livestock

Cow/calf operation

4. Percent federal range[3]

[2] Season of use within the Mosby-Nay Allotment (including the two pastures formerly part of the Pakoon Springs Allotment) is year-round. The BLM is working with the permittee to sign an agreement that cattle will be removed from desert tortoise critical habitat during the active season (March 15 to October 15). This would remain in effect until the environmental analysis process is completed for the Mosby-Nay Allotment permit renewal.

The Pakoon Springs Allotment (that portion available for livestock grazing) is 89% federal range. The Pakoon Allotment is 99% federal range. State lands within the allotment boundaries are grazed in conjunction with federal lands and are a part of the allotment management plan (AMP) grazing rotation.

D. Key Species[4]

Management of the allotment is based on a selection of key species. These species are selected for their similarity to other grasses and browse species that occur in the allotment. The definition of key species is: (1) Forage species of sufficient abundance and palatability to justify its use as an indicator to the *degree of use* of associated species; and (2) Those species which must, because of their importance, be considered in the management program. Key species for these allotments are:

Common Name	Scientific Name
Indian ricegrass	*Achnatherum hymenoides* *(Oryzopsis hymenoides)*
Big galleta	*Pleuraphis rigida* *(Hilaria rigida)*
Sand dropseed	*Sporobolus spp.*
Bush muhly	*Muhlenbergia porteri*
Threeawn	*Aristida spp.*
Low woollygrass	*Dasyochloa pulchella* *(Tridens pulchellus)*
Browse	
Mormon tea	*Ephedra nevadensis*
Range ratany	*Krameria erecta* *(Krameria parvifolia)* *(Krameria erecta)*
Gray ratany	*Krameria grayi*
Winterfat	*Krascheninnikovia lanata* *(Ceretoides lanata)* *(Krascheninnikovia ceratoides)* *(Eurotia lanata)*
Other Shrubs	
Rayless goldenhead	*Acamptopappus sphaerocephalus*
Burrobush	*Ambrosia dumosa*
Sweatbush	*Bebbia juncea*
Blackbrush	*Coleogyne ramosissima*
California croton	*Croton californicus*

[3] The percentage of public land use determined by the proportion of livestock forage available on public lands within the allotment compared to the total amount available from public lands, state lands, and those owned or controlled by the permittee or lessee.

[4] A complete list of species included in this assessment can be found in Section VIII.

Acton's brittlebush	*Encelia actonii* *(Encelia frutescens)* *(Encelia virginensis)*
Burrobush	*Hymenoclea salsola*
Creosote bush	*Larrea tridentata*
Desert-thorn (wolfberry)	*Lycium spp.*
Cholla	*Opuntia spp.*
Desert almond	*Prunus fasciculata*
Whitestem paperflower	*Psilostrophe cooperi*
Mexican bladdersage	*Salazaria mexicana*
Purple sage	*Salvia dorrii*
Turpentinebroom (desertrue)	*Thamnosma montana*
Banana yucca	*Yucca baccata*
Joshua tree	*Yucca Brevifolia*

E. Grazing System

Pakoon Springs Allotment:
There is no specific grazing system for the Pakoon Springs Allotment. The Grand Canyon-Parashant National Monument Resource Management Plan (RMP) identified portions of the Pakoon Springs Allotment within the former area of critical environmental concern (ACEC) as unavailable for livestock grazing (see footnote 1 on page 3 of this evaluation report). The RMP also expanded the area unavailable for grazing north up Pakoon Wash approximately 3 miles, and up Cedar Wash and Cottonwood Wash to just below Wayne's Well. As described on page 3, the remaining portion of the Pakoon Springs Allotment (approximately 15,103 acres) is now included within the Mosby-Nay Allotment (through an allotment reconfiguration). As such, an allotment management plan for the newly reconfigured Mosby-Nay Allotment needs to be developed to address how the former Pakoon Springs pastures will be used. During the interim, a deferred seasonal rotational grazing system between the Mosby-Nay and Pakoon Springs pastures needs to be developed to allow grazing deferment for the vegetative resources.

Pakoon Allotment:
Grazing on the allotment occurs during the winter and spring. The lower areas (formerly within the Pakoon ACEC) are deferred (i.e., cattle removed) as the spring green up starts (approximately March 15). Livestock distribution on the remainder of the allotment is controlled by available water sources from Middle and Upper Wells. The allotment may be grazed between November 1 and May 15.

F. Biological Resources

1. Special Status Species

Threatened, Endangered, and Candidate Species

There are no listed or candidate plant species, or habitat for any listed plant species, in this allotment. Listed below are the federally listed animal species that may occur within these allotments.

- Mojave Desert tortoise (*Gopherus agassizii*) – threatened + critical habitat
- California condor (*Gymnogyps californianus*) – endangered
- Mexican spotted owl (*Strix occidentalis lucida*) – threatened

See Section IV.B.7 of this assessment report for a detailed discussion of these species.

BLM Sensitive Species and Migratory Birds

Sensitive species are usually rare within at least a portion of their range. Many are protected under certain State and/or Federal laws. Species designated as sensitive by the BLM must be native species found on BLM-administered lands for which the BLM has the capability to significantly affect the conservation status of the species through management, and either:

1. There is information that a species has recently undergone, is undergoing, or is predicted to undergo a downward trend such that the viability of the species or a distinct population segment of the species is at risk across all or a significant portion of the species

2. The species depends on ecological refugia or specialized or unique habitats on BLM-administered lands, and there is evidence that such areas are threatened with alteration such that the continued viability of the species is that area would be at risk.

All federally-designated candidate species, proposed species, and delisted species in the 5 years following delisting are included as BLM sensitive species. Table 1 lists the sensitive species that may occur within these allotments, or may be affected by livestock grazing within the allotments.

Table 1. Sensitive Species Associated with these Allotments

Species	Potential for Occurrence
Bald eagle (*Haliaeetus leucocephalus*)	potential*
Golden eagle (*Aquila chrysaetos*)	potential
American peregrine falcon (*Falco peregrinus*)	verified
Ferruginous hawk (*Buteo regalis*)	potential
Burrowing owl (*Athene cunicularia*)	potential
Townsend's big-eared bat (*Corynorhinus townsendii pallescens*)	potential
Spotted bat (*Euderma maculatum*)	verified
Greater western mastiff bat	potential

Species	Potential for Occurrence
(*Eumops perotis californicus*)	
California leaf-nosed bat (*Macrotus californicus*)	verified
Grand Wash spring snail (*Pyrglopsis bacchus*)	potential

* "Potential to occur" means that suitable habitat exists, but species presence has not been verified.

Executive Order 13186 requires the BLM and other Federal agencies to work with the USFWS to provide protection for migratory birds. These species are protected by legislation and it is important to maintain habitat for these species so migratory patterns are not disrupted. All migratory birds are protected under the 1918 Migratory Bird Treaty Act (16 USC 703-712), which prohibits the taking of any migratory birds, their parts, nests, or eggs unless specifically permitted by regulation. Additional protection is provided by the Neotropical Migratory Bird Conservation Act of 2000 (16 USC Chapter 80).

Bald and golden eagles are protected by the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c). This law, enacted in 1940, and amended several times since then, provides for the protection of bald and golden eagles by prohibiting, except under certain specified conditions, the taking, possession and commerce (selling, purchasing, bartering, transporting, importing, or exporting) of such birds including their parts, nests, or eggs. "Take" includes "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb."

2. Other Wildlife Species

The Pakoon and Pakoon Springs allotments are in AGFD's Game Management Unit (GMU) 13B. Desert bighorn sheep (*Ovis canadensis nelson*) may be present along the Grand Wash Cliffs found in the eastern portion of the Pakoon Allotment. Additionally, this allotment contains approximately 75 percent year-round habitat and 25 percent limited habitat for mule deer (*Odocoileus hemionus*); the Pakoon Springs Allotment contains 50 percent year-round habitat and 50 percent limited habitat for this species.

Nongame wildlife found on the allotment is typical of the area, including a variety of small mammals, including desert cottontail rabbits, birds including raptors, and reptiles. Predators include coyotes, bobcats, and mountain lions.

G. Recreation Resources

General Management: These allotments are within Grand Canyon-Parashant National Monument. Their recreation values derive from their geology, scenic view sheds, and remoteness. General recreation activities could include sightseeing, horseback riding, hiking, camping, hunting, photography, bird watching and nature study.

Recreational Settings: These allotments are within the Parashant Special Recreation Management Area (SRMA) and the Shivwitz Frontier Recreation Management Zone (RMZ). The primary strategy for the Parashant SRMA is to target a demonstrated undeveloped recreation-tourism market demand from local communities and regional/national visitors for trophy hunting opportunities, guided backcountry tours, hiking, viewing and appreciating wildland landscapes and cultural sites, canyoneering and motorized/mechanized/non-mechanized exploring. This demand is supported by the area's distinctive remote, rugged landscape; its proximity to the Grand Canyon; its vast size; and the largely open and undeveloped character of its recreation settings. Regional and local recreation-tourism visitors value this area for the distinctive kinds of dispersed recreation it produces.

The Shivwits Frontier RMZ is managed for sustainable access for scenic, natural, open-space appreciation, and exploration recreation adventure somewhat close to nearby communities.

These allotments contain portions of three Travel Management Areas: Backways, Specialized, and Primitive. TMAs describe areas delineated for varying types of access. The Backways and Specialized TMAs provide for a variety of motorized, non-motorized, and mechanical travel modes to serve existing and future recreational, traditional, casual, commercial, and private needs in remote, rustic settings, but not to the detriment or exclusion of the protection of resources. They are characterized by low to moderate densities of improved roads and primitive roads. In the Primitive TMA, high quality recreation opportunities associated with more primitive recreation experience opportunities and non-motorized uses such as camping, sightseeing, hiking, horseback riding, and hunting, will be maintained/ enhanced, provided they will be compatible with the protection and enhancement of sensitive resource values, where appropriate.

Off Highway Vehicle (OHV) Management: The OHV designations in these allotments are closed to motorized/mechanized travel within the wilderness area in the Pakoon Allotment and limited to designated roads and trails outside designated wilderness. The entire Pakoon Springs Allotment is limited to designated roads and trails.

Visual Resource Management (VRM): Two VRM Classes occur on these allotments. VRM Class I occurs within the wilderness area in the Pakoon Allotment and VRM Class II occurs in the remainder of the Pakoon Allotment and all of the Pakoon Springs Allotment. The objectives for these two VRM classes are:

Class 1 - The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change of the characteristic landscape should be very low and must not attract attention.

Class II - The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual

observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

Trails: No designated national or scenic trails occur in these allotments.

Wilderness Characteristics: There are areas managed to protect wilderness characteristics within each allotment; there are 2,136 acres within the Pakoon Allotment (available for grazing with seasonal restrictions) and 8,392 acres in the southwestern portion of the Pakoon Springs Allotment (the area now unavailable for grazing). All 2,136 acres within the Pakoon Allotment burned in the 2005 Tank Fire; none of the 8,392 acres within the Pakoon Springs Allotment have burned.

H. Special Designations

1. Designated Wilderness

The eastern half of the Pakoon Allotment contains part of the Grand Wash Cliffs Wilderness, a wild and remote area occurring on the Grand Wash Cliffs. Many rugged canyons, scenic escarpments, miles of cliffs, and sandstone buttes mark the transition between the Colorado Plateau and Basin and Range provinces in this wilderness. There is no designated wilderness in the Pakoon Springs Allotment.

2. Wild & Scenic Rivers

No eligible or suitable wild and scenic river segments occur within the allotments.

3. Areas of Critical Concern (ACECs)

No ACECs occur within the Pakoon Springs or Pakoon allotments.

III. Management Objectives

A. Land Use Plan Objectives

Grand Canyon – Parashant National Monument Resource Management Plan (RMP)

Objectives are labeled according to the applicable resource or resource use and sequentially numbered in the RMP. Listed here are the Desired Future Condition (DFC) decisions that will be assessed in this document. The codes are as follows:

RP= Riparian Ecological Zone	GM=Livestock Grazing	RR=Recreation Resources
WS=Air, Water and Soils	TE=Special Status Species	WM=Designated Wilderness
VM=Vegetation	WC=Wilderness Characteristics	VR=Visual Resources
WF=Wildlife and Fisheries		

Water

DFC-RP-06
All surface water will meet, or be improving towards, Arizona State water quality standards.

DFC-WS-03
Surface water availability at seeps and springs will be appropriate for the soil type, climate, and landform.

Soil Stability

DFC-VM-04 (Vegetation – All Ecological Zones)
Vegetative communities will provide sufficient plant cover and litter accumulation to protect soils from wind and water erosion and enhance nutrient cycling and productivity, even during drought years.

DFC-WS-06
The natural hydrologic functions of all watersheds will be intact.

DFC-WS-07
Soils will exhibit infiltration, permeability, and erosion rates appropriate for the soil type, climate, and landform.

DFC-WS-08
Physical soil crusts will show an increase in organic cover including cryptobiotic colonies, moving them towards being organic crusts.

Ecological Processes

DFC-VM-05 (Vegetation – All Ecological Zones)
Ecological processes and functions will be protected, enhanced, and/or restored by allowing tools that are necessary and appropriate to mitigate adverse impacts of allowable uses and undesirable disturbances, and contribute to meeting the Standards for Rangeland Health and NPS Vital Signs and enhance Monument values.

DFC-RP-02
Riparian areas will be protected, enhanced, and/or restored by allowing tools that are necessary and appropriate to mitigate adverse impacts of allowable uses and undesirable disturbances, and contribute to meeting the Arizona Standards for Rangeland Health, NPS Vital Signs, and enhance Monument objects and values.

DFC-RP-03
Ecological functions and processes will be intact with vegetative species composition and cover appropriate to the site.

DFC-WS-04
Ecological functions and processes will be intact at all seeps and springs.

DFC-WF-01
Ecological conditions will be within the range of natural variability and will be functional for dependant animal species.

DFC-WF-12
The natural biological diversity of fish, wildlife, and plant species will be maintained or, where necessary and feasible, restored throughout the Monument. Habitats will be managed on an ecosystem basis, ensuring that all parts of the ecosystem and natural processes are functional.

Invasive Plants

DFC-VM-06 (Vegetation – All Ecological Zones)
Invasive plant species will be contained, controlled, or eliminated and native species restored to meet desired plant community (DPC) objectives.

DFC-RP-11
Invasive plants and animals such as tamarisk, Russian olive, and brown-headed cowbird will be reduced or eliminated.

DFC-VM-38 (Vegetation – Mojave-Great Basin Transition Ecological Zone)
Management of Mohave-Great Basin Transition Ecological Zone plant communities will focus on removing invasive non-native plants, especially cheatgrass, Sahara mustard, and red brome, and preventing habitat degradation due to wildfire.

No Net Loss

DFC-VM-32 (Vegetation – Mojave Desert Ecological Zone)
There will be no net loss of acres of Mohave Desert plant communities (i.e., long-term or permanent removal from the landscape). A no net loss objective will not preclude restoration, rehabilitation, or related management actions.

DFC-VM-37 (Vegetation – Mojave-Great Basin Transition Ecological Zone)
There will be no net loss in acres of Transition plant communities (i.e., long-term or permanent removal from the landscape). A no net loss objective will not preclude restoration, rehabilitation, or related management actions.

Livestock Grazing

DFC-GM-02
Livestock use and associated management practices will be conducted in a manner consistent with other resource needs and objectives to ensure that the health of rangeland resources is preserved or improved so that they are productive for all rangeland values. Where needed, public rangeland ecosystems will be improved to meet objectives.

DFC-GM-04
Monument values will be maintained, protected, and improved.

Desired Plant Community

DFC-GM-01
Healthy, sustainable rangeland ecosystems will be maintained or improved to meet Arizona's Standards for Rangeland Health and Vital Sign Standards on NPS-administered lands, and produce a wide range of public values such as wildlife habitat, livestock forage, recreation opportunities, clean water, and functional watersheds.

DFC-VM-03 (Vegetation – All Ecological Zones)
Native vegetative communities will be protected. A mosaic of native perennial and non-invasive annual vegetative communities will be present across the landscape with diversity of species, canopy, density, and age class reflecting its local ecological site potential and naturally occurring habitat conditions.

DFC-VM-30 (Vegetation – Mojave Desert Ecological Zone)
Endemic plant species and associated communities such as creosote bush, Joshua tree, Mojave yucca and cacti, will be present along with other shrubs, grasses, and wildflowers. These communities can include stands of young and old shrubs, sparse vegetation, scattered to larger expanses of creosote bush or Joshua trees, seeps, healthy streamside (riparian) vegetation, and other interspersed grassland and shrub habitats.

DFC-VM-34 (Vegetation – Mojave-Great Basin Transition Ecological Zone)
Endemic plant species and associated communities such as black brush, Joshua tree, Mojave yucca, and cacti will be present along with other shrubs, grasses, and wildflowers. These communities can include stands of young and old shrubs, sparse vegetation, scattered to larger expanses of black brush to various mixes of black brush, Joshua trees, pinyon-juniper, yucca, and shrub habitats.

DFC-VM-36 (Vegetation – Mojave-Great Basin Transition Ecological Zone)
Priority plant species and associated communities such as black brush, Joshua tree, Mojave yucca, and cacti will be present along with other shrubs, grasses, and wildflowers. These communities can include stands of young and old shrubs, sparse vegetation, scattered to larger expanses of black brush to various mixes of black brush, Joshua trees, pinyon-juniper, yucca, and shrub habitats.

DFC-RP-01
Riparian areas, including Monument objects, will consist of a diversity of vertical and horizontal structures, vegetative age classes, and endemic species.

Riparian

DFC-RP-04
Where sites have the potential for over-story vegetation, the canopy cover of over-story and under-story vegetation will be at or approaching maximum density.

DFC-RP-05
All riparian areas will be in, or moving towards, proper functioning condition.

DFC-RP-07
Flowing water systems will provide contiguous water and associated riparian vegetative cover, where possible.

DFC-RP-08
Availability of surface water at seeps and springs will be appropriate for the soil type, climate, and landform and will support a diverse population of endemic plant and wildlife species.

DFC-RP-10
Riparian communities will provide habitat for common species such as rush, cottonwood, willow, and yellow-breasted chat, as well as rare species such as southwestern willow (SW) flycatcher, common black hawk, Lucy's warbler, and speckled dace where consistent with site potential.

DFC-WS-05
Flowing water systems will provide continuous flowing water and associated riparian vegetative cover, where possible.

DFC-TE-15
Essential habitats, important migration routes, required flows, and water quality will be protected and maintained in lentic and lotic systems in the Monument.

DFC-TE-24
Riparian areas will be in proper functioning condition and be of sufficient quantity and quality to provide adequate foraging areas for bald eagles, peregrine falcon, common black hawk, and other special status raptors.

DFC-TE-31
Riparian areas will be in proper functioning condition and be of sufficient quantity and quality to provide adequate foraging areas for SW flycatcher, Yuma clapper rail, yellow-billed cuckoo, and other special status birds.

DFC-TE-33
Riparian areas that can physically support SW flycatcher habitats due to floodplain width and gradient will attain the vegetation structure, plant species diversity, density, and canopy cover to be suitable habitat.

DFC-TE-34
Riparian vegetation will be sufficiently dense and structurally complex to minimize or eliminate the effects of SW flycatcher predators and preclude brown-headed cowbirds from finding SW flycatcher nests.

DFC-TE-35
Cottonwood gallery forests will be abundant and provide habitat for yellow-billed cuckoos.

DFC-TE-36

Potential roosting and nesting sites for riparian dependent special status birds will be abundant.

Wildlife Habitat

DFC-VM-31 (Vegetation – Mojave Desert Ecological Zone)
Endemic animal species such as desert tortoise and chuckwalla will be present and thriving with more than adequate food, water, and cover resources.

DFC-VM-35 (Vegetation – Mojave-Great Basin Transition Ecological Zone)
Endemic animal species such as desert tortoise, chuckwalla, and desert bighorn sheep will be present and thriving with more than adequate food, water, and cover resources.

DFC-WF-02
Native wildlife communities will be protected. A complete range of diverse, healthy, and self-sustaining populations of native animal species will occupy all available suitable habitats.

Habitat Connectivity

DFC-WF-06
Habitat connectivity and wildlife movement between ecological zones will be maintained.

DFC-TE-14
Habitat connectivity will be maintained, providing sufficiently frequent contact between tortoises to maintain genetic diversity.

Fences

DFC-WF-05
Fences will be the minimum necessary for effective livestock control or other administrative purposes. Fences will be wildlife passable, consistent with the species found in the area.

DFC-WF-20
All fences in mule deer habitat will be deer passable.

Healthy Wildlife Populations

DFC-WF-03
Forage, water, cover, and space will be available to wildlife of sufficient quantity and quality to support productive and diverse wildlife populations.

DFC-WF-13
Mule deer habitat will provide the necessary forage, water, and shelter components for healthy, self-sustaining populations within the range of natural variability.

DFC-WF-28

Desert bighorn habitat will provide the necessary forage, water, and shelter components for healthy, self-sustaining populations within the range of natural variability.

DFC-WF-35
Desert cottontail habitat will provide the necessary forage, water, and shelter components for healthy, self-sustaining populations within the range of natural variability.

DFC-WF-37
Migratory bird habitats will provide the necessary forage, water, and shelter components for healthy, self-sustaining populations within the range of natural variability.

DFC-WF-45
Carnivore habitat will provide the necessary forage, water, and shelter components for healthy, self-sustaining populations within the range of natural variability.

Wildlife Population Numbers

DFC-WF-14
On BLM administered lands, mule deer populations will be at or near maximum levels sustainable for the habitat.

DFC-WF-29
On BLM administered lands, desert bighorn sheep populations will be at or near maximum levels sustainable for the habitat.

DFC-WF-36
Desert cottontail rabbits will be present in sufficient quantity to provide an adequate prey base for raptors, carnivores, and other predatory species, as well as ample recreational opportunities for hunting and wildlife viewing.

DFC-WF-38
Migratory birds that nest in the Monument will have resources of sufficient quantity and quality to provide for nesting sites and to fledge young successfully.

Wildlife Waters

DFC-WF-04
All waters will be safely accessible to wildlife.

DFC-WF-18
Water sources within mule deer habitat will be safely accessible to deer and other wildlife.

DFC-WF-19
On BLM administered lands, water sources within mule deer habitat will be spaced no more than 3 miles apart.

DFC-WF-31

Water sources within bighorn sheep habitat areas will be safely accessible to bighorn and other wildlife.

DFC-WF-32
On BLM administered lands, water sources within bighorn sheep habitat will be spaced no more than 4 miles apart.

DFC-WF-43
Water sources within game bird habitats will be safely accessible by all wildlife.

DFC-RP-09
A sufficient quantity of water with safe access for wildlife will be available, where appropriate.

Threatened and Endangered Species Habitat

DFC-TE-03
The Monument will provide a block of remote, contiguous habitat that will serve as refugia for populations of special status species.

DFC-TE-13
Desert tortoise habitat will provide sufficient forage and cover attributes to support thriving populations of the species.

DFC-TE-21
Habitat areas for special status raptors will provide sufficient forage and cover attributes to support thriving populations of the species.

DFC-TE-23
Potential roosting and nesting sites (for special status raptors) will be abundant.

Healthy Threatened and Endangered Populations

DFC-TE-11
Desert tortoise populations within the desert wildlife management areas (DWMAs) will be healthy and self-sustaining. Populations will be stable or increasing. Population declines will be halted.

DFC-TE-12
Desert tortoise populations outside of the WHA will be healthy and stable. Impacts to the population of the WHA will be minimized to the extent possible through mitigation.

DFC-TE-20
Special status raptor populations will be healthy and self-sustaining throughout their range.

DFC-TE-25
Rodent populations, as a prey base (for special status raptors), within the Monument will be abundant.

No Net Loss of Threatened and Endangered Species Habitat

DFC-TE-04 and DFC-TE-08
There will be no net loss in the quality or quantity of special status species habitat throughout the Monument.

DFC-TE-10
There will be no net loss in the quality or quantity of desert tortoise habitat within WHA.

DFC-TE-16
No net loss will occur in the quality and quantity of suitable habitat for endemic amphibians and aquatic invertebrate species within the Monument.

DFC-TE-22
No net loss will occur in the quality and quantity of suitable habitat for special status raptors within the Monument.

DFC-TE-29
No net loss will occur in the quality and quantity of suitable habitat for riparian-dependent special status bird species within the Monument.

Condors

DFC-TE-27
The experimental non-essential population of California condor will be at or above 150 individuals, viable, and stable to increasing in number.

Aquatic Habitat

DFC-TE-17
All biologically suitable perennial waters on public lands in the Monument will be occupied by thriving, self-sustaining populations of native, endemic amphibians and aquatic invertebrate species, as appropriate.

DFC-TE-18
New introduced (or re-introduced) populations of relict leopard frog will increase to the point of being viable and self-sustaining.

Wilderness Characteristics

DFC-WC-02
Areas where wilderness characteristics will be maintained will be ecologically sustainable and resilient to natural and human-caused disturbances.

Recreation and Visitor Services

DFC-RR-01

Recreation and visitor services will be managed to provide varying levels of structured recreation opportunities that offer a range of specific benefits, activities, and experiences within outdoor settings.

DFC-RR-05
The excellent opportunities that exist to enjoy remote, rustic settings that provide moderate challenge and solitude in the Specialized travel management areas (TMAs) will be maintained/enhanced.

DFC-RR-06
In Backways and Specialized TMAs, recreation opportunities associated with somewhat remote settings, such as exploring backcountry roads, vehicle camping, hunting, sightseeing, recreation aviation, and picnicking will be maintained/enhanced on existing roads, provided they will be compatible with the protection and enhancement of sensitive resource values, where appropriate.

DFC-RR-07
In the Primitive TMA, high quality recreation opportunities associated more with primitive recreation experience opportunities and non-motorized uses such as camping, sightseeing, hiking, horseback riding, and hunting, will be maintained/enhanced, provided they will be compatible with the protection and enhancement of sensitive resource values, where appropriate.

Designated Wilderness

DFC-WM-01
The first and dominant goal will be to provide for the long-term protection and preservation of the areas' wilderness character under a principle of non-degradation. The areas' natural condition, opportunities for solitude, opportunities for primitive and unconfined types of recreation, and any ecological, geological, or other features of scientific, educational, scenic, or historical value present will be managed so that they remain unimpaired.

DFC-WM-06
BLM wilderness areas and NPS proposed wilderness will be managed to be ecologically sustainable and resilient to natural and human-caused perturbations (See Vegetation Management and Fire Management decisions). The NPS and BLM will strive to preserve or restore the natural quiet and natural sounds associated with the physical and biological resources of designated wilderness.

Visual Resources

DFC-VR-01
Public lands will be managed in a manner which will protect the quality of the scenic (visual) values of these lands. (43 U.S. Code [USC] 1701, Section 102 (a) (8)).

DFC-VR-03
The region's scenic beauty, open space landscapes, and other high-quality visual resources will be maintained within the Monument.

B. Specific Resource Objectives

1. Land Health Standards

Standard 1 - Upland Sites

Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform (ecological site).

Objective:

- Signs of accelerated erosion are minimal and are appropriate for the site as indicated by ground cover (litter, rock, vegetative cover, etc.) and signs of erosion.
- This objective applies to all ecological sites. A departure from the ecological site description or reference sheet of moderate or greater would not be achieving the standard. A departure of none to slight or slight to moderate is considered achieving the standard.
- Achievement of Standard 1 (appropriate erosion and vegetative cover levels) will ensure properly functioning watersheds and ecological processes in order to sustain healthy biotic populations and communities.

Standard 2 – Riparian/Wetlands

Riparian-wetland areas are in properly functioning condition. If Standard 2 is achieved, stream channel morphology and functions are appropriate for proper functioning condition for existing climate, landform, and channel reach characteristics. Riparian-wetland areas are functioning properly when adequate vegetation, land form, or large woody debris is present to dissipate stream energy associated with high water flows.

Standard 3 – Desired Resource Conditions

Productive and diverse upland and riparian-wetland communities of native species exist and are maintained. If Standard 3 is achieved, ecological sites contain productive and diverse communities of native species, resulting in proper ecosystem function. Under Standard 3, when Desired Plant Community (DPC) objectives for wildlife habitat are being achieved, the site is producing desirable forage, cover and soil protection. For wildlife this means "healthy" rangeland should provide the necessary food and cover to sustain the species.

All key areas will be measured against the ecological site DPC objectives. The objectives will be used to determine whether standards for land health are being achieved or not achieved, and if not achieved, is significant progress being made toward achievement

2. Allotment Management Plan[5] Specific Objectives

Pakoon Springs Allotment:

No objectives have been developed for this allotment.

Pakoon Allotment:

Key Area #1:

- Increase warm-season grasses from 17% to 20% frequency
- Increase cool season grasses from 0% to 5% frequency
- Increase key browse from 3% to 5% frequency

Key Area #2

- Increase warm-season grasses from 13% to 20% frequency
- Increase cool season grasses from 1% to 5% frequency
- Increase key browse from 3% to 5% frequency

Key Area #3

- Increase warm-season grasses from 7% to 10% frequency
- Increase cool season grasses from 0% to 2% frequency
- Increase key browse from 1% to 5% frequency

3. Desired Plant Community (DPC) Objectives

DPC objectives were developed during this evaluation process by an interdisciplinary team of resource specialists. The species composition objectives were developed by consulting the Ecological Site Guides, developed by the Natural Resource Conservation Service, and site specific information of the potential of the site to produce vegetation. Site guides used are from the Soil Survey of Shivwits Area, Arizona (Part of Mohave County) USDA-Natural Resources Conservation Service, 2004. The DPC objectives implement RMP objectives and reflect vegetative composition and attributes important for desert tortoise habitat, as well as habitat requirements for other species. The objectives are set to be achieved within a time interval of 20 years from permit renewal. DPC objectives are expressed in figures of Composition by Weight (CBW). Composition data is collected using the Dry Weight Rank sampling method.

Pakoon Springs Allotment

Key Area #1

Rangesite: Limy Upland (Deep), (6 to 9 inch p.z.)

- Maintain total ground cover at 25-40%.

[5] Current frequency objectives found in the allotment management plan (AMP) will be analyzed in this assessment. DPC objectives developed for this assessment will also be analyzed in this document and will replace the AMP objectives in future assessments.

- Maintain native perennial grass at 5-15% CBW (includes *Pleuraphis rigida, Achnatherum hymenoides, Sporobolis flexuosus, Aristida longiseta and Dasyochloa pulchella*).
- Increase total shrubs/trees to 65-80% CBW (includes *Psilostrophe cooperi, Opuntia, Krameria grayi, Acamptopappus sphaerocephalus, Ambrosia dumosa, Ephedra nevadensis, Krascheninnikovia lanata, Lycium andersonii, Yucca brevifolia, Yucca schidigera, Larrea tridentata*, and other shrubs except *Gutierrezia*).
- Maintain forbs at 5-10% CBW (excludes non-native invasive species).

Key Area #2

Rangesite: Limy Upland (Deep), (6 to 9 inch p.z.)

- Maintain total ground cover at 25-40%.
- Maintain native perennial grass at 5-15% CBW (includes *Pleuraphis rigida, Achnatherum hymenoides, Sporobolis flexuosus, Aristida longiseta and Dasyochloa pulchella*).
- Increase total shrubs/trees to 65-80% CBW (includes *Psilostrophe cooperi, Encelia frutescens, Opuntia, Thamnosma, Krameria grayi, Acamptopappus sphaerocephalus, Ambrosia dumosa, Ephedra nevadensis, Krascheninnikovia lanata, Lycium andersonii, Yucca brevifolia, Yucca schidigera, Yucca baccata, Coleogyne ramosissima, Larrea tridentata*, and other shrubs except *Gutierrezia*).
- Maintain forbs at 5-10% CBW (excludes non-native invasive species).

Key Area #3

Rangesite: Sandy Wash (6 to 9 inch p.z.)

- Maintain total ground cover at 15-30%.
- Increase perennial grass to 2-21% CBW (includes *Pleuraphis rigida, Aristida, Sporobolus cryptandrus and Tridens muticus*)
- Maintain total shrub at 60-85% CBW (includes *Acacia greggii, Hymenoclea salsola, Eriogonum fasciculatum var. polifolium, Ambrosia eriocentra, Salvia dorrii, Lycium cooperia, Encelia farinose, Encelia frutescens, Opuntia, Thamnosma montana, Salazaria Mexicana, Prunus fasciculata, Ambrosia dumosa, Ephedra nevadensis, Lycium andersonii, Larrea tridentata*, and other shrubs except *Gutierrezia*).
- Increase forbs to 2-14% CBW (excludes non-native invasive species).

Key Area #4

Rangesite: Limy Upland (Deep), (6 to 9 inch p.z.)

- Increase total ground cover to 25-40%.
- Maintain native perennial grass at 5-15% CBW (includes *Pleuraphis rigida, Achnatherum hymenoides, Sporobolis cryptandrus, Aristida longiseta and Dasyochloa pulchella*).
- Increase total shrubs/trees to 65-80% CBW (includes *Opuntia, Thamnosma, Krameria grayi, Krameria parvifolia, Acamptopappus sphaerocephalus, Ambrosia dumosa, Ephedra nevadensis, Krascheninnikovia lanata, Yucca brevifolia, Yucca schidigera, Larrea tridentata*, and other shrubs except *Gutierrezia*).
- Increase forbs to 5-10% CBW (excludes non-native invasive species).

Pakoon Allotment:

Key Area #1

Rangesite: Limy Upland (Deep), (6 to 9 inch p.z.)

- Maintain total ground cover at 25-40%.
- Increase native perennial grasses to 5-15% CBW (includes *Pleuraphis rigida, Achnatherum hymenoides, Aristida longiseta, Muhlenbergia porteri and Dasyochloa pulchella*).
- Maintain total shrubs/trees at 65-80% CBW (includes *Acacia greggi, Mimosa biundifera, Bebbia, Hymenoclea salsola, Opuntia, Thamnosma, Krameria* parvifolia, *Acamptopappus sphaerocephalus, Ambrosia dumosa, Ephedra nevadensis, Krascheninnikovia lanata, Yucca brevifolia, Yucca schidigera, Larrea tridentata*, and other shrubs except *Chrysothamnus* and *Gutierrezia*).
- Increase forbs to 5-10% CBW (excludes non-native invasive species).

Note: This key area burned in 2005, which set the ecological processes on the site back to an earlier successional stage.

Key Area #2

Rangesite: Limy Upland, (6 to 9 inch p.z.)

- Maintain total ground cover at 30-45%.
- Maintain native perennial grass at 1-7% CBW (includes *Pleuraphis, Achnatherum hymenoides, Achnatherum speciosum, Aristida, Muhlenbergia porteri, Tridens muticus and Dasyochloa pulchella*).
- Increase total shrubs to 50-65% CBW (includes *Echinocactus, Ferocactus, Opuntia basilaris, Encelia frutescens, Ephedra viridis, Grayia spinosa, Psilostrophe cooperi, Hymenoclea salsola, Lycium andersonii, Opuntia, Thamnosma montana, Krameria, Acamptopappus* sphaerocephalus, *Ambrosia dumosa, Ephedra nevadensis, Krascheninnikovia lanata, Yucca schidigera, Larrea tridentata*, and other shrubs *Gutierrezia*).
- Maintain trees at between 2-7% CBW.
- Maintain forbs at 2-7% CBW (excludes non-native invasive species).

Note: This key area burned in 2005, which set the ecological processes on the site back to an earlier successional stage.

Key Area #3

Rangesite: Limy Upland, (6 to 9 inch p.z.)

- Maintain total ground cover at 30-45%.
- Maintain native perennial grass at 1-7% CBW (includes *Pleuraphis, Achnatherum hymenoides, Achnatherum speciosum, Aristida, Muhlenbergia porteri, Tridens muticus, Sporobolus spp. and Dasyochloa pulchella*).
- Increase total shrubs to 50-65% CBW (includes *Echinocactus, Ferocactus, Opuntia basilaris, Encelia frutescens, Ephedra viridis, Grayia spinosa, Psilostrophe cooperi, Hymenoclea salsola, Lycium andersonii, Opuntia, Thamnosma montana, Krameria, Acamptopappus* sphaerocephalus, *Ambrosia*

dumosa, Ephedra nevadensis, Krascheninnikovia lanata, Yucca schidigera, Larrea tridentata, and other shrubs *Gutierrezia*).

- Maintain trees at 2-7% CBW.
- Increase forbs to 2-7% CBW (excludes non-native invasive species).

Rationale for the above objectives:
Maintaining ground cover at (or increasing to) the desired levels identified for each key area will support stable soil conditions. Maintaining the desired composition of key browse and perennial grass species will ensure perennial forage for wildlife and livestock. The current functional groups of plants provide habitat for desert tortoises and other wildlife species in the area. Perennial grass and annual forbs are among the plant species considered important for the physiological requirements of the desert tortoise. In addition, the functional groups of shrubs and trees provide cover for desert tortoise and other wildlife.

Summary
The Pakoon Springs and Pakoon Allotments are within designated critical habitat for the Mojave population of the desert tortoise (see pages 42-47 of this assessment report). The physical and biological habitat features (referred to as primary constituent elements) that are essential for the conservation of the species are:

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

Vegetation attributes for composition, structure, and cover are used to detail a site-specific plant community which will provide the primary constituent habitat elements for desert tortoise. The DPC objectives for this allotment (presented as functional groups) provide for known desert tortoise forage plants (native perennial grasses and forbs – Element #2 above), or those important to their needs for cover, shelter or denning (browse and other shrub species – Element #3 above) – see Table 2. The DPC objectives were established and based upon monitoring data collected at each key area and the associated species in the ecological site guides. The DPC objectives are also intended to provide forage and habitat components for other wildlife, forage for livestock, ground cover to protect the soils and watershed values, and ethno-botanicals for the Southern Paiute (Kaibab and Shivwits).

In setting the species composition levels of each functional group, it is recognized that all species vary in levels across a given site and over time. A range is therefore given for each species due to this natural variance, which is shown in the vegetation data in Appendix H and in Table 5. The time interval to accomplish the objectives is 20 years after the permit renewal.

Table 2. Important Forage and Shelter Plants for the Desert Tortoise.

Grasses	
Six-weeks three-awn	***Aristida adscensionis***
Grama grass	***Bouteloua* sp.**
Fluffgrass	***Dasyochloa pulchella***
Big galleta grass	***Pleuraphis rigida***
Bush muhly	***Muhlenbergia porteri***
Indian rice grass	***Achnatherum hymenoides***
Sand dropseed	***Sporobolis cryptandrus***
Desert needle grass	***Stipa speciosa***
Six-weeks fescue	***Vulpia octoflora***
Shrubs	
White bursage	***Ambrosia dumosa***
Blackbrush	***Coleogyne ramosissima***
California buckwheat	***Eriogonum fasciculatum***
Mormon tea	***Ephedra* sp.**
Spiny hopsage	***Grayia spinosa***
Little-leaf ratany	***Krameria parvifolia***
Creosote bush	***Larrea tridentata***
Forbs	
Windmills	***Allionia incarnate***
Two-seeded milkvetch	***Astragalus didymocarpus***
Woolly bottlebrush	***Camissonia boothii***
Desert pincushion	***Chaenactis fremontii***
Nievitas	***Cryptantha* sp.**
Rattlesnake weed	***Euphorbia albomarginata***
Sandmat	***Euphorbia micromera***
Deer vetch	***Lotus strigosus***
Desert dandelion	***Malacothrix glabrata***
Combbur	***Pectocarya recurvata***
Plantain	***Plantago* sp.**
Desert globemallow	***Sphaeralcea ambigua***

Source: U. S Fish and Wildlife Service 2010

According to monitoring data, most of the above plants occur in the allotments on the Arizona Strip, including Pakoon Springs and Pakoon, which are within desert tortoise critical habitat. Many of the perennial plants listed above are in the key areas (see the trend tables, Tables 5-11). However, it should be noted that not all of the species occur at all of the key areas due to site variation. The Ecological Site Guides allow for annual plants, but do not list them by species due to their great variation in occurrence year to year. Annual plants are important food sources for the tortoise (Ernst and Lovich 2009; Oftedal et. al 2002). The annual forbs listed above occur in the key areas of these allotments, but last only two months in the spring and then turn to dried plant litter. They fluctuate in abundance according to the winter and spring moisture. If monitoring is done while the annuals are present, they are recorded for reference.

C. Issues identified in scoping

1. Issues relating to Rangeland Health

a. Invasive non-native species may be causing a decrease in perennial vegetation. (Both Pakoon and Pakoon Springs Allotments)

b. The impact area around livestock waters may be increasing and/or may already be in an unacceptable vegetation condition (lack of species/structural diversity). (Both Pakoon and Pakoon Springs Allotments)

c. Livestock water lot(s) are not accessible to wildlife on Middle Spring pipeline, at Middle Well and Upper Well. (Both Pakoon and Pakoon Springs Allotment)

d. Springs may be dewatered, not providing wildlife water or riparian vegetation potential. (Pakoon Springs Allotment)

e. Excessive erosion is occurring in areas where there is a lack of cover relating to unnatural fire return interval. (Both Pakoon and Pakoon Springs Allotments)

f. Large area not meeting Standard #1. (Pakoon Allotment)

g. Desert tortoise populations are still declining. (Both Pakoon and Pakoon Springs Allotments)

h. Restoration project at Pakoon Springs, fencing and reconfiguration of allotment boundaries. (Pakoon Springs Allotment)

i. Burros are still there. (Both Pakoon and Pakoon Springs Allotments)

j. Protect unburned areas through collaboration with Mojave Desert Initiative (MDI) in helping to implement research projects designed to maintain intact Mojave desert plant communities. (Both Pakoon and Pakoon Springs Allotments)

k. Current season of use authorizes grazing until May 15 which is well into the tortoise active period (that begins March 15). (Both Pakoon and Pakoon Springs Allotments)

2. Issues not relating to Rangeland Health, and not discussed further in this document.

a. Supplemental feeding

The permittees are authorized to use salt and supplemental feed in the form of meal and/or block - type supplements at their discretion. Unauthorized

feeding of bakery products as a supplement occurred on a neighboring allotment; this situation has been resolved (i.e., is no longer occurring). There is concern that this may take place on the Pakoon Springs Allotment. Feeding of bakery products may increase the presence of ravens, which are known predators to small desert tortoises. However, this practice has never been known to occur on the Pakoon Springs Allotment.

IV. Management Evaluation

A. Purpose of Evaluation

The purpose of this assessment is to determine if the existing soil, water, and vegetative resources are meeting, making progress toward meeting, or not meeting the Arizona Standards for Rangeland Health. These resources are managed according to the Grand Canyon-Parashant National Monument RMP, allotment management plan, and other activity plans, which identify terms and conditions for management on public lands within the Pakoon Springs and Pakoon allotments. If the current livestock grazing practices are determined to be causing non-attainment of standards, then the appropriate action will be taken in conformance with the Guidelines for Grazing Administration. This assessment will also evaluate and update existing activity plan objectives to ensure multiple use objectives are tied to the indicators for rangeland health. Evaluation of land health standards is based on all available monitoring, inventory, and assessment data.

B. Summary of Studies Data.

1. Livestock Actual Use

Pakoon Springs Allotment: Authorized (1,394 AUMs)

Year	AUMS Used	Percent of Permitted Use
1986	1190	85%
1987	1190	85%
1988	1189	85%
1989	1394	100%
1990	818	59%
1991	751	54%
1992	784	56%
1993	793	57%
1994	864	62%
1995	910	65%
1996	852	61%
1997	1025	74%
1998	1025	74%
1999	35	3%
2000	No Use	
2001	No Use	
2002	No Use	
2003	No Use	

2004	No Use
2005	No Use
2006	No Use
2007	No Use
2008[6]	No Use
2009	No Use
2010	No Use

Pakoon Allotment: Authorized (1,624 AUMs)

Year	AUMS Used	Percent of Permitted Use
1990	1,685	104%
1991	1,877	116%
1992	2,090	129%
1993	2,244	138%
1994	2,208	136%
1995	2,002	123%
1996	1,897	117%
1997	1,700	105%
1998	2,038	125%
1999	2,050	126%
2000	1,804	111%
2001	1,288	79%
2002	1,758	108%
2003	434	27%
2004	716	44%
2005	1,508	93%
2006	1,566	96%
2007	1,419	87%
2008	1,513	93%
2009	1,133	70%
2010	1,083	67%

There are two possible reasons for actual use being higher than permitted numbers during the period of 1990 to 2002. These reasons are: trespass and temporary nonrenewable. It would be speculation to state an exact reason for the higher use as it is not documented.

2. Precipitation

Average annual precipitation for the northern portion of the Pakoon Springs Allotment is 11.89", with most precipitation occurring during winter, as depicted by the data from the Cottonwood Wash Exclosure precipitation gauge. The southern portion of the allotment averages 7.28" based on the Pakoon precipitation rain gauge located in the Tassi Allotment approximately 5 miles south of the allotment.

[6] Since the completion of the Grand Canyon-Parashant National Monument RMP, both unavailable and available portions of the Pakoon Springs Allotment have been ungrazed, with the exception of some trespass livestock that have been removed.

Average annual precipitation for the northern portion of the Pakoon Allotment is 8.98", with most precipitation occurring during winter, as depicted by the data from the Olaf Knolls precipitation gauge. The southern portion of the allotment averages 7.28" based on the Pakoon precipitation rain gauge located in the Tassi Allotment approximately 5 miles south of the allotment.

The Cottonwood Wash Exclosure rain gauge is located in T. 37 N., R. 15 W., Sec. 17, northeast of Brumley Well, at the exclosure in the middle of the Cottonwood Allotment. Average precipitation for this area is 1.81 inches for the fall season, 4.82 inches for the winter season, 1.99 inches for the spring, and 3.23 inches for the summer, with the average total annual being 11.84 inches.

The Pakoon rain gauge is located in T. 34 N., R. 16 W., Sec. 34, ½ mile west of Seven Springs Ranch. Average precipitation for this area is 1.35 inches for the fall season, 3.01 inches for the winter season, 1.20 inches for the spring, and 1.66 inches for the summer, with the average total annual being 7.22 inches.

The Olaf Knolls rain gauge is located in T. 36 N., R. 14 W., Sec. 20, north of Olaf Knolls, at the north end of the Pakoon Allotment. Average precipitation for this area is 1.39 inches for the fall season, 3.63 inches for the winter season, 1.89 inches for the spring, and 2.04 inches for the summer, with the average total annual being 8.95 inches.

Data shows that seasonal precipitation fluctuations, as depicted in Table 3 (below), have played a major role in vegetation changes. Summer average precipitation has had fluctuations similar to the annual precipitation. (Specific precipitation data is located in Appendix F.)

Table 3

Pakoon Precipitation Rain Gauge Number: 13

Year	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Fall % Avg	229	33	65	47	89	39	20	130	91	248	14	36	37	67	256
Winter % Avg	129	248	52	59	106	25	104	92	76	65	59	75	46	143	269
Spring % Avg	113	60	261	133	112	10	72	40	101	144	21	53	245	255	69
Summer % Avg	28	138	130	141	209	147	89	137	49	79	50	275	22	87	18
Annual % Avg	120	153	109	89	128	53	80	100	76	113	43	111	73	136	174

Year	1994	1995	1996	2004	2005	2006	2007	2008	2009	2010	2011	2012			
Fall % Avg	191	98	0		472	89	59	0	79	10	181	167			
Winter % Avg	62	106	57		228	4	8	130	106	151	125	25			
Spring % Avg	114	207	0		130	80	20	20	20	120	0				
Summer % Avg	12	418	88	59	94	29	103	59	15	22	45				
Annual % Avg	82	195	45		222	38	41	72	65	91	96				

Cottonwood Wash Exclosure					Precipitation Rain Gauge Number:			04							
Year	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Fall % Avg	64	219	28	90	55	223	134	109	183	67	222	34	24	74	66
Winter % Avg	325	108	19	42	58	121	21	137	44	92	66	87	55	71	116
Spring % Avg	145	199	54	149	119	142	27	37	184	89	153	32	108	95	256
Summer % Avg	81	69	93	89	172	127	223	66	102	98	126	108	119	141	44
Annual % Avg	187	129	47	80	100	142	95	96	105	89	121	75	77	95	113

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Fall % Avg	180	113	87	63	127	56	158	0	194	28	64	39	366	70	70
Winter % Avg	259	51	200	61	102	116	31	82	178	19	71	93	258	11	21
Spring % Avg	93	68	75	31	57	119	112	13	204	31	124	50	137	124	19
Summer % Avg	38	237	76	72	168	163	122	95	168	53	31	27	84	130	88
Annual % Avg	158	114	127	59	117	121	89	61	182	32	68	59	206	72	47

Year	2008	2009	2010	2011	2012										
Fall % Avg	0	78	14	149	111										
Winter % Avg	137	87	161	186	62										
Spring % Avg	12	25	217	63											
Summer % Avg	57	15	18	56											
Annual % Avg	73	55	109	124											

Olaf Knolls					Precipitation Rain Gauge Number:			08							
Year	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Fall % Avg	0	41	25	75	51	165	143	61	40	171	71	218	0	303	11
Winter % Avg	53	58	65	53	124	295	70	142	86	109	125	34	81	111	32
Spring % Avg	140	41	80	158	207	82	79	281	28	31	136	79	54	196	6
Summer % Avg	151	151	178	53	84	24	34	85	82	145	232	261	90	72	17
Annual % Avg	87	74	89	78	121	166	75	146	66	110	144	124	65	149	19

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012					
Fall % Avg	25	45	506	80	140	0	107	24	128	201					
Winter % Avg	79	100	267	16	27	69	113	194	240	42					
Spring % Avg	193	32	138	165	27	15	31	103	135						
Summer % Avg	67	88	115	80	112	92	35	51	92						
Annual % Avg	93	74	240	72	64	53	76	93	168						

Precipitation and weather patterns affect the amount of vegetation produced on these allotments; fluctuating amounts and the seasonal distribution of precipitation results in varying amounts of forage from year to year. Normal grazing schedules and livestock management practices may have to be modified during periods of drought. WO IM No. 2002-120 and Arizona IM No. AZ-2002-025 outline guidance strategies when evaluating impacts to rangelands due to drought. The BLM works with livestock permittees to voluntarily reduce livestock numbers on public lands, or portions of or entire allotments may be temporarily closed. Livestock operators and the BLM jointly develop short and long-term strategies for modifying livestock use on public land to ensure the conservation and protection of soil and vegetation resources. For example, the BLM works cooperatively with livestock permittees to

match available forage with appropriate livestock numbers. Historically, most livestock operators impacted by drought conditions have voluntarily reduced their numbers without issuance of formal livestock closure notices. However, if the BLM determines immediate protection of the range resource is merited, closures or modifications to an allotment may be issued effective upon issuance under the authority of 43 CFR 4110.3-3.

3. Utilization

Utilization is defined as the proportion of current years' forage production that is consumed or destroyed by grazing animals (both livestock and wildlife). Utilization is read using the grazed class method to collect the data. Utilization is read at or around the designated key area for each pasture. Utilization levels on these allotments are limited to 45% because it is within desert tortoise habitat. Utilization data from 1982-2010 has been compiled for this evaluation.

Table 4 (below) shows the utilization levels recorded on an individual key perennial plant species for the years[7] the studies were completed.

Table 4
Pakoon Springs Allotment
Key species utilization by year

Key Area #1	1982	1983	1984	1985	1987	1988	1989	1993
Sporobolus spp	42	26	25	55	64	70	76	3
Pleuraphis rigida	10	23	25	53	30	50	58	
Warm season grasses				55	62	71	67	
Ephedra nevadensis	39	41	41	43	22	33	41	
Key Area #2	1982	1983	1984	1985	1987	1988	1989	1993
Achnatherum hymenoides		10	14	70	45		55	1
Sporobolus spp	35							
Pleuraphis rigida	30	54	44	62	37	56	60	2
Muhlenbergia porteri						40	43	
Ephedra nevadensis	55	45	37	50	36	46	58	0

Key Area #3	1983	1984	1985	1987	1988	1989	1990	1991	1993
Ephedra nevadensis	24	46	19	24	8	37	32	13	3
Krameria erecta				35			27	7	
Krameria grayi	43	23	20		37	23			
Ambrosia dumosa						10	11		
Other shrubs						48	38		

Key Area #4	1990	1991	1993	1996
Achnatherum hymenoides	63	10		22
Sporobolus spp	50			
Pleuraphis rigida	35	43	13	22
Ephedra nevadensis	42			
Krameria erecta		10		
Krameria grayi	24			
Ambrosia dumosa	22	10		0

[7] No studies were completed between 1996 and 2011 on the Pakoon Springs Allotment. Livestock have not grazed the four Pakoon Springs pastures since 1999. Where livestock are authorized in the Pakoon Springs Allotment, as a result of the northern portion being combined with the Mosby-Nay Allotment, there still has not been any grazing due to the 2005 and 2006 wildfires. The key areas where livestock grazing is authorized in the Pakoon Springs Allotment are numbers 1 and 2.

Key Area #1	81	82	83	84	85	86	87	88	89	90	91	92	93	94	96	99	2000	2003	2008	2009	2010[8]
Achnatherum hymenoides	45	63	10	16	14		8	15			6	25		24	5	0					
Sporobolus spp												2	20	23	12						
Pleuraphis rigida	35	27	23	31	19	11	12	23	36	4	7	12	35	21	30	15	19	0	38	48	
Muhlenbergia porteri	35	33	37	39	18	9	3	18	38	4	16				12			0			
Krascheninnikovia lanata	34	17	17	30	14	3	4	24	43	1	3				10	12	15	0	15	45	
Ephedra nevadensis		39		30	14	3	4		43	1		3	10	15	10	12	15	0	65	54	
Krameria erecta																			9	36	

Key Area #2	81	81	82	85	86	1987	1988	1989	1990	1991	1992	1993	1994	1996	1999	2000	2003	2004	2009
Achnatherum hymenoides	41	30	41	22	10	18	19	50	33	13	6	6	34	29	42	24			40
Sporobolus spp			18	30		18	3	24	33							15			40
Pleuraphis rigida	19		13	15	4	0	3	10	4		3	2	2	11	7	15		17	41
Muhlenbergia porteri			13	11	5	5	3	24	11	1	8	3	2	22	30	24		18	52
Krascheninnikovia lanata	34	44	16	1	5	2	13	26	2		9	5	12	14	11	22		3	44
Ephedra nevadensis			30		5	2	13	26	2		9	8	12	14	11	22	7	30	57

Key Area #3	81	82	86	87	88	89	90	91	92	93	94	96	99	2000	2003	2004	2008	2009
Achnatherum hymenoides	40	50		43	50	37		10			33							
Sporobolus spp		13	4	5	2	29	29	6				15	6	36				
Pleuraphis rigida	25	27	19	10	14	24	22	9	7		11	29	7	1	3	46	43	53
Ephedra nevadensis	38	15		30	30	30	40	8							43	58	54	57

* Last utilization read on this allotment was 2009.

On the Pakoon Springs Allotment, the overall utilization for the evaluation period for each key area is:

- Key Area #1: 48%
- Key Area #2: 38%
- Key Area #3: 24%
- Key Area #4: 20%

On the Pakoon Allotment, the overall utilization for the evaluation period for each key area is:

- Key Area #1: 19%
- Key Area #2: 18%
- Key Area #3: 27%

[8] Last utilization read on this allotment was 2009.

4. Trend of frequency and cover data

The trend of an area may be judged by noting changes in vegetation attributes such as species composition, density, cover, production, and frequency. Vegetation data is collected at different points in time on the same site (key area), and results are then compared to detect change.

Trend monitoring was collected using the pace-frequency method, which measures the occurrence frequency of forage and non-forage vegetative species. Cover data, which determines the percent of bare ground, litter, rock, cryptogram and live basal vegetation, is also collected. Ground cover is determined by dividing the total number of hits for all categories except bare ground and rock by the total number of hits – see page 73 of BLM Technical Reference 1734-4 (BLM 1996). The first readings established a baseline for comparison to all future readings. Trend is considered up when the species increases by 10+ points from the first reading to the last shown reading. The trend of a species is static or not apparent if it shows a change of 0 to 10 or 0 to -10 from the first to the last reading. Down trend is a reading of more than -10 from the first reading.

Monitoring data (1982 to 2008) from both allotments indicates that seasonal precipitation fluctuations and fires have had impacts on trends. In the Pakoon Springs Allotment, fire has been an influence on Key Area #1 and #2 (1980 and 2005). Fire has also had an impact on the Pakoon Allotment at Key Area #3 (possibly mid to late 1970s, 1980, 1986, 1988). On both allotments, seasonal precipitation fluctuations have influenced all key areas. (See Appendix G for specific frequency information.)

Tables 5-11 show the key species frequency for both allotments; frequency is the ratio between the number of sample units that contain key species and the total number of sample units, comparing the most recent data to the base year. Overall trend at each key area is the direction of change in frequency observed between the initial reading (base year) and the current reading, as depicted by the arrows, i.e., (↗) up, (↘) down, and (→) no apparent trend or static (if numbers are between 1-10%).

Table 5. Trend Data – Pakoon Springs Allotment, Key Area #1		
Key Species or Cover Category	**Baseline**	**Current**
Pakoon Springs Allotment		
Key Area #1	**1982**	**2008**
Litter	72	59
Vegetation (basal cover)	1	1
Pleuraphis rigida	1	
Achnatherum hymenoides		
Sporobolus spp	15	4
Dasyochloa pulchella	1	
Ephedra nevadensis	1	
Prunus fasciculata	1	
Psilostrophe cooperi		
Opuntia	1	1
Acamptopappus sphaerocephalus	1	
Yucca brevifolia		
Salazaria mexicana	1	
Larrea tridentata		
Overall Trend for Key Area #1: (↓) Down		

Prior to the drought in 2002, trend for Key Area #1 was up. For 2001 its data was as follows: Litter – 84, Vegetation (basal cover) – 3 and Key Species – 26.5. We then experienced a drought as indicated in the precipitation data. As a result, the key area saw a reduction in key species frequency. In the fall / winter of 2004 and 2005 the area experienced significant amounts of precipitation which created a huge fuel load in annual species. As a result, a fire burned through the area in the summer of 2005. The key area is slowly recovering from those events.

Table 6. Trend Data – Pakoon Springs Allotment, Key Area #2		
Key Species or Cover Category	**Baseline**	**Current**
Key Area #2	1982	2008
Litter	19	49
Vegetation (basal cover)	1	1
Pleuraphis rigida	4	
Achnatherum hymenoides	1	1
Aristida	1	
Muhlenbergia poteri		
Sporobolus flexious		
Ephedra nevadensis		1
Yucca brevifolia	3	
Larrea tridentata	9	
Encelia frutescens		2
Croton californicus	12	
Opuntia	6	
Krameria erecta	3	
Ambrosia dumosa	3	1
Coleogyne ramosissima	1	
Thamnosma Montana	1	
Salvia dorrii	1	
Psilostrophe		1
Yucca baccata		1
Overall Trend for Key Area #2: (→) Static		

Prior to the drought in 2002, trend for Key Area #2 was up. For the year 2000 its data was as follows: litter – 30; vegetation (basal cover) – 13; and key species – 35.5. The area then experienced a drought, as indicated in the precipitation data. This resulted in a reduction in key species frequency at the key area. In the fall/winter of 2004 and 2005, the area experienced significant amounts of precipitation, creating a huge fuel load in annual species. A fire burned through the area in the summer of 2005. The key area is slowly recovering from those events.

Table 7. Trend Data – Pakoon Springs Allotment, Key Area #3		
Key Species or Cover Category	**Baseline**	**Current**
Key Area #3	1982	2008
Litter	5	27
Vegetation (basal cover)		1
Pleuraphis rigida		
Aristida		
Sporobolus spp		
Dasyochloa pulchella		
Ephedra nevadensis		
Larrea tridentata	18	29
Ambrosia dumosa	5	7
Krameria grayi		3
Lycium andersonii		1
Acamptopappus sphaerocephalus	1	
Overall Trend for Key Area #3: (↑) Up		

With an increase in litter ground cover and also the shrub component, trend for Key Area #3 is up.

Table 8. Trend Data – Pakoon Springs Allotment, Key Area #4		
Key Species or Cover Category	**Baseline**	**Current**
Key Area #4	1982	2008
Litter	16	13
Vegetation (basal cover)	9	3
Pleuraphis rigida	16	11
Achnatherum hymenoides	3	1
Krascheninnikovia lanata		3
Krameria erecta	4	5
Ambrosia dumosa	29	36
Larrea tridentata	1	4
Overall Trend for Key Area #4: (→) Static		

Trend for Key Area #4 is static, as shown by the data – very little change has been detected.

Table 9. Trend Data – Pakoon Allotment, Key Area #1		
Key Species or Cover Category	**Baseline**	**Current**
Key Area #1	**1982**	**2008**
Litter	21	24
Vegetation (basal cover)	2	0
Pleuraphis rigida	13	1
Muhlenbergia porter		1
Ephedra nevadensis	1	2
Krascheninnikovia lanata	2	1
Krameria erecta	4	8
Ambrosia dumosa	9	22
Larrea tridentata	1	6
Overall Trend for Key Area #1: (↑) Up		

Trend in Key Area #1 of the Pakoon Allotment is up and moving toward the DPC objectives established using the ecological site guide. Since 1982, there has been a decrease in perennial grasses and an increase in the shrub component. This indicates it is moving toward PNC (Potential Natural Community).

Table 10. Trend Data – Pakoon Allotment, Key Area #2		
Key Species or Cover Category	**Baseline**	**Current**
Key Area #2	1982	2008
Litter	26	42
Vegetation (basal cover)	1	1
Pleuraphis rigida	6	4
Aristida	1	2
Muhlenbergia porter	6	2
Sporobolus spp	1	
Achnatherum hymenoides	1	
Krascheninnikovia lanata	1	1
Krameria erecta	2	2
Larrea tridentata	9	11
Acamptopappus sphaerocephalus		2
Hymenoclea salsola		2
Yucca brevifolia	2	5
Overall Trend for Key Area #2: (↑) Up		

Trend in Key Area #2 of the Pakoon Allotment is up and moving toward the DPC objectives established using the ecological site guide. Since 1982, there has been a

decrease in perennial grasses and an increase in the shrub component. This indicates it is moving toward PNC.

Table 11. Trend Data – Pakoon Allotment, Key Area #3		
Key Species or Cover Category	**Baseline**	**Current**
Key Area #3	1982	2008
Litter	59	49
Vegetation (basal cover)		2
Aristida	1	
Pleuraphis rigida	4	10
Sporobolus spp	2	1
Achnatherum hymenoides		
Ephedra nevadensis	1	1
Bebbia juncea		2
Psilostrophe cooperi	2	
Overall Trend for Key Area #3: (→) Static		

Key Area #3 of the Pakoon Allotment burned multiple times in the 1980s. From the data, we see perennial grasses starting to take hold as well as shrubs. The key to continue moving the site forward to PNC is to continue to break the fire cycle or lengthen the fire return interval.

5. Lithology and Soils

a. Lithology:

The Pakoon and Pakoon Springs allotments consist mainly of limestone, sandstone, gypsum, granite and gneiss. Landforms are mesas, ridges, fan and stream terraces, plateaus, fan terrace dunes, and cliffs that have slopes ranging from one to seventy percent. Soils are loamy, gravelly or cobbly, very shallow to very deep and well drained.

b. Soils – Shivwits SSA 623

03 Arada family loamy fine sand, 1 to 10 percent slopes, (fan terrace dunes), sandstone; Coarse Sandy Loam (limey), 6" to 9" ppt

04 Arizo gravelly sandy loam, 1 to 5 percent slopes, nonflooded, (coalescent fan piedmont), granite and gneiss; Limey Upland (Deep), 6" to 9" ppt

05 Arizo very gravelly sandy loam, 1 to 5 percent slopes, flooded, (floodplain, fan), granite and gneiss; Sandy Wash, 6" to 9" ppt

26 Grapevine-Hobcan complex, 1 to 5 percent slopes (fan, fan terrace), LS, Moenkopi; Grapevine=Limey Upland (Deep), 6" to 9"; Hobcan=Loamy Wash (Gypsic), 6" to 9"

27 Grapevine-Shelley complex, 1 to 5 percent slopes (fan terrace), LS, Moenkopi; Grapevine and Shelley=Limey Upland (Deep), 6" to 9"

28 Gypill-Badland association, 10 to 70 percent slopes (hills, escarpments) Moenkopi; Gypsum Hills (Alkaline), 6" to 9" ppt

30 Gypill-Hobog complex, 6 to 35 percent slopes, (hills, ridges, mesas), gypsite, limestone; Gypill=Gypsum Hills, 6" to 9"; Hobog=Limey Upland, 6" to 9"

34 Hindu-RO-Gypill complex, 35 to 70 percent slopes, (cliffs, scarps, mtns), gyp, LS, SS, CG; Hindu=Limestone Hills, 6" to 9"; Gyphill=Gypsum Hills, 6" to 9"

39 Hobog very gravelly sandy loam, 5 to 30 percent slopes, (plateau, mesa), limestone; Shallow Upland, 9" to 12"

44 Meadview very gravelly sandy loam, 2 to 18 percent slopes, (fan terraces) LS, Moenkopi; Limey Upland (Deep), 6" to 9"

64 Riverwash-Torrifluvents complex, 1 to 3 percent slopes, (channel, floodplain), mixed; Torrifluvents=Sandy Wash, 9" to 12" ppt

67 Ruesh very gravelly fine sandy loam, 3 to 20 percent slopes, (fan terrace), mixed sediment; Gypsum Fan, 6" to 9" ppt

77 Tonopah gravelly loamy fine sand, 1 to 10 percent slopes, (fan terraces), mixed alluvium; Limey Upland (Deep), 6" to 9" ppt

78 Torriorthents-Calciorthids-RO complex, 10 to 40 percent slopes, (mesa scarps), Moenkopi and basalt; Torriorthents=Basalt Slopes, 6" to 9" ppt; Calciorthids=Limey Upland, 6" to 9" ppt

86 Winkel-RO complex, 2 to 35 percent slopes, (plateaus, mesas), LS alluvium over basalt; Limey Upland, 6" to 9" ppt

87 Winkel_RO complex, 2 to 35 percent slopes, moist, (summits, shoulders), basalt; Shallow Upland, 9" to 12" ppt

88 Winkel very gravelly loam, 2 to 25 percent slopes (mesa) basalt; Winkel=Limey Upland, 6" to 9"

89 Winkel very gravelly loam, 2 to 25 percent slopes, moist, (plateaus, mesas), mixed alluvium; Shallow Upland, 9" to 12" ppt

96 Yurm family-Meadview association, 15 to 40 percent slopes, (fan terraces, mesas), LS; Yurm family=Limey Upland, 6" to 9" ppt; Meadview=Limey Upland (Deep), 6" to 9" ppt

97 Yurm family-Meadview association, 15 to 40 percent slopes, moist,(fan terraces, mesas), LS; Yurm family=Shallow Upland, 9" to 12" ppt; Meadview=Sandy Loam (Gravelly), 9" to 12" ppt

98 Yurm family very gravelly loam, 15 to 35 percent slopes, (fan terraces), LS, conglomerate; Limey Upland, 6" to 9" ppt

99 Yurm family very gravelly loam, 15 to 35 percent slopes, moist, (fan terraces), LS; Shallow Upland, 9" to 12" ppt

Additional field observations, data collection, and lab testing were done in July 2011. The results of this data collection are shown in Table 12.

Table 12. Soil Data for Pakoon/Pakoon Springs Allotments

Soil Sample	Location	Texture	pH $CaCO_3$	EC	Normal Bulk Density (Db) g/cc	Root restricting Db g/cc*	Sample Db g/cc	% Increase in Db	% Decrease in Porosity
PS- Db-1 (2-8") Torriorthents, mu 78	T35N, R16W sec 02 NWNWSW	sandy loam	7.9 e-es	0.35	1.4	1.75	1.47	5.0	4.7
PS-Db-2 (2-6") Winkel, mu 88	T35N, R15W sec 31 NWNW	gravelly sandy loam	8.1 ev	0.18	1.4	1.75	1.26	10.0 decrease, grass roots	11.9 increase, grass roots
P-Db-3 (2-6") Yurm, mu 98	T35N, R15W sec 23 NWSW	sandy loam	8.0 ev	0.20	1.4	1.75	1.47	5.0	4.7
P-Db-4 (2-6") Yurm, mu 96	T35N, R14W sec 31 NWNWNE	gravelly sandy loam	8.0 ev	0.25	1.4	1.75	1.34	4.3	4.2
P-Db-5 (2-6") Shelly, mu 27	T35N, R15W sec 22 SWNW	sandy loam	8.1 ev	0.17	1.4	1.75	1.54	10.0	11.2

*NRCS soil quality information sheet "Rangeland Soil Quality – Compaction", May 2001. Most root systems are greatly affected at these Db levels, especially young grasses. The initiation of root restriction for many plants may start below these Db levels.

Except for the floodplains, most of the soils on the allotments are shallow sandy loams over caliche hardpans or basalt. The shallow soils have slight to moderate compaction, but all are well below root restricting bulk density. One sample, containing many grass roots, had below average bulk density. Very little sheet or rill erosion is evident, likely due to mostly gentle and undulating slopes, low precipitation, high infiltration rates of the sandy soils, some litter, and surface gravels of 25 to 50 percent. Cryptogamic cover is generally sparse, but with scattered pockets of good colonies. As in the first field assessment, no significant areas of impacts detrimental to soils or vegetation were found. Annuals have stabilized some of the old burn areas that had some erosion right after the fires.

6. Ecological Site Inventory

The "Dry Weight Rank" vegetative sampling method was used to measure composition, which is the proportion (percentage) of various plants in relation to the total at a particular area. This vegetation attribute is also used to describe ecological sites. An ecological site is a distinctive kind of land with specific physical characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation. It is the product of all the environmental factors responsible for its development. Ecological sites have developed a characteristic kind and amount of vegetation. The natural plant community on an

ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in annual production (BLM, 2001). While the natural plant community of a particular ecological site is recognized by characteristic *patterns* of species associations and community structure, the *specific species* present from one location to another may exhibit natural variability - the natural plant community is not a precise assemblage of species for which the proportions are the same from place to place, or even in the same place from year to year. Variability is the rule rather than the exception.

The distinctive plant communities associated with each ecological site (including the variability which frequently occurs) can be identified and described, and are called ecological site descriptions. These ecological site descriptions (or guides) are provided by the Natural Resource Conservation Service (NRCS). The ecological site's potential for change in composition over time was considered along with other vegetation attributes to quantify desired plant community objectives for each key area. The potential composition is determined by the applicable soil type and precipitation zone. These potentials are described in the NRCS Ecological Site Guides, and were used to set the DPC objectives.

Ecological status is the present state of the vegetation at an ecological site in relation to the potential natural community (PNC). A PNC is "the biotic community that would become established if all successful sequences were completed without interferences by humans under the present environmental conditions". It may include "naturalized non-native species" (BLM 2005 and BLM, 2001). PNC differs from "historic climax plant community" in that an historic climax plant community is "the plant community that existed before European immigration and settlement" (BLM, 2001). The BLM uses "potential natural community" terminology rather than "historic climax plant community" because PNC recognizes past influences by man. It is an expression of the relative degree to which the kinds, proportions, and amount of plants in a plant community resemble that of the PNC for the site. It is a coefficient of community similarity, which gives an ecological rating of the plant community.

Ecological status expresses the relative degree to which the kinds, proportions, and amounts of plants in a plant community resemble that of the potential natural plant community for the site. Ecological status changes slowly for most of the sites in this area; it is reported in the following four classes, or seral stages, which are the developmental stages of ecological succession (and corresponds to percent similar to the PNC):

- **Early Seral:** 0-25% of the expected potential natural community exists.
- **Mid Seral:** 26-50% of the expected potential natural community exists.
- **Late Seral:** 51-75% of the expected potential natural community exists.
- **PNC:** 76-100% of the expected potential natural community exists.

Table 13 lists by key area the ecological site, similarity index, and ecological (successional) status or seral status rating. (See Appendix G for specific frequency information.)

Table 13 – Ecological Site Inventory			
Pakoon Springs Allotment			
Key Area	Ecological Site	Seral Status	Similarity to PNC
1[a b]	Limy Upland (Deep)	Early	14%
2[a b]	Limy Upland (Deep)	Early	22%
3	Sandy Wash	Mid	30%
4	Limy Upland (Deep)	Late	70%
Pakoon Allotment			
Key Area	Ecological Site	Seral Status	Similarity to PNC
1	Limy Upland (Deep)	Late	73%
2	Limy Upland	Late	58%
3[a]	Limy Upland	Early	16%

[a] Area burned about 1980.
[b] Area burned during summer of 2005.

It should be noted that the vegetative composition listed in the site guides is an average across the entire ecological site; variations in an ecological site (due to inclusions or transition zones) may result in an actual plant composition that is different from that listed in the site guide.

7. Special Status Species

Threatened, Endangered, and Candidate Species

Desert Tortoise: The Mojave population of the desert tortoise was listed under the ESA as threatened on April 2, 1990 (USFWS 1990). Critical habitat was designated on February 8, 1994 (USFWS 1994b). The recovery plan developed in 1994 (USFWS 1994a) divided the range of the desert tortoise into six recovery units and established 14 desert wildlife management areas (DWMAs) throughout the recovery units. Recovery units for the desert tortoise are special units that are geographically identifiable and are essential to the recovery of the entire listed population. DWMAs are areas where recovery efforts are concentrated. Most DWMAs were also used for the foundation of designating ACECs and then, subsequently, critical habitat units. Establishment of recovery units and DWMAs was intended, in part, to facilitate an ecosystem approach to land management and desert tortoise recovery, as stipulated by section 2(b) of the ESA. The recovery plan was revised in May 2011 and recovery units were adjusted in light of new information, with the goal of balancing both distinctiveness and variability to ensure that local adaptation and critical genetic diversity are maintained. The revised recovery plan reduces the number of recovery units from six to five, and changes some boundaries, although the collective boundary of recovery units (when taken as a whole) has not changed and still encompasses the entire range of the species. The recovery units were revised based upon identification of geographic barriers that coincide with observed variation among tortoise populations (USFWS 2011). No areas in Arizona are affected by the recovery unit boundary revisions.

Under the revised recovery plan, the focal areas for recovery within each recovery unit are "tortoise conservation areas." These tortoise conservation areas include desert tortoise habitat within critical habitat units, ACECs, DWMAs, national monuments, national wildlife refuges, National Park Service lands, the Red Cliffs Desert Reserve, and other areas managed for desert tortoises. Tortoise conservation areas capture the diversity of the Mojave population of the desert tortoise within each recovery unit and are considered the minimum baseline within which to focus recovery efforts (USFWS 2011).

The Pakoon and Pakoon Springs allotments lie within the Northeastern Mojave Recovery Unit and the Gold Butte-Pakoon DWMA/critical habitat unit. All of the Pakoon Springs and all but about 1,600 acres (less than 3% of the allotment) on the eastern edge of the Pakoon Allotment are in designated critical habitat (and thus within a desert tortoise conservation area).

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. During droughts, tortoises forage over larger areas, increasing the likelihood of injury or mortality through encounters with humans and predators.

Documented threats to the Mojave population of the desert tortoise were identified in the 1994 recovery plan, and continue to affect the species today. The revised recovery plan discusses these threats to the desert tortoise and its habitat in detail; a brief summary of these threats is included below. Threats identified in the revised recovery plan include:

- ***The present or threatened destruction, modification, or curtailment of desert tortoise habitat or its range.***

This threat includes permanent habitat loss across large areas, such as urbanization, proliferation of roads and highways, off-highway vehicle activity, landfills and other waste facilities, poor grazing management, and habitat invasion by non-native invasive species. Another threat that has come to the forefront is the increased frequency of wildfire due to the invasion of desert habitats by non-native plant species. The proliferation of non-native plant species has contributed to an increase in fire frequency in tortoise habitat by providing sufficient fuel to carry fires, especially in the inter-shrub spaces that are mostly devoid of native vegetation. Changes in plant communities caused by non-native plants and recurrent fire can adversely affect the desert tortoise by altering habitat structure and species available as food plants.

Within the Gold Butte-Pakoon DWMA, large portions have burned in the last thirty years, in some cases they have burned several times. Wildfires have significantly

diminished the quality of desert tortoise habitat. Wildfires have destroyed the natural Mojave vegetation and caused that native vegetation to be replaced by less desirable non-native annual vegetation, such as cheatgrass and red brome (*Bromus* sp). The invasion of bromes also leads to additional wildfires, creating an opportunity for additional invasion of non-native annual plants, and reducing productivity. Approximately 20 percent (11,391 acres) of the desert tortoise critical habitat in the Pakoon Allotment have been affected by wildfires since 1992. In the Pakoon Springs Allotment, 7,559 acres of desert tortoise critical habitat have been affected by wildfires since 1992.

Off-highway vehicle activity, roads, livestock grazing, agricultural uses, and other activities contribute to the spread of non-native species (or the displacement of native species) and the direct loss and degradation of habitats. For example, unmanaged livestock grazing, especially where plants are not adapted to large herbivorous mammals or where the non-native species are less palatable than the natives, can preferentially remove native vegetation, leaving non-native plants to grow under reduced competition (USFWS 2011).

The revised recovery plan identifies livestock grazing and related actions as a threat to the species. Among the threats described from livestock grazing are competition for forage plants between the two species, trampling of tortoise by cows and crushing of burrow and shelter sites, crushing of tortoise by ATVs or other vehicles associated with livestock operations, and increased predation on tortoise resulting from attraction of predators to livestock water developments.

Livestock grazing can have direct and indirect impacts on desert tortoises and their habitats through trampling that result in direct mortality, either while above ground or in burrows, and degradation of vegetation and soils, including the spread of non-native plants or the displacement of native plants. The magnitude of the threat on desert tortoise populations remains unclear, and the degree of impact depends on a number of factors including, but not limited to, resiliency of soil and vegetation types, type of livestock, stocking rates, season of use, and years of use with and without rest (USFWS 2011). Cattle can potentially step on tortoises and injure or kill them should cattle be present during the tortoise active season (March 15-October 15). The likelihood of this is greater for hatchling or juvenile tortoises that are small and presumably difficult for cattle to see. However, there are no records of tortoise being injured or killed as a result of trampling by livestock on these or neighboring allotments, although there are records from the Beaver Dam Slope in both Arizona and Utah.

Similarly, cattle can step on and cause burrows to cave in, thereby disturbing essential thermal cover or even entrapping/injuring/killing a tortoise within. Tortoise burrows and cover sites are typically on the side slopes of washes or beneath shrub or other vegetation mounds; burrows may be as much as 30 feet long. It was determined during the 1991 monitoring effort in the Pakoon Allotment that caliche caves were plentiful but soil burrows were scarce. Throughout much of the study site, there was only a shallow substrate of soil over a solid substrate of caliche. Therefore, soil burrows where tortoises can lay eggs at a proper depth were thought to be a limiting resource (Bashor 1991). Livestock typically attempt to avoid stepping directly on holes or openings in the ground, as evidenced by the large

number of intact ground squirrel burrows present on these allotments. There is a greater likelihood that livestock would step on and collapse a portion of a burrow away from the opening.

Use of ATVs in cattle ranching operations is not common on these allotments. In addition, speed limits apply to BLM-authorized actions within desert tortoise habitat, which reduces the possibility of direct encounters. However, it is possible that ATVs could cause burrows to cave in, with the same effects as described in the previous paragraph. No such encounters have been reported on these allotments.

Oldemeyer (1994) suggests that the primary evidence that grazing adversely affects desert tortoises relates to an overlap in food habits of livestock and tortoises. Grazing is thought to reduce cover of shrubs and annual forbs. Studies in the eastern Mojave Desert on foraging behavior and food preferences of range cattle and desert tortoises showed that a dietary overlap (spatial and temporal) exists and that this overlap is greatest in the spring when fresh annual plants preferred by both desert tortoises and livestock are at their peak biomass and densities. Competition for these food plants is expected to be greatest when annual plants start to dry in the spring, before cattle and tortoises switch to other forage plants (Avery and Neibergs 1997).

Hohman and Ohmart (1980) reported that forbs comprised the largest percentage of the diet of cattle and tortoises on the Beaver Dam Slope (which is within a different DWMA than the Pakoon and Pakoon Springs allotments, but within the same recovery unit). These annual plants comprised over 95% of the diet for tortoises and 57% for cattle. Overlap between the diets of tortoises and cattle in April of 1977, was 40%. During May, forbs accounted for 54% of the diet of tortoises but only 5% for cattle, which had shifted to using palatable shrubs. According to Medica et al (1975), growth of desert tortoises is influenced by winter annual production and availability of food; they found that growth of tortoises was greatest following winters of high precipitation, which resulted in increased production of annual plants in the spring. During April, succulent annual forbs and grasses were present in low to moderate amounts, indicating some competition for forage was likely occurring. Most of the food plants in their diet contain high levels of potassium, which is toxic, and low levels of protein (nitrogen). Unlike many other reptiles, desert tortoises lack functional salt glands that would normally assist in eliminating excess potassium. When water is available, tortoises excrete liquid urine, but they are able to compensate during times of little to no available water by going for months without discharging from their bladder (Dantzler and Schmidt-Nielsen 1966). During this time they will store uric acid in their bladders. Tortoises use this uric acid to accumulate potassium and other electrolytes in their bladder until opportunities to drink again allow them to eliminate (Jørgensen 1998, Oftedal 2002, Oftedal et al. 2002).

A potassium excretion potential (PEP) index is a method of measuring the impact of varying diets on an animals' osmoregulation and protein assimilation (Oftedal 2002). Plants with a high PEP index indicate that there is more than enough water and protein in the food for a tortoise to excrete excess potassium, while those with a low PEP index implies that there are inadequate amounts of water and nitrogen in food for the tortoise to excrete excess potassium. Thus, plants with high PEP help the tortoises both rehydrate and ultimately produce uric acid that can assist in binding the excess

potassium. The availability of high PEP plants in the spring is especially important to tortoises that may not get the opportunity to drink during the hot summer months.

Oftedal (2002) also states that impacts to vegetation (from livestock grazing, invasion of non-native plants, and soil disturbance) that reduce the abundance and distribution of high PEP plants may result in additional nutritional challenges for foraging desert tortoises. Tracy et al (2006) claim that habitat disturbances that favor species with little nutritional value and preclude access to low-fiber foods may adversely impact the physiological and behavioral ecology of young desert tortoises (i.e. cause dehydration). Additionally, access to and ingestion of high PEP plants may be essential to short and long term nitrogen balance, overall health in the face of infectious disease, and female reproductive output (Oftedal 2002). Henen (2002) evaluated whether body reserves help females produce eggs independent of rainfall and food availability, and found that female desert tortoises used large seasonal and annual changes in metabolism and body water, protein and energy reserves to survive and produce eggs. Although lipid reserves are important to female desert tortoises, nitrogen or crude protein appears to be the primary limiting resource for producing eggs. By reducing metabolic rates 90%, females conserved enough body reserves to produce eggs during extreme drought conditions, which is an effective "bet-hedging" reproductive pattern in an extreme and unpredictable environment such as occurs in the Mojave Desert.

A shortage of high PEP plants may underlie the steep population crashes of desert tortoises throughout the Mojave Desert (Oftadal 2002). Desert tortoises are known to actively seek out plants with a PEP index that are both uncommon and highly patchy (Jennings 1993). Major tortoise foods with a high PEP index include evening primrose (*Camissonia claviformis*) and desert dandelion (*Malacothrix glabrata*). The most important foods seem to be desert annuals, plants with a life span of less than 30 days and are generally only available from April to June (Ernst and Lovich 2009).

- ***Overutilization for commercial, recreational, scientific, or educational purposes.***

This threat refers to the deliberate maiming or killing of tortoises (previously referred to as vandalism) and collection of desert tortoises by humans for food or as pets were cited as potential threats to the species. Data and anecdotal observations indicate that collection for personal or commercial purposes was significant in the past. While illegal collection of desert tortoises still occurs and collection could possibly impact local populations, there is no quantitative estimate of the magnitude of this threat (USFWS 2011).

- ***Disease or predation.***

To date the available evidence indicates that upper respiratory tract disease (URTD), as caused by the bacteria *Mycoplasma agassizii* and *M. testudineum*, is probably the most important infectious disease affecting desert tortoises. Less is known about other diseases that have been identified in the desert tortoise (*e.g.*, herpesvirus, cutaneous dyskeratosis, shell necrosis, bacterial and fungal infections, and

urolithiasis or bladder stones).

In the 1970s, desert tortoises with signs of the disease were observed on the Beaver Dam Slope of Arizona/Utah, a site where many captive tortoises were being released. Surveys in 1989 and 1990 indicated that URTD was widespread on the Beaver Dam Slope (Jacobson 1992). A monitoring study conducted at the south end of the Pakoon Allotment in 1991 located one tortoise with definite URTD symptoms and two with possible symptoms (Bashor 1991). Disease has been considered an important threat to the desert tortoise since its emergency listing in 1989. Changing ecological conditions as a result of natural events or human-caused activities may stress individual tortoises and result in a more severe clinical expression of URTD (Brown et al. 2002). However, what is currently known with certainty about disease in the desert tortoise relates entirely to individual tortoises and not populations; virtually nothing is known about the demographic consequences of disease (Tracy et al. 2004). Disease is a natural phenomenon in wild populations of animals and can contribute to population declines by increasing mortality and reducing reproduction. The disease probably occurs mostly in relatively dense desert tortoise populations, as mycoplasmal infections are dependent upon higher densities of the host (Tracy et al. 2004).

The role of environmental contaminants in directly inducing toxicosis-related diseases (*i.e.*, liver diseases) and increasing susceptibility to infectious diseases has recently been suggested as a significant source of mortality. Illegal dumping of hazardous wastes may expose tortoises to increased levels and possible consumption of toxic substances and affect populations on a localized level where these activities are concentrated. It has been postulated that elemental toxicity may compromise the immune system of desert tortoises or otherwise detrimentally affect physiological function, rendering them more susceptible to disease, but further investigation is needed.

Desert tortoises, particularly hatchlings and juveniles, are preyed upon by several native species of mammals, reptiles, and birds. The common raven (*Corvus corax*) has been the most highly visible predator of small tortoises, while coyotes (*Canis latrans*) have been commonly implicated in deaths of adult tortoises. Over the past several decades, ravens have increased in number by a factor of 15 in parts of the Mojave Desert. There are a variety of anthropogenic (or human-caused) reasons for this. This many-fold increase above historic levels is due in large part to recent human subsidies of food, water, and nest sites (Knight et al.1993, Boarman 1993, Boarman and Berry 1995). For example, ravens are able to use power structures as nesting substrates and consequently have increased in abundance in areas that have had power poles added (Kristan and Boarman 2007). While not all ravens may include tortoises as significant components of their diets, these birds are highly opportunistic in their feeding patterns and concentrate on easily available seasonal food sources, such as juvenile tortoises. The population-level effects of these or other predators are unknown (USFWS 2011).

California Condor: The California condor was listed as endangered in 1967. In the late 1970s, the species was reduced to a population of about 25 birds. The decision was made to bring all of the wild condors into captivity to begin a captive breeding

program, the last wild condor was secured in April of 1987. In 1996, California condors were re-introduced into Arizona in the Vermilion Cliffs, under the ESA's 10(j) rule (non-essential experimental population). Additional releases in 1998 and 1999 of 16 condors occurred from the Hurricane Cliffs northeast of Diamond Butte. The reintroduction continues annually as captive-reared birds are released along the Vermilion Cliffs. Each released condor is equipped with radio telemetry or GPS satellite transmitters and numbered wing tags to allow observers to track their movements. As of March 2011, there were 74 condors in the wild in northern Arizona. The reintroduced population as a whole appears to be stable and is increasing.

California condors currently range across the entire Arizona Strip, throughout the Grand Canyon, into adjacent Utah and Nevada, and south of the Grand Canyon in Arizona. Condors range widely, easily covering over 100 miles in a day. Condors are most commonly observed near the release site on the Vermilion Cliffs, at Navajo Bridge near Marble Canyon, on the Kaibab Plateau, and near the South Rim of the Grand Canyon. They have also been seen flying over Fredonia. However, it would be a rare event for condors to occur over the Pakoon Springs and Pakoon allotments. Condors are strictly scavengers and prefer to eat large, dead mammals such as deer, elk, pronghorn, bighorn sheep, cattle, and horses. While the condors now find much of their food on their own, carcasses of dairy calves are provided near the Vermilion Cliffs release site in order to provide carrion which is contaminant free.

Mexican spotted owl: The Mexican spotted owl was listed as threatened on April 15, 1993. The range of the Mexican spotted owl extends from the southern Rocky Mountains in Colorado and the Colorado Plateau in central and southern Utah, southward through Arizona and New Mexico and into northern Mexico. Although the Mexican spotted owl's entire range covers a broad area of the southwestern United States and Mexico, it does not occur uniformly throughout its range. Instead, it occurs in disjunct localities that correspond to isolated forested mountain systems, canyons, and in some cases steep, rocky canyon lands. Surveys have revealed that the species has an affinity for older, uneven-aged forests, and the species is known to inhabit a physically diverse landscape in the southwestern United States and Mexico. Steep slopes and canyons with rocky cliffs characterize much of the owl's habitat on the Colorado Plateau (which includes the majority of the Arizona Strip). The Arizona Strip District is surrounded by areas where Mexican spotted owls have been detected, including Grand Canyon, Zion, and Canyonlands national parks, and Grand Staircase-Escalante National Monument.

Designated critical habitat was established for this species in 2001 and revised in 2004. No designated critical habitat occurs on these allotments. A tool for predicting suitable canyon habitats that may have higher potential for species occupancy and nesting birds than other nearby canyons is the Mexican Spotted Owl Habitat Model (Willey, 2001, and 1997). The model uses terrain parameters to determine depth and width of canyons (owls need cooler microsites for nesting and roosting) and other features (such as distance to water and north facing cliff sites). The model predicts the canyons most likely to support nesting owls; from this it can then be determined if any "higher quality" habitat (according to the model) exists. It is important to note that any model is only an analysis tool, and experience with the

current owl model has shown it to be accurate in some cases, but not in others (such as delineating cliff faces outside of canyons as high potential owl habitat). For canyon habitats, the primary constituent elements of habitat include one or more of the following attributes: (1) cooler and often more humid conditions than the surrounding area, (2) clumps or stringers of trees and/or canyon walls with crevices, ledges or caves, (3) high percent of ground litter and woody debris, and (4) riparian or woody vegetation. The primary constituent elements related to forest structure include (1) a range of tree species, (2) a shade canopy created by the tree branches covering 40 percent or more of the ground, and (3) large dead trees with a trunk diameter of at least 12 inches.

The Pakoon Allotment contains a small amount of habitat that is considered potential Mexican spotted owl habitat by the Spotskey-Willey (1997) habitat model. Seventeen separate habitat polygons totaling 147 acres are scattered along the eastern edge of the Pakoon Allotment. Approved protocol surveys have not been done in this habitat and no spotted owls have been observed on the allotment or elsewhere on Arizona Strip BLM-managed lands. A visual assessment of the suitability of these habitat polygons was completed during the fall of 2010. All of these modeled habitats lie within canyons cut into the base of the Grand Wash Cliffs, and most lie within the Grand Wash Cliffs Wilderness. In general, these canyons are narrowest at their mouths, but even in the broadest sections seldom more than ½ mile wide. The canyons are generally dry, with sporadic stream flow following storms or snowmelt. The most common sources of free water in the canyons are potholes and other natural rock basins that retain water after precipitation events. Riparian vegetation is limited, consisting of scattered shrub-sized willows. The Mojave mixed-shrub plant community is dominant in the canyons; trees are either absent or scattered. Denser stands of pinyon-juniper woodland can be found on Grand Wash Bench, above the canyons. Modeled habitat within these canyons typically lies on faces with north or nearly-north aspects, and generally contains crevices, ledges, or fractures with moderate or deeper shade. Some of these cool microsites include caves and fractures several feet deep. Thus, these habitat sites are considered suitable nesting habitat for the Mexican spotted owl.

A red-tailed hawk was noted during the habitat assessment in the vicinity of Squaw Canyon, along with the presence of a great horned owl near polygon #592. Both are considered competitors and predators of Mexican spotted owls and may discourage them from nesting in those areas.

<u>BLM Sensitive Species and Migratory Birds</u>

The bald eagle was delisted from the Federal ESA on August 9, 2007 (USFWS 2007). This species is not known to nest anywhere on the BLM's Arizona Strip District, although it may occur as a transient on these allotments. The bald eagle is a seasonal (winter) migrant that forages in and around the Kaibab Plateau. Bald eagles are both scavengers and predators. Golden eagles use their agility and speed combined with extremely powerful talons to snatch up prey including rabbits, marmots, ground squirrels, and large mammals such as fox, wild and domestic cats, and young deer. They will also eat carrion if prey is scarce, as well as reptiles. Birds, including large species up to the size of swans and cranes as well as ravens

have all been recorded as prey. Golden eagles nest in high places including cliffs, trees, or human structures such as telephone poles. There are no known nests within these allotments.

The American peregrine falcon was virtually eradicated from eastern North America by pesticide poisoning in the mid-20th century. After significant recovery efforts, the peregrine falcon was delisted in 1999. Powerful and fast-flying, this falcon hunts medium-sized birds, dropping down on them from high above in swift, spectacular dives. The peregrine falcon nests in a scrape, normally on cliff edges. Optimum habitat is considered to be steep cliffs overlooking woodlands, riparian habitats or other areas supporting abundant avian prey species. Cliff nests are generally located under an overhang, on ledges with vegetation, and south-facing sites are favored (Wikipedia 2011a). There are no known nests within these allotments, although suitable nesting habitat occurs in the Grand Wash Cliffs in the Pakoon Allotment. Peregrine falcons may, however, fly over and forage on these allotments.

Ferruginous hawks are large hawks that inhabit the grasslands, deserts, and open areas of western North America – they are the largest American hawk and are often mistaken for eagles due to their size. Ferruginous means "rusty color" and refers to the bird's colored wings and legs. During the breeding season, the preference is for grasslands, sage, and other arid shrub country. Nesting occurs in the open areas or in trees including cottonwoods, willows and swamp oaks along waterways. They nest in trees if they are available, including riparian strips, but the presence of water does not appear to be critical. The ferruginous hawk primarily hunts small to medium-sized mammals but will also take birds, reptiles, and some insects. Mammals generally comprise 80 to 90 percent of the prey items or biomass in the diet with birds being the next most common mass component. The diet varies somewhat geographically, depending upon the distribution of prey species (Wikipedia 2011b). Ferruginous hawks are known to use habitat similar to that found on these allotments, but records verifying their presence are not available.

Burrowing owls inhabit open areas, such as grasslands, pastures, coastal dunes, desertscrub, and the edges of agricultural fields, and wherever there is sufficient friable soil for a nesting burrow at elevations between 650 and 6,140 feet in Arizona. The presence of other nesting burrows (such as that of a badger, prairie dog, tortoise or other animal) seems to be a requirement for the species; a decline in the population of burrowing mammals may adversely affect owls through a lack of available burrows. Burrowing owls forage primarily at twilight but have been observed to hunt any time of the day or night. Insects are often taken during daylight and small mammals after dark. Observed causes of mortality include human disturbance through agricultural and construction activities and collisions with vehicles (the owls habitually sit and hunt on roads at night). Human activities that reduce quality of prey habitat and thus lower food supplies result in poorer reproductive success in females (Haug et al. 1993). This species is known to use habitat similar to that found on these allotments, although specific sightings have not been recorded.

The spotted bat and California leaf-nosed bat are known to occur on these allotments. They colonize in the Grand Wash Cliffs and forage over both allotments.

Townsend's big-eared bat and greater western mastiff bat are likely to also occur but have not been documented.

Spotted bats have been found from low desert in southwestern Arizona to high desert and riparian habitats in northwestern Arizona and Utah to conifer forests in northern Arizona and other western states. They are found in desertscrub, riparian, pinyon-juniper, and montane coniferous forests at elevations up to 8,670 feet. They roost in small cracks found in cliffs and stony outcrops. They forage on large flying insects, primarily moths (AGFD 2003).

As its name implies, the California leaf-nosed bat it has a triangular fleshy growth of skin, called a noseleaf, protruding above the nose. It is a small bat, and is one of the most maneuverable in flight. With short, broad wings, it can fly at low speeds using minimal energy. Because of this adaptation, it is not suited for long-distance travel, and is non-migratory. This bat has an unusual reproductive pattern. After breeding occurs in the fall, the embryos develop very slowly until March, when growth continues at a more normal rate before birth in May or June. Twins are common. This bat is known from caves, mines, and rock shelters, mostly in Sonoran or Mojave desert scrub. Roost sites are usually located near foraging areas. The California leaf-nosed bat feeds on large flying insects, including grasshoppers, moths, and flying beetles. The bat can catch prey in flight, or may glean forage from vegetation and on the ground. The bat seizes its prey from above, transporting it to a night roost to feed (Pima County 2011). They are the only bats in North America known to catch caterpillars and are among the very few insect-eating bats that supplement their diets with cactus fruit (Arizona-Sonora Desert Museum 2011a).

Townsend's big-eared are a medium-sized bat with very long ears – when the ears are laid back they extend to the middle of its body. They use a variety of habitats, almost always near caves or other roosting areas. They can be found in pine forests and arid desert scrub habitats. When roosting they do not tuck themselves into cracks and crevices like many bat species do, but prefer large open areas. They specialize in eating moths and other insects such as beetles, flies and wasps (Arizona-Sonora Desert Museum 2011b).

The western mastiff bat is the largest bat native to North America. The subspecies *Eumops perotis californicus* (greater western mastiff bat) ranges principally in the southwest desert regions of the United States, along the border with Mexico; however, the range extends as far north as the Pacific coast. In the southwestern United States, this bat is most common in rugged rocky canyons and cliffs, where crevices provide favored daytime retreats. Unlike most North American bats, they do not undergo either migration or prolonged hibernation but are periodically active all winter. This bat is capable of fast and prolonged flight; however, it usually cannot get airborne from the ground, but will scramble to a post or a tree to gain height for launching. It feeds on insects, up to 80% of which are moths. It will often drop down and forage on the ground (Wikipedia 2011c and Cabeza Prieta Natural History Association 2011).

The Grand Wash springsnail is known to occur in only three springs along Grand Wash. It has been verified slightly over two miles south of the Pakoon Springs

Allotment. The species possibly also occurs in the Virgin Mountains in Clark County, Nevada. The species lives within aquatic communities associated with spring flows. It is threatened by groundwater depletion and subsequent loss of spring flows and habitat degradation due to livestock use.

Some of the migratory bird species typical of the habitat in these allotments include black-throated sparrow, horned lark, rock wren, raven, Say's phoebe, black-tailed gnatcatcher, spotted towhee.

8. Wildlife Habitat

As stated on page 8 of this evaluation report, these allotments are within AGFD's GMU 13B. Mule deer populations are monitored annually by the AGFD. While there is no estimate of mule deer numbers available specifically for these allotments, population trends should parallel data collected for GMU 13B (see Appendix I). The mule deer population in the unit exists at low densities, in some areas less than one per square mile. The population, while not at levels attained in the 1970s, has shown signs of growth in recent years. Fawn production has remained at approximately 50 per 100 does for the past five years, as documented by AGFD survey counts, and the buck to doe ratio appears strong. Despite wide fluctuations, AGFD considers the mule deer population in Unit 13B to be stable and gradually increasing. Mule deer can be found throughout these allotments, but not in large numbers.
AGFD has categorized habitat characteristics for big game species within the state. Habitat categories are based on several factors such as topography, forage and cover, availability of water, and limiting factors such as prohibitive fencing. The Pakoon Allotment is categorized by AGFD as 75% yearlong habitat for mule deer and the remaining 25 percent is limited habitat for mule deer. Aproximately 50 percent of the Pakoon Springs Allotment is categorized as yearlong habitat for mule deer, while the remaining 50 percent is limited habitat.

Desert bighorn sheep habitat has been identified from habitat analysis that evaluates a combination of slope, topography, aspect, vegetation, proximity to escape cover, and water availability (Bighorn Sheep Core Team 2006). To escape predators, bighorn sheep prefer rough, rocky terrain with slopes greater than 20%, as is found in the Grand Wash Cliffs. Bighorn sheep likely obtain some of the moisture they need from succulent vegetation. During the hot summer months, the sheep stay in shaded areas near water as much as possible and are seldom found more than three miles from dependable water sources. When rain or snowfall occurs, bighorn sheep expand their use of suitable habitat and range out from permanent waters. They also commonly drink from ephemeral pools of water found in rock pockets (Bighorn Sheep Core Team 2006).

Bighorn sheep may be found on the eastern portion of the Pakoon Allotment, in and near the Grand Wash Cliffs. Desert bighorn sheep habitat has been identified from habitat analysis that evaluates a combination of slope, topography, aspect, vegetation, proximity to escape cover, and water availability. To escape predators, bighorn sheep prefer rough, rocky terrain with slopes greater than 20%, as is found in and near the Grand Wash Cliffs. Bighorn sheep likely obtain some of the moisture they need from succulent vegetation. During the hot summer months, the sheep stay in shaded areas

near water as much as possible and are seldom found more than three miles from dependable water sources. When rain or snowfall occurs, bighorn sheep expand their use of suitable habitat and range out from permanent waters. They also commonly drink from ephemeral pools of water found in rock pockets (Bighorn Sheep Core Team 2006). These allotments are within the Pakoon Wildlife Habitat Area (WHA), allocated for desert bighorn sheep.

9. Riparian/Fisheries Habitat

Pakoon Springs is the largest riparian area within Grand Canyon-Parashant National Monument. The Pakoon Springs complex delivers 90 gallons of water per minute. For at least the last century, these springs have been developed and modified to provide water for livestock, agricultural irrigation, and domestic use. The spring sources were dug out and a series of five ponds was created. Many non-native plants and animals were introduced, including an alligator, bullfrogs and mosquito fish. In November 2002, the United States accepted title to the Pakoon Springs Ranch (240 acres) through a donation by the Conservation Fund. In 2005, clean up and rehabilitation of the springs was initiated. All but one pond has been filled in and riparian vegetation has been transplanted onto the new spring mounds. The area being wetted has been increased to approximately 10 acres, which is now covered with riparian vegetation. Pakoon Wash, previously ephemeral, now contains approximately one mile of perennial flow. Rehabilitation efforts are ongoing, as are attempts to eradicate the bullfrogs, mosquito fish, and non-native invasive plant species. Once the work is completed, the feasibility of translocating native species will be evaluated. Some species being considered include speckled dace, Grand Wash spring snails, relict leopard frogs, and muskrats. As the area of riparian habitat expands, it may become suitable for southwestern willow flycatchers. This is the only major riparian area on the Pakoon Springs and the Pakoon Allotments. Its functioning condition is not rated as yet, and will be rated once the restoration work has been completed.

There are two additional spring sites within the allotments: Ed Spring and Burro Spring. The riparian area at each spring was evaluated on September 21, 2011. Burro Spring is dry. Historic documents show there has been no surface and subsurface flow since 1986. The causal factor is unknown. Salt cedar was present but has since been removed and is being monitored. The functioning condition of Ed Springs was rated as unknown since no surface water is currently present. Burro trails to the spring indicate possible seasonal surface water. It does have one large *Tamarix ssp.*and a *Vitis ssp.* growing at the site. Both appear to be healthy which indicates some amount of subsurface water. We have no historic documents showing surface flow.

10. Wild Horse and Burro Habitat

This allotment is outside of any herd management area. However, burros do occur in the area – in spring 2008, eight burros were observed on the uplands east of Pakoon Springs. Burros have been observed at other times as well.

C. Information and/or Data Pertaining to Issues (from III.C.1.)

1. Issues relating to Rangeland Health and Guidelines for Grazing Administration.

a. Invasive non-native species may be causing a decrease in perennial vegetation. (Both Pakoon and Pakoon Springs Allotments)

The most significant invasion in the region is the expansion and dominance of exotic annual grasses including red brome (*Bromus rubens)* and cheatgrass (*Bromus tectorum*). Red brome, a typical Mediterranean winter annual, and cheatgrass (originally from southwestern Asia) are prolific seed producers and tend to germinate under cool, moist conditions typical of this region and can germinate with as little as 0.5 inch of precipitation. Monitoring studies conducted since 1982 do not indicate a decrease in perennial vegetation based on the expansion alone of invasive non-native species. According to Reid et. al. (2008), red brome was first reported in northern Arizona in 1911. By the 1960s, red brome dominated even relatively undisturbed areas of Nevada, Utah, and Arizona. Cheatgrass is found in most of the western states having reached its range of current distribution by 1930 (Mack 1981). A survey of 11 western states showed that cheatgrass was present on at least 60 million acres (Pellant 1996).

Red brome and cheatgrass significantly change ecosystem processes. They compete with native species, particularly native annuals for ground surface, soil moisture, and nutrients, but they mostly alter fire regimes and native plant regeneration patterns. These species' propensity to carry fires represents a real threat to Joshua trees, cacti and other native Mojave Desert plants, which are not fire adapted.

During wet winters, annual grasses grow under shrubs and fill the interspaces between shrubs sequestering moisture and nutrients, creating fine fuels that enable wildfires to spread killing desert vegetation, and changing the fire frequency. Fire frequency in the desert community is very long (historically), possibly over 100 years. Expansion of the fine fuels increases the fire frequency to only a few years, resulting in the elimination of native perennial vegetation, which cannot survive the frequent and widespread wildfires.

b. The impact area around livestock waters may be increasing and/or may already be in an unacceptable vegetation condition (lack of species/structural diversity). (Both Pakoon and Pakoon Springs Allotments)

The area immediately surrounding livestock waters is subject to trampling and soil compaction from livestock concentration. At these sites there is a reduced density and abundance of vegetation.

c. Livestock water lot(s) are not accessible to wildlife on Middle Spring pipeline, at Middle Well and Upper Well. (Both Pakoon and Pakoons Springs Allotment)

Pakoon Springs Allotment has one non-functioning well. It has three reservoirs currently not catching and holding water. One of those reservoirs is fenced but has acess points for wildlife. In addition, there is one pipeline from Middle Spring, which is part of the Mosby-Nay Allotment that extends into the Bench Pasture of the Pakoon Springs Allotment that feeds two troughs and one reservoir. The two troughs are unfenced. The reservoir is fenced and is accessable to wildlife. Also, water in the reservoir overflows outside the fenced area.

The wells in the Pakoon Allotment are pumped when livestock are using the allotment, which is from late November to late May. The status of each well in the Pakoon Allotment is as follows:

- Lower Well has a trough located inside the fenced corral. The corral's gate is always open.
- Middle Well has a trough located inside the fenced corral. The corral's gate is always open. It also has a pipeline which runs to a storage tank and unfenced second trough.
- Upper Well has water distribution pipelines to three unfenced water troughs.

The Pakoon Allotment has one reservoir which is fenced but the fence is in a state of disrepair and the gate is open.

d. Springs may be dewatered, not providing wildlife water or riparian vegetation potential. (Pakoon Springs Allotment)

Within the boundary of both allotments, where livestock grazing is authorized, there are no functioning springs. There are three springs in that portion of the Pakoon Springs Allotment that is not authorized for livestock grazing. Pakoon Springs is the only major riparian area. Its functioning condition is not rated as yet, and will be rated once the restoration work has been completed. There are two additional spring sites (Ed and Burro) that were evaluated on September 21, 2011. Burro Spring is dry. Historic documents show there has been no surface and subsurface flow since 1986. The causal factor is unknown. *Tamarix ssp.* was present; however, it has since been removed and is being monitored. The functioning condition of Ed Spring was evaluated as unknown since no surface water is present. It does have one large *Tamarix ssp.* and a grapevine growing at the site. Both appear to be healthy which indicates some amount of subsurface water. We have no historic documents showing surface flow.

e. Excessive erosion is occurring in areas where there is a lack of cover relating to unnatural fire return interval. (Both Pakoon and Pakoon Springs Allotments)

Wildfires have burned several times over the past 30 years on both allotments. The areas burned during 2005 and 2006 are the ones that have created the most concern, though all areas burned in the past have not fully recovered vegetatively. Fires burned approximately 6,007 acres in the Pakoon Springs Allotment in 2005 and 1,420 acres in 2006. In the Pakoon Allotment, there were 10,619 acres burned during 2005 and 817 acres during 2006. Of the areas that were burned, only one area did not meet Standard 1 (Upland Sites), the Tank fire area in the Pakoon Allotment that burned 9,254 acres during 2005.

f. Large area not meeting Standard #1. (Pakoon Allotment)

The many fires in the past 30 years have initiated a "grass-fire cycle," in which fire promotes resurgence of exotic annual grasses that fuel the fire to create a frequent-fire regime in areas where fire was historically infrequent. Some areas have burned more than once and appear to have been converted from desert scrub to annual grassland, with exotics dominating the landscape between scattered native perennials. While once-burned areas often show signs of native species recovery, areas with multiple burns typically show little natural recovery. Soils in the area are shallow with limited precipitation and many plant species are fire-susceptible with infrequent regenerating native desert species. Repeated wildfires are depleting the native plant seed banks, which are resulting in years to possible millennia for the area to recover. According to Haines et al. (2003), "Annual exotic grasslands may require significant environmental changes for transition reversal to occur, and the transition from desert scrub to annual grassland may be irreversible under the current climatic regime."

In the Pakoon Allotment, the Tank fire of 2005 burned 9,254 acres of which 950 acres was determined not to be meeting Standard #1. These soils are shallow and have burned several times during the past 30 years with wildfires in the same vicinity during the years of 1980, 1981, 1983, 1988, 1991, 1992, 1993, 1995, 1996, 1999, and 2005. Standard #1 evaluates soils and abnormal erosional rates. Live basal vegetation, litter, cryptograms and rock ground cover help to restore natural erosion rates. Rock cannot be controlled by short term land management decisions, but live basal vegetation and litter can. In order to meet standard #1, the site must recover or make progress towards recovering vegetatively. This is the case on post fire sites. In order to achieve vegetative recovery following a fire, the BLM will form an ID Team which will include an employee of the USFWS. This team will determine (based on severity, size and location of the fire) whether deferment of livestock grazing for a minimum of two growing seasons is needed. If needed, following the second growing season, the ID Team will reevaluate if standard #1 is being met or progressing towards meeting and if livestock can return to the area.

g. Desert tortoise populations are still declining. (Both Pakoon and Pakoon Springs Allotments)

The recovery program for the Mojave population of the desert tortoise requires range-wide, long-term monitoring to determine whether recovery goals are met. Monitoring of this species has been occurring for many years. Before the tortoise was listed, populations were monitored either using strip transects (where indications of tortoise presence – live or dead tortoises, scats, burrows, or tracks – were converted to estimates of abundance based on transects conducted in areas of better-known tortoise density) or by using capture-recapture population estimates on a limited number of (usually) 1 square mile study plots. Although data have continued to be collected on transects and study plots in recent years, both methods suffer statistical deficiencies and logistical constraints that render them unsuited for monitoring trends in abundance applicable either range-wide or to individual recovery units (USFWS 2010b).

In 1999 the Desert Tortoise Management Oversight Group endorsed the use of line distance sampling for estimating range-wide desert tortoise density, and this methodology began to be used in 2001 (Buckland et al., 2001). Distance sampling methods use measurements taken from the center of the transect lines to tortoises to model detection as a function of distance from the path walked by sampling personnel. Density estimates from any brief window of time would be expected to detect only catastrophic declines or remarkable population increases. Therefore, the first five years of this monitoring (2001-2005) were not to document trends, but to gather information on baseline densities and year-to-year recovery unit to recovery unit variability. In 2001, five live animals and nine carcasses were observed within the Gold Butte-Pakoon sampling area (which did not include transects within these two allotments). In 2002, no live tortoises were encountered while two carcasses were observed (again, the sampling area did not include transects within these two allotments). In 2003, the sampling area included portions of the allotments, as well as other parts of the DWMA; ten live tortoises were encountered while 24 carcasses were observed – one of the live tortoises was found within the Pakoon Allotment. In 2004, five live tortoises were encountered and ten carcasses were observed; of these, one of the live tortoises and four of the carcasses were found within the Pakoon Allotment. In 2005, three live tortoises were encountered and six carcasses were observed; of these, two of the live tortoises and one of the carcasses were found within the Pakoon Allotment (USFWS 2006).

Monitoring efforts since 2001 (since line-distance sampling began) have generated the following data (shown in Table 14) to facilitate density estimates (USFWS 2009; USFWS 2010b; USFWS 2010c).

Table 14. Gold Butte-Pakoon Desert Tortoise Monitoring Results

Year	Area Monitored	Sampling Dates	# of live tortoises observed*	Density (per km^2)	
				Gold Butte-Pakoon	NE Recovery Unit
2001	1,603 km^2	May 10 – June 22	5/0**	1.2	2.4
2002	Data not provided	April 24 – April 25	0/0**	---	None calculated
2003	162 km^2	April 30 – June 17	10/1	1.8	3.7
2004	1,923 km^2	April 21 – May 19	5/1	0.7	1.2
2005	1,977 km^2	April 12 – June 7	3/2	0.2	1.8
2006	Not monitored				
2007	1,977 km^2	April 17 – May 29	4/0	1.2	1.7
2008	1,977 km^2	April 13 – May 16	0	0**	0.9
2009	1,977 km^2	April 27 – May 30	8/0	2.2	3.4
2010	1,977 km^2	April 7 – April 22	22/1***	1.8	3.2

* First number represents total number across the entire DWMA; second number represents number associated with the Pakoon Springs and Pakoon Allotments.

** No sampling occurred in either allotment.

*** In portion of allotment unavailable for grazing.

Results from the line distance sampling effort listed tortoise populations in the area as low. Density estimates from the monitoring are lower than estimates from earlier studies (Luckenbach 1982, Berry 1984). Precise comparisons cannot be made because the historical monitoring efforts were conducted using different techniques at different scales and with different goals. At this time, the data collected is only statistically valid at the recovery unit level. While annual estimates may be imprecise (due to a variety of factors such as vegetation that differentially obscures vision with distance, or different detection protocols used by individual crews), over a period of years any underlying trend in the number of tortoises should be obvious (USFWS 2010b).

h. Restoration project at Pakoon Springs, fencing and reconfiguration of allotment boundaries. (Pakoon Springs Allotment)

The Pakoon Springs riparian area was private land up until a few years ago when the land was purchased by the Conservation Fund and subsequently transferred to the BLM. Since then, efforts have been made to restore the riparian function that was lost due to water diversions over the past century.

The RMP did not authorize livestock grazing in the Pakoon Springs riparian and surrounding areas. As such, in order to keep livestock out of the area

where grazing is not authorized, new boundary fences are being built as funding permits. At this time, about half of the boundary fence is built and a cattleguard has been installed just north of the Pakoon Springs riparian area. Materials for the other half of the fence have been purchased and a request to secure funding to construct the fence has been made.

i. Burros are still there. (Both Pakoon and Pakoon Springs Allotments)

Both allotments are outside of the herd management area but burros have been seen in both allotments. The appropriate management level for the adjacent herd management area is set at zero for wild burros.

j. Unburned areas - Mohave Desert Initiative - DPC objective development. (Both Pakoon and Pakoon Springs Allotments)

Several areas of the Mojave Desert Ecological Zone within these allotments have not been burned by wildfires. The main goals of the Mojave Desert Initiative are to protect unburned Mojave Desert vegetation and reduce re-burning, and restore strategically located islands, key habitat areas, and corridors. Strategies to meet these goals are currently being developed.

k. Current season of use authorizes grazing until May 15 which is into the tortoise active period beginning March 15. (Both Pakoon and Pakoon Springs Allotments)

In 1988, the BLM issued a habitat management plan for conservation of desert tortoise on public lands. This plan grouped desert tortoise habitat into three categories. The Pakoon Allotment contained both Category II and Category III habitat. Approximately 8,000 acres were considered Category II habitat, which would receive only seasonal grazing (October 15 – March 15). The remainder of the allotment was category III with no seasonal restrictions. Since the early 1990s the permittees have been operating as such. On June 28, 1994 the original Desert Tortoise (Mojave Population) Recovery Plan was approved. This plan eliminated the category designations. The proposed critical habitat rule had been published but not finalized when the 1994 Recovery Plan was finished. The 1994 Recovery Plan referred to the desert tortoise habitat as proposed critical habitat. During the land health evaluation process, the USFWS stated that the season of use on the entire Pakoon Allotment should be changed to avoid grazing during the active season of the desert tortoise and a seasonal restriction be implemented on the two available pastures of the Pakoon Springs Allotment now incorporated into the Mosby-Nay Allotment. They also recommended instituting a pasture rotation system in the Pakoon Allotment to ensure adequate rest of tortoise habitat.

V. Conclusions

A. Pertaining to Objectives

1. Land Use Plan Objectives

Grand Canyon – Parashant National Monument RMP[9]

Water

DFC-RP-06
All surface water will meet, or be improving towards, Arizona State water quality standards.

DFC-WS-03
Surface water availability at seeps and springs will be appropriate for the soil type, climate, and landform.

These objectives are being met. Burro Spring is dry and Ed Spring appears to only have subsurface water flow; the IAT team does not believe it has the potential for surface flow. As described on page 55 of this evaluation report, Pakoon Springs delivers 90 gallons of water per minute. No water quality testing has been done at the spring, but site visits to the spring area do not indicate issues with water quality.

Soil Stability

DFC-VM-04 (Vegetation – All Ecological Zones)
Vegetative communities will provide sufficient plant cover and litter accumulation to protect soils from wind and water erosion and enhance nutrient cycling and productivity, even during drought years.

DFC-WS-06
The natural hydrologic functions of all watersheds will be intact.

DFC-WS-07
Soils will exhibit infiltration, permeability, and erosion rates appropriate for the soil type, climate, and landform.

DFC-WS-08
Physical soil crusts will show an increase in organic cover including cryptobiotic colonies, moving them towards being organic crusts.

These objectives are mostly being met. Soil and watershed function are at acceptable levels. See Section IV.B.5 of this evaluation report (Lithology and Soils) – the exception to this is the steep side slopes of about 950 acres of truncated alluvial

[9] Similar RMP objectives have been grouped together with one conclusion per grouping.

fans near the mouth of Grand Gulch Canyon. Erosion is occurring in some areas where a recent fire burned off all the litter and vegetation. In a 2011 site visit, many of these eroding areas have been stabilized by annuals. To assess the increase/decrease of cryptobiotic colonies, photo plots could be established at colony sites in conjunction with the grazing trend studies. There are scattered thick colonies in the allotment, but they are thin in most areas. An increase in such colonies would be very slow in the desert environment, even under protected conditions. In addition, there is no information on how thick the colonies were in the past.

Ecological Processes

DFC-VM-05 (Vegetation – All Ecological Zones)
Ecological processes and functions will be protected, enhanced, and/or restored by allowing tools that are necessary and appropriate to mitigate adverse impacts of allowable uses and undesirable disturbances, and contribute to meeting the Standards for Rangeland Health and NPS Vital Signs and enhance Monument values.

DFC-RP-02
Riparian areas will be protected, enhanced, and/or restored by allowing tools that are necessary and appropriate to mitigate adverse impacts of allowable uses and undesirable disturbances, and contribute to meeting the Arizona Standards for Rangeland Health, NPS Vital Signs, and enhance Monument objects and values.

DFC-RP-03
Ecological functions and processes will be intact with vegetative species composition and cover appropriate to the site.

DFC-WS-04
Ecological functions and processes will be intact at all seeps and springs.

DFC-WF-01
Ecological conditions will be within the range of natural variability and will be functional for dependant animal species.

DFC-WF-12
The natural biological diversity of fish, wildlife, and plant species will be maintained or, where necessary and feasible, restored throughout the Monument. Habitats will be managed on an ecosystem basis, ensuring that all parts of the ecosystem and natural processes are functional.

Site visits to the allotments determined that soils are within normal parameters, or are making significant progress toward functioning properly. One exception is an area of about 950 acres of truncated alluvial fans on the Pakoon Allotment, near the mouth of the Grand Gulch Canyon, which was impacted by the 2005 wildfire and where erosion is occurring on the steep side-slopes of these alluvial fans. This area has burned several times in the past. The Pakoon Springs Allotment has not been grazed since 1999, so those areas that were burned during the 2005 and 2006

wildfires have been rested from grazing. Plant communities that include native shrubs, perennial grasses, and annual forbs are present and areas that have been burned by wildfire appear to be slowly recovering. As described on page 55 of this evaluation report, rehabilitation and restoration of Pakoon Springs has been occurring since 2005. All but one pond has been filled in and riparian vegetation has been transplanted onto the new spring mounds. The area being wetted has been increased to approximately 10 acres, which is now covered with riparian vegetation. Pakoon Wash, previously ephemeral, now contains approximately one mile of perennial flow. Attempts to eradicate bullfrogs, mosquito fish, and non-native invasive plant species are also occurring, and the feasibility of translocating native species (such as speckled dace, Grand Wash spring snails, and relict leopard frogs) will be evaluated once restoration efforts are complete. Progress toward meeting these objectives is therefore occurring.

Invasive Plants

DFC-VM-06 (Vegetation – All Ecological Zones)
Invasive plant species will be contained, controlled, or eliminated and native species restored to meet desired plant community (DPC) objectives.

DFC-RP-11
Invasive plants and animals such as tamarisk, Russian olive, and brown-headed cowbird will be reduced or eliminated.

DFC-VM-38 (Vegetation – Mojave-Great Basin Transition Ecological Zone)
Management of Mohave-Great Basin Transition Ecological Zone plant communities will focus on removing invasive non-native plants, especially cheatgrass, Sahara mustard, and red brome, and preventing habitat degradation due to wildfire.

These objectives are being met to the extent feasible. Invasive plant species are monitored and treated as resources allow. Invasive plant species (i.e., red brome, cheatgrass and Sahara mustard) occur over a broad area in unburned areas even during wet years; this was the case in 2005, an extremely wet year. However, on normal to dry years such as 2006, 2007, 2008, 2009 and 2010 (see precipitation data in Appendix F), little red brome, cheatgrass or Sahara mustard grew in those unburned areas. This is not the case in burned areas where invasive species occur during both wet and dry years. The BLM is considering proposals to test ways to control some invasive species such as cheatgrass and red brome. Two of these proposals are green stripping roads and using a pre-emergent herbicide specifically targeting brome species. The intent would be to create firebreaks thus breaking up the area into smaller units. If a fire were to occur in one unit it would hopefully stay contained in that smaller unit thus extending the fire return interval in the other units. This will hopefully allow more time for native vegetation to return to these burned areas and compete with the invasive species. Also, research continues trying to find ways to establish native vegetation in burned areas that will out compete the invasive species.

No Net Loss

DFC-VM-32 (Vegetation – Mojave Desert Ecological Zone)
There will be no net loss of acres of Mohave Desert plant communities (i.e., long-term or permanent removal from the landscape). A no net loss objective will not preclude restoration, rehabilitation, or related management actions.

DFC-VM-37 (Vegetation – Mojave-Great Basin Transition Ecological Zone)
There will be no net loss in acres of Transition plant communities (i.e., long-term or permanent removal from the landscape). A no net loss objective will not preclude restoration, rehabilitation, or related management actions.

These objectives are being met to the extent feasible. The BLM is actively participating in the Mojave Desert Initiative (a multi-agency consortium with representatives from the BLM, USFWS, National Park Service, and State wildlife agencies from Nevada, Arizona and Utah) to find solutions for the growing number of large fires and exotic invasive species in the Mojave Desert in order to protect remaining unburned Mojave Desert vegetation and reduce reburning to prevent habitat conversion to non-native annual grasslands.

Livestock Grazing

DFC-GM-02
Livestock use and associated management practices will be conducted in a manner consistent with other resource needs and objectives to ensure that the health of rangeland resources is preserved or improved so that they are productive for all rangeland values. Where needed, public rangeland ecosystems will be improved to meet objectives.

DFC-GM-04
Monument values will be maintained, protected, and improved.

These objectives are being met to the extent possible. As indicated in Table 13 of this assessment, the ecological status of key areas that are unburned have a high similarity index to PNC (except for Key Area #3 in Pakoon Springs Allotment, which is in mid-seral). As shown in the data, particularly Key Areas #1 and #2 in the Pakoon Springs Allotment, following fires in1980 the key areas were recovering with grazing occurring until the drought of 2002 coupled with the fires of 2005. This indicates that fire is the primary causal factor of areas not meeting DPC objectives. This is also supported in unburned Key Areas #1 and #2 of the Pakoon Allotment where trend is up with grazing still occurring. This data suggests that it is the effects of wildfire that are the causal factor for those areas of a low similarity index, not livestock grazing.

DPC objectives were developed for these allotments to maintain and/or improve ecological condition, as well as to ensure habitat constituents for desert tortoises and other Mojave Desert species are provided. Implementing these DPC objectives in conjunction with efforts to lengthen fire return intervals and reduce large fire occurrences through fire suppression and the Mojave Desert Initiative research will allow rangeland resources (including monument objects and values such as special

status species, wildlife habitat, native vegetation, watershed function, and soil productivity) to be maintained, protected, and/or improved. Livestock grazing (i.e., season of use, utilization levels, etc.) is managed to maintain or improve the ecological condition of the allotment and protect monument values. Although managed livestock grazing cannot entirely eliminate the fine fuel loads, it can serve as a tool in achieving this objective by reducing the fine fuel loads that feed large fire events.

In the event of a fire, the BLM will form an ID Team which will include an employee of the USFWS. This team will determine (based on severity, size and location of the fire) whether deferment of livestock grazing for a minimum of two growing seasons is needed. If needed, following the second growing season of deferment, the ID Team will reevaluate if standards are being met or progressing towards meeting and if livestock can return to the area.

Desired Plant Community

DFC-GM-01
Healthy, sustainable rangeland ecosystems will be maintained or improved to meet Arizona's Standards for Rangeland Health and Vital Sign Standards on NPS-administered lands, and produce a wide range of public values such as wildlife habitat, livestock forage, recreation opportunities, clean water, and functional watersheds.

DFC-VM-03 (Vegetation – All Ecological Zones)
Native vegetative communities will be protected. A mosaic of native perennial and non-invasive annual vegetative communities will be present across the landscape with diversity of species, canopy, density, and age class reflecting its local ecological site potential and naturally occurring habitat conditions.

DFC-VM-30 (Vegetation – Mojave Desert Ecological Zone)
Endemic plant species and associated communities such as creosote bush, Joshua tree, Mojave yucca and cacti, will be present along with other shrubs, grasses, and wildflowers. These communities can include stands of young and old shrubs, sparse vegetation, scattered to larger expanses of creosote bush or Joshua trees, seeps, healthy streamside (riparian) vegetation, and other interspersed grassland and shrub habitats.

DFC-VM-34 (Vegetation – Mojave-Great Basin Transition Ecological Zone)
Endemic plant species and associated communities such as black brush, Joshua tree, Mojave yucca, and cacti will be present along with other shrubs, grasses, and wildflowers. These communities can include stands of young and old shrubs, sparse vegetation, scattered to larger expanses of black brush to various mixes of black brush, Joshua trees, pinyon-juniper, yucca, and shrub habitats.

DFC-VM-36 (Vegetation – Mojave-Great Basin Transition Ecological Zone)
Priority plant species and associated communities such as black brush, Joshua tree, Mojave yucca, and cacti will be present along with other shrubs, grasses, and

wildflowers. These communities can include stands of young and old shrubs, sparse vegetation, scattered to larger expanses of black brush to various mixes of black brush, Joshua trees, pinyon-juniper, yucca, and shrub habitats.

DFC-RP-01
Riparian areas, including Monument objects, will consist of a diversity of vertical and horizontal structures, vegetative age classes, and endemic species.

These objectives are partially being met. Four key areas are meeting or making significant progress toward meeting Standard 3. Three key areas are not yet fully meeting Standard 3 due to the lack of the shrub functional group as they are recovering from past wildfire. These three key areas are Pakoon Springs #1 and #2 and Pakoon #3. Also, an area of 6,300 acres on the Pakoon Allotment is not meeting Standard 3 due to recent wildfires. Major wildfires have affected both allotments over the past 20 or so years, which have affected both plant and animal resources. Even so, the allotments provide habitat for a diversity of wildlife (including avian species, reptiles, and large and small mammals), provide forage for livestock and provide recreation opportunities. Once an area has burned, there is a greater potential for the area to burn again, which is the case for most of the area that was burned in the past. As such, past burned areas contain a variety of vegetative age classes. Areas that have burned will take many years to recover. Communities of healthy diverse habitat including vertical and horizontal structures, vegetative age classes, and endemic species are present throughout the unburned portions of the allotments, and every effort to maintain them is being deployed. The DPC objectives for these allotments have been developed to maintain and/or enhance these public values, including providing the primary constituent habitat elements for desert tortoise (see discussion under "Threatened and Endangered Species Habitat" on pages 70-72).

Riparian

DFC-RP-04
Where sites have the potential for over-story vegetation, the canopy cover of over-story and under-story vegetation will be at or approaching maximum density.

DFC-RP-05
All riparian areas will be in, or moving towards, proper functioning condition.

DFC-RP-07
Flowing water systems will provide contiguous water and associated riparian vegetative cover, where possible.

DFC-RP-08
Availability of surface water at seeps and springs will be appropriate for the soil type, climate, and landform and will support a diverse population of endemic plant and wildlife species.

DFC-RP-10

Riparian communities will provide habitat for common species such as rush, cottonwood, willow, and yellow-breasted chat, as well as rare species such as southwestern willow (SW) flycatcher, common black hawk, Lucy's warbler, and speckled dace where consistent with site potential.

DFC-WS-05
Flowing water systems will provide continuous flowing water and associated riparian vegetative cover, where possible.

DFC-TE-15
Essential habitats, important migration routes, required flows, and water quality will be protected and maintained in lentic and lotic systems in the Monument.

DFC-TE-24
Riparian areas will be in proper functioning condition and be of sufficient quantity and quality to provide adequate foraging areas for bald eagles, peregrine falcon, common black hawk, and other special status raptors.

DFC-TE-31
Riparian areas will be in proper functioning condition and be of sufficient quantity and quality to provide adequate foraging areas for SW flycatcher, Yuma clapper rail, yellow-billed cuckoo, and other special status birds.

DFC-TE-33
Riparian areas that can physically support SW flycatcher habitats due to floodplain width and gradient will attain the vegetation structure, plant species diversity, density, and canopy cover to be suitable habitat.

DFC-TE-34
Riparian vegetation will be sufficiently dense and structurally complex to minimize or eliminate the effects of SW flycatcher predators and preclude brown-headed cowbirds from finding SW flycatcher nests.

DFC-TE-35
Cottonwood gallery forests will be abundant and provide habitat for yellow-billed cuckoos.

DFC-TE-36
Potential roosting and nesting sites for riparian dependent special status birds will be abundant.

Progress is being made toward meeting these objectives. The Pakoon Springs riparian area was on private land until a few years ago when the land was purchased by the Conservation Fund and subsequently transferred to the BLM. Since then, efforts have been undertaken (and are currently ongoing) to restore the riparian function that was lost due to water diversions over the past century. To date, great strides have been made in this undertaking. Some riparian obligate birds such as the yellow warbler occur at Pakoon Springs. However, the area is probably not of

sufficient size and too far from other riparian areas to host all the riparian species listed in the above objectives.

Ed and Burro Springs have no surface water present. There is no riparian vegetative species at Burro Springs and Ed Spring has one *Tamarix ssp.* and one *Vitis ssp.* These areas do not have water or riparian vegetation to host the riparian species listed in the above objectives.

Wildlife Habitat

DFC-VM-31 (Vegetation – Mojave Desert Ecological Zone)
Endemic animal species such as desert tortoise and chuckwalla will be present and thriving with more than adequate food, water, and cover resources.

DFC-VM-35 (Vegetation – Mojave-Great Basin Transition Ecological Zone)
Endemic animal species such as desert tortoise, chuckwalla, and desert bighorn sheep will be present and thriving with more than adequate food, water, and cover resources.

DFC-WF-02
Native wildlife communities will be protected. A complete range of diverse, healthy, and self-sustaining populations of native animal species will occupy all available suitable habitats.

These objectives are partially being met. The unburned areas, Pakoon Springs key areas #3 and #4 and Pakoon key areas #1 and #2, are meeting or making significant progress toward meeting DPC objectives. The other three key areas, Pakoon Springs #1 and #2 and Pakoon #3, are meeting or making progress toward meeting DPC objectives related to ground cover, perennial grasses and forbs. They are lacking in the shrub functional group which is largely due to fire and the presence of invasive brome species. Thus, the primary shrub constituent habitat element for desert tortoises is not provided in the burned areas but is making progress toward meeting, and will continue to do so if fire can be kept from returning to the sites. In addition, livestock currently graze in the Pakoon Allotment into mid-May, which creates competition for spring plant growth that is important for the desert tortoise and other Mojave Desert wildlife species.

Habitat Connectivity

DFC-WF-06
Habitat connectivity and wildlife movement between ecological zones will be maintained.

DFC-TE-14
Habitat connectivity will be maintained, providing sufficiently frequent contact between tortoises to maintain genetic diversity.

The repeated wildfires within these allotments have eliminated some potential connectivity, especially to the north, for tortoises and other small wildlife species until large shrubs can be restored to the area in a sufficient number. Although desert tortoises may wander up to 1.5 miles at a time, if there is a lack of sufficient shade cover, individuals who may already be sparsely distributed and in low numbers may not have the opportunity to interact and mate and may die if there is not sufficient cover/shade. Within unburned portions of the allotments, there are no known barriers to wildlife movement.

Fences

DFC-WF-05
Fences will be the minimum necessary for effective livestock control or other administrative purposes. Fences will be wildlife passable, consistent with the species found in the area.
DFC-WF-20
All fences in mule deer habitat will be deer passable.

These objectives are being met. No issues have been identified on these allotments regarding unsafe wildlife fences. Should wildlife safety issues be identified, fence modification will occur as funding allows.

Healthy Wildlife Populations

DFC-WF-03
Forage, water, cover, and space will be available to wildlife of sufficient quantity and quality to support productive and diverse wildlife populations.

DFC-WF-13
Mule deer habitat will provide the necessary forage, water, and shelter components for healthy, self-sustaining populations within the range of natural variability.

DFC-WF-28
Desert bighorn habitat will provide the necessary forage, water, and shelter components for healthy, self-sustaining populations within the range of natural variability.

DFC-WF-35
Desert cottontail habitat will provide the necessary forage, water, and shelter components for healthy, self-sustaining populations within the range of natural variability.

DFC-WF-37
Migratory bird habitats will provide the necessary forage, water, and shelter components for healthy, self-sustaining populations within the range of natural variability.

DFC-WF-45

Carnivore habitat will provide the necessary forage, water, and shelter components for healthy, self-sustaining populations within the range of natural variability.

These objectives are being met in areas that have not been burned. The BLM is progressing towards meeting these objectives in burned sites. Sustainability needs (such as forage, cover, and shelter) for wildlife including mule deer, migratory birds, and carnivores were taken into consideration when the DPC objectives for these allotments were developed and were incorporated into these objectives. Wildlife waters are inspected by the BLM and AGFD and maintained/repaired as funding allows. Wildlife population and habitat monitoring will continue. Impacts to wildlife (including mule deer, migratory birds, and carnivores) and their sustainability needs are taken into consideration and analyzed during all project-level planning in order to minimize impacts from proposed activities.

Wildlife Population Numbers

DFC-WF-14
On BLM administered lands, mule deer populations will be at or near maximum levels sustainable for the habitat.

DFC-WF-29
On BLM administered lands, desert bighorn sheep populations will be at or near maximum levels sustainable for the habitat.

DFC-WF-36
Desert cottontail rabbits will be present in sufficient quantity to provide an adequate prey base for raptors, carnivores, and other predatory species, as well as ample recreational opportunities for hunting and wildlife viewing.

DFC-WF-38
Migratory birds that nest in the Monument will have resources of sufficient quantity and quality to provide for nesting sites and to fledge young successfully.

The BLM is working to meet these objectives. Sustainability needs such as forage, cover, shelter, and nesting sites, for mule deer, bighorn sheep, desert cottontail rabbits, migratory birds, and other wildlife species have been taken into consideration when developing the DPC objectives for these allotments and were incorporated into these objectives. These objectives provide for sufficient plant cover and litter accumulation to protect soils from wind and water erosion, encouraging nutrient cycling and productivity.

Wildlife Waters

DFC-WF-04
All waters will be safely accessible to wildlife.

DFC-WF-18

Water sources within mule deer habitat will be safely accessible to deer and other wildlife.

DFC-WF-19
On BLM administered lands, water sources within mule deer habitat will be spaced no more than 3 miles apart.

DFC-WF-31
Water sources within bighorn sheep habitat areas will be safely accessible to bighorn and other wildlife.

DFC-WF-32
On BLM administered lands, water sources within bighorn sheep habitat will be spaced no more than 4 miles apart.

DFC-WF-43
Water sources within game bird habitats will be safely accessible by all wildlife.

DFC-RP-09
A sufficient quantity of water with safe access for wildlife will be available, where appropriate.

These objectives are all being met. The BLM is working with AGFD to ensure that sufficient water sources within big game habitat are available. Wildlife and livestock water catchments are inspected and repaired/maintained as funding allows; those found to be hazardous to wildlife are modified.

Threatened and Endangered Species Habitat

DFC-TE-03
The Monument will provide a block of remote, contiguous habitat that will serve as refugia for populations of special status species.

DFC-TE-13
Desert tortoise habitat will provide sufficient forage and cover attributes to support thriving populations of the species.

DFC-TE-21
Habitat areas for special status raptors will provide sufficient forage and cover attributes to support thriving populations of the species.

DFC-TE-23
Potential roosting and nesting sites (for special status raptors) will be abundant.

These objectives are partially being met. Fires have burned much of these allotments, which are designated critical habitat for the Mojave desert tortoise. The BLM is making efforts to restore these burned landscapes. As described previously, the BLM is actively participating in the Mojave Desert Initiative in an effort to

protect unburned Mojave Desert vegetation and reduce reburning to prevent habitat conversion to non-native annual grasslands.

The primary constituent elements (PCE) for the desert tortoise are addressed below.

PCE 1: Sufficient space to support viable populations within each of the six recovery units and to provide for movement, dispersal, and gene flow.

These allotments contain nearly 92,000 acres of critical habitat which is contiguous with habitat located in Nevada (Gold Butte) allowing for movement, dispersal, and gene flow.

PCE 2: Sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species.

As stated above on p. 25-27 these species are present in the key areas (Tables 5-11). Wildfires and invasion of non-native species adversely affect this PCE by altering habitat structure and species available as food plants.

PCE 3: Suitable substrates for burrowing, nesting, and overwintering.
PCE 4: Burrows, caliche caves, and other shelter sites.

It was determined during the 1991 monitoring effort in the Pakoon Allotment that caliche caves were plentiful but soil burrows were scarce. Throughout much of the study site, there was only a shallow substrate of soil over a solid substrate of caliche. Therefore, soil burrows where tortoises can lay eggs at a proper depth were thought to be a limiting resource (Bashor 1991).

PCE 5: Sufficient vegetation for shelter from temperature extremes and predators.

Important shelter plants such as creosote bush, blackbrush, and bursage are found at key areas in the allotments and are plentiful throughout the area in unburned areas. Wildfires have reduced shrub cover on nearly 19,000 acres in the allotments over the last 30 years. These areas have been slow to recover and the occurrence of future wildfires would further reduce shrub cover available to tortoises.

PCE 6: Habitat protected from disturbance and human-caused mortality.

The GCPNM RMP has resulted in the implementation of management actions and conservation measures that are likely to reduce the disturbance and human-caused mortality of desert tortoises. For example, the plan resulted in the designation of open routes of travel and the legal closure (and, in some cases, physical closure) of unauthorized routes. The area is patrolled for illegal activity but the amount of illegal take of tortoises within the allotments is unknown.

Quantity and quality of habitat for special status species are taken into consideration for all project-level planning, including applications for new trails, roads, or projects that bisect contiguous habitat and/or may affect the habitat needs for these species.

Sustainability needs such as prey items, forage, cover, roosting and nesting sites, and quantity of suitable habitat for special status raptors and riparian-dependent special status bird species have also been taken into consideration when developing the DPC objectives for these allotments. All of these factors will contribute toward providing (i.e., maintaining or developing) habitat constituents for listed species.

Healthy Threatened and Endangered Populations

DFC-TE-11
Desert tortoise populations within the DWMAs will be healthy and self-sustaining. Populations will be stable or increasing. Population declines will be halted.

DFC-TE-12
Desert tortoise populations outside of the WHA will be healthy and stable. Impacts to the population of the WHA will be minimized to the extent possible through mitigation.

DFC-TE-20
Special status raptor populations will be healthy and self-sustaining throughout their range.

DFC-TE-25
Rodent populations, as a prey base (for special status raptors), within the Monument will be abundant.

These objectives are not being met on at least parts of the allotments. Wildfires have occurred in many parts of the allotments, resulting in non-native vegetation dominating the landscape and important forage and shelter plants for the desert tortoise either being not present or reduced in frequency. This lack of cover plants in burned areas may reduce interactions between individual tortoises or result in mortality if they cannot get out of the heat quickly, which would prevent an already sparsely distributed population from increasing. In addition, livestock are currently grazed in the Pakoon Allotment into mid-May, creating competition for spring plant growth which is important for desert tortoises and other wildlife species.

In unburned areas, there appears to be sufficient forage and cover for special status species. The plant communities in these areas provide a mixture of creosote, bursage, and native perennial grasses, all of which are essential to the survival of the desert tortoise. Sustainability needs such as prey items, forage, cover, roosting and nesting sites, and quantity of suitable habitat for special status species have been taken into consideration when developing the DPC objectives for these allotments and were incorporated into these objectives. Managing for these DPC objectives will facilitate wildlife population numbers (including those of special status species) maintaining or reaching levels sustainable for the habitat, to the extent possible.

No Net Loss of Threatened and Endangered Species Habitat

DFC-TE-04 and DFC-TE-08

There will be no net loss in the quality or quantity of special status species habitat throughout the Monument.

DFC-TE-10
There will be no net loss in the quality or quantity of desert tortoise habitat within WHA.

DFC-TE-16
No net loss will occur in the quality and quantity of suitable habitat for endemic amphibians and aquatic invertebrate species within the Monument.

DFC-TE-22
No net loss will occur in the quality and quantity of suitable habitat for special status raptors within the Monument.

DFC-TE-29
No net loss will occur in the quality and quantity of suitable habitat for riparian-dependent special status bird species within the Monument.

These objectives are not being met on parts of the allotments (i.e., areas that have burned). Non-native vegetation dominates the landscape which does not provide nutritious food for the desert tortoise. The presence of these invasive plants has facilitated wildfires across much of the landscape, which has in turn facilitated the increase of invasives. Depletion of forage and cover for native wildlife and livestock is the result of this cycle. In unburned areas, however, there appears to be sufficient forage and cover for special status species. The plant communities in these areas provide a mixture of creosote, bursage, and native perennial grasses, all of which are essential to the survival of the desert tortoise and other endemic Mojave Desert species.

The objectives pertaining to riparian and aquatic habitat are being met. As described previously in this assessment, there has been considerable effort to restore Pakoon Springs. This restoration project has improved the quality and quantity of habitat for native aquatic species and riparian-dependent birds. Continuing restoration efforts are expected to improve/enlarge the riparian habitat even further.

Condors

DFC-TE-27
The experimental non-essential population of California condor will be at or above 150 individuals, viable, and stable to increasing in number.

Progress toward meeting this objective is occurring. The BLM works cooperatively with the U.S. Fish and Wildlife Service, AGFD, and the Peregrine Fund to continue the highly successful California condor reintroduction program on the Arizona Strip. The BLM provides financial and in-kind assistance to this program. The condor population in Arizona as of March 2011 was 74 and has been steadily increasing.

Aquatic Habitat

DFC-TE-17
All biologically suitable perennial waters on public lands in the Monument will be occupied by thriving, self-sustaining populations of native, endemic amphibians and aquatic invertebrate species, as appropriate.

DFC-TE-18
New introduced (or re-introduced) populations of relict leopard frog will increase to the point of being viable and self-sustaining.

Progress toward meeting these objectives is occurring. As described previously, there has been considerable effort to restore and monitor Pakoon Springs riparian area. Native and non-native amphibians abound in this wetland and restoration efforts have been underway for several years to improve the habitat for native aquatic species. Efforts to eradicate nonnative bullfrogs from Pakoon Springs are continuing. Pakoon Springs is one of the target sites for introduction of the relict leopard frog, which is expected to occur once the habitat is determined suitable for this species.

Wilderness Characteristics

DFC-WC-02
Areas where wilderness characteristics will be maintained will be ecologically sustainable and resilient to natural and human-caused disturbances.

This objective is being met to the extent possible. These areas are managed to maintain the wilderness characteristics of naturalness, solitude, and opportunities for primitive recreation. A portion of the Pakoon Allotment burned in the 2005 Tank Fire, including 2,136 acres managed to maintain wilderness characteristics. In these areas, the shrub component is lacking and invasive brome species are dominant. However, native species are present and re-sprouting is occurring, which is moving the community in the desired direction although this will be difficult to attain in the future should fires continue to occur. Unburned areas contain communities of healthy diverse vegetation including vertical and horizontal structures, vegetative age classes, and endemic species (including creosote, bursage, and native perennial grasses). Every effort to control wildfires (i.e., keep unburned areas from burning, and protect areas that have already burned so that they recover over time) is being deployed in order to provide ecologically sustainable areas. In addition, wilderness characteristics are considered during all project-level planning so that these characteristics remain ecologically sustainable and resilient.

Recreation and Visitor Services

DFC-RR-01
Recreation and visitor services will be managed to provide varying levels of structured recreation opportunities that offer a range of specific benefits, activities, and experiences within outdoor settings.

DFC-RR-05
The excellent opportunities that exist to enjoy remote, rustic settings that provide moderate challenge and solitude in the Specialized TMAs will be maintained/enhanced.

DFC-RR-06
In Backways and Specialized TMAs, recreation opportunities associated with somewhat remote settings, such as exploring backcountry roads, vehicle camping, hunting, sightseeing, recreation aviation, and picnicking will be maintained/enhanced on existing roads, provided they will be compatible with the protection and enhancement of sensitive resource values, where appropriate.

DFC-RR-07
In the Primitive TMA, high quality recreation opportunities associated more with primitive recreation experience opportunities and non-motorized uses such as camping, sightseeing, hiking, horseback riding, and hunting, will be maintained/enhanced, provided they will be compatible with the protection and enhancement of sensitive resource values, where appropriate.

These objectives are being met because a variety of recreation experiences are provided to local and regional community members within this rugged and remote SRMA and the RMZ in these allotments.

Designated Wilderness

DFC-WM-01
The first and dominant goal will be to provide for the long-term protection and preservation of the areas' wilderness character under a principle of non-degradation. The areas' natural condition, opportunities for solitude, opportunities for primitive and unconfined types of recreation, and any ecological, geological, or other features of scientific, educational, scenic, or historical value present will be managed so that they remain unimpaired.

DFC-WM-06
BLM wilderness areas and NPS proposed wilderness will be managed to be ecologically sustainable and resilient to natural and human-caused perturbations (See Vegetation Management and Fire Management decisions). The NPS and BLM will strive to preserve or restore the natural quiet and natural sounds associated with the physical and biological resources of designated wilderness.

The objectives for the management of the Grand Wash Cliffs Wilderness within the Pakoon Allotment are being met. This wilderness area is managed to protect its wilderness characteristics; these values are taken into consideration during all project-level planning so that the wilderness remains unimpaired.

Visual Resources

DFC-VR-01
Public lands will be managed in a manner which will protect the quality of the scenic (visual) values of these lands. (43 U.S. Code [USC] 1701, Section 102 (a) (8)).

DFC-VR-03
The region's scenic beauty, open space landscapes, and other high-quality visual resources will be maintained within the Monument.

The objectives for managing visual resources in these allotments are being met because visual resources are considered during all project-level planning in order to minimize impacts from proposed activities.

2. Specific Resource Objectives

Land Health Standards

Standard 1 (Upland Sites):

Ground cover is static or improved on 91% of the study areas on both allotments and as stated on pages 60 - 61, Soil Stability, the IAT determined soil and watershed function are at acceptable levels.

An exception for meeting Standard #1 is the steep side slopes of about 950 acres of truncated alluvial fans near the mouth of the Grand Gulch Canyon. Here the erosion is occurring where the 2005 wildfire burned off all the litter and vegetation.

Standard 2 (Riparian-Wetland Sites):

As discussed previously, the Pakoon Springs riparian area (where livestock grazing is not authorized) was privately owned until a few years ago when the land was purchased by the Conservation Fund and subsequently transferred to the BLM. Since then, substantial efforts have been made to restore the riparian function that was lost due to water diversions over the past century. The riparian area has increased to approximately 10 acres, which is now covered with riparian vegetation. Pakoon Wash, previously ephemeral, now contains approximately one mile of perennial flow. The functioning condition of this riparian area will be evaluated once restoration work is complete.

The location listed as Burro Spring is no longer a functional spring and is therefore not considered a riparian area. This was determined by the IAT.

The presence of two riparian plants at Ed Spring indicates subsurface flow. However, no other riparian characteristics exist per the IAT evaluation, so this site is not considered a riparian area.

Standard 3 (Desired Resource Conditions):

Thirty of the 47 DPC objectives are being met as evidenced by analyses and supporting documentation referenced herein. The data shows that seasonal precipitation fluctuations have played a major role in vegetation changes along with the latest major wildfires of 2005 and 2006, which removed existing vegetation and established a new vegetative baseline from which to begin monitoring the vegetative community recovery.

Seventeen of the 47 DPC objectives are not being met; however, eight of these 17 objectives were at key areas that burned during the 2005 and 2006 wildfires and three additional DPC objectives are at key areas that burned during the past 20 (plus or minus) years. Those objectives not met during this assessment process were established on the opinion that these key areas would be able to recover from the recent wildfires based on the sites' potential, and that the objectives would be attainable by 2020, if fire was successfully excluded from those areas. The remaining six DPC objectives not being met are for species that tend to respond quickly to fluctuations in precipitation; these species (including bottlebrush, squirreltail, and certain forbs) could increase from one year with good winter and spring moisture, resulting in their meeting DPC objectives.

There was a discussion by the IAT at Key Area #2 in the Pakoon Springs Allotment, and at a another site (approximately 2,800 acres) that had burned recently, as to whether significant progress is being made toward attainment of Standard #3; however, it was determined by the IAT that there is not sufficient information available to make that determination at present. Examples of the information needed to help make that determination include developing State and Transition models for individual ecological sites, closer examination of vegetative recovery of areas that have burned in the past, seeding and treatment trials, literature search etc., to aid in determining what if any potential exists to speed up the vegetative recovery after wildfire. With a better understanding of the effects of various management strategies on plant recovery after wildfire, determining what an acceptable rate of vegetative recover is would aid in determining what the management strategy should be and what could realistically be expected.

With the potential of the DPC objectives to be met by 2020, based on their response to precipitation, and based on the supporting documentation referenced herein and relative to the criteria for meeting standards, and indicators of rangeland health, key areas appear to be progressing towards meeting standard #3. This determination is supported by the IAT based on supporting documentation and on-site observation that native species are present and re-sprouting is occurring, which is moving the community in the desired direction. There is one exception to the area meeting Standard #3 and that is 6,300 acres in the Pakoon Allotment near the mouth of Grand Gulch Canyon that burned again during 2005. Here the area has limited perennial vegetation and with the ecological site being a Shallow Upland that has burned several times in the past 20 - 30 years, the potential for any recovery without active intervention is minimal.

Summary

The amount and timing of precipitation and wildfire have affected the frequency of plant species and other vegetation attributes. As such, seasonal precipitation fluctuations and wildfires were the causal factors influencing vegetation attributes.

Monitoring has indicated that resprouting is slowly occurring, which is gradually moving the community in the desired direction. The IAT recommends that resource conditions are thus slowly progressing towards meeting standards #1, 2, and 3, with the exceptions as described above.

There is the perception that current livestock grazing may be affecting recovery of the areas that were burned by the wildfires, i.e., livestock graze in the Pakoon Allotment from mid-November to mid to late May. As a result, perennial plants that are actively growing during the springtime are subject to livestock grazing every year. This grazing could result in the potential for reduced vigor and lower seed production as well as competition between livestock and wildlife for spring plant growth, which provides important forage for desert tortoises. Changing management to remove cattle by March 15 would reduce or eliminate this competition for annual forbs which are so important to the desert tortoise. Changing management would also provide forage plants with an occasional rest and allow them to improve in vigor and improved seed production, etc.

Allotment Management Plan Objectives

Pakoon Springs Allotment

No objectives were developed.

Pakoon Allotment

Key Area #1:

- *Increase warm-season grasses from 17% to 20% frequency*
- *Increase cool season grasses from 0% to 5% frequency*
- *Increase key browse from 3% to 5% frequency*

Not met. Data collected in 2008 show the frequency of warm season grasses at 4%, cool season grasses at 0%, and key browse species at 3%. Other shrub species are at a 34% frequency. These species include range ratany, burro bush, and creosote bush.

Key Area #2

- *Increase warm-season grasses from 13% to 20% frequency*
- *Increase cool season grasses from 1% to 5% frequency*
- *Increase key browse from 3% to 5% frequency*

Not met. Warm season grass frequency from 2008 was at 8%, cool season grasses at 0%, and key browse species at 1%. The frequency of other shrubs was at 22% which include creosote bush, range ratany, bursage, and burrobrush.

Key Area #3

- *Increase warm-season grasses from 7% to 10% frequency*
- *Increase cool season grasses from 0% to 2% frequency*
- *Increase key browse from 1% to 5% frequency*

Partially met. Frequency data collected in 2008 show warm season grasses at 11%, cool season grasses at 0%, and key browse species at 1%. Other shrub were at a frequency of 1%.

Desired Plant Community Objectives

Table 15 presents each DPC objective and whether or not it is currently being met.

Pakoon Springs Allotment

Key Area #1

Rangesite: Limy Upland (Deep), (6 to 9 inch p.z.)

- Maintain total ground cover at 25-40%.
- Maintain native perennial grass at 5-15% CBW (includes *Pleuraphis rigida, Achnatherum hymenoides, Sporobolis flexuosus, Aristida longiseta and Dasyochloa pulchella*).
- Increase total shrubs/trees to 65-80% CBW (includes *Psilostrophe cooperi, Opuntia, Krameria grayi, Acamptopappus sphaerocephalus, Ambrosia dumosa, Ephedra nevadensis, Krascheninnikovia lanata, Lycium andersonii, Yucca brevifolia, Yucca schidigera, Larrea tridentata*, and other shrubs except *Gutierrezia*).
- Maintain forbs at 5-10% CBW (excludes non-native invasive species).

Conclusion: These objectives are partially met. Ground cover (currently at 42%) exceeds the objective. Composition of both perennial grass and forbs far exceeds the objectives at 84% and 15% respectively. The shrub component is the element of the DPC objectives not currently meeting objectives. The BLM knows of two times the site has burned, around 1980 and 2005. In 1993 composition of shrub species was at 9%. It increased to 15% in 2003 prior to the 2005 burn. It was determined by the IAT that the causal factor for not meeting the shrub objective is fire and not current livestock grazing. The IAT feels the objective is attainable with the absence of fire over a period of time.

Key Area #2

Rangesite: Limy Upland (Deep), (6 to 9 inch p.z.)

- Maintain total ground cover at 25-40%.
- Maintain native perennial grass at 5-15% CBW (includes *Pleuraphis rigida, Achnatherum hymenoides, Sporobolis flexuosus, Aristida longiseta and Dasyochloa pulchella*).
- Increase total shrubs/trees 65-80% CBW (includes *Psilostrophe cooperi, Encelia frutescens, Opuntia, Thamnosma, Krameria grayi, Acamptopappus sphaerocephalus, Ambrosia dumosa, Ephedra nevadensis, Krascheninnikovia*

lanata, Lycium andersonii, Yucca brevifolia, Yucca schidigera, Yucca baccata, Coleogyne ramosissima, Larrea tridentata, and other shrubs except *Gutierrezia*).

- Maintain forbs at 5-10% CBW (excludes non-native invasive species).

Conclusion: These objectives are partially met. Ground cover (currently at 29%) meets the objective. Composition of perennial grass meets at 10%. Composition of forbs far exceeds the objectives at 71%. The shrub component is the element of the DPC objectives not currently meeting objectives. The BLM knows of two times the site has burned, around 1980 and 2005. It was determined by the IAT that the causal factor for not meeting the shrub objective is fire and not current livestock grazing.

Key Area #3

Rangesite: Sandy Wash, (6 to 9 inch p.z.)

- Maintain total ground cover at 15-30%.
- Increase perennial grass to 2-21% CBW (includes *Pleuraphis rigida, Aristida, Sporobolus cryptandrus and Tridens muticus*).
- Maintain total shrubs at 60-85% CBW (includes *Acacia greggii, Hymenoclea salsola, Eriogonum fasciculatum var. polifolium, Ambrosia eriocentra, Salvia dorrii, Lycium cooperia, Encelia farinose, Encelia frutescens, Opuntia, Thamnosma montana, Salazaria Mexicana, Prunus fasciculata, Ambrosia dumosa, Ephedra nevadensis, Lycium andersonii, Larrea tridentata*, and other shrubs except *Gutierrezia*).
- Increase forbs to 2-14% CBW (excludes non-native invasive species).

Conclusion: These objectives are partially met. Ground cover (currently at 27%) meets the objective. Shrub species composition exceeds the objective at 99%. Perennial grass and forb composition do not meet DPC objectives. They are at 0%. This site is a very stable shrub-dominated plant community with little to no occurrences of perennial grass since monitoring was initiated in 1982. Realistically, the objective for perennial grasses and forbs at this key area may be unattainable due to the site potential and current successional stage of the plant community, but the IAT would like to try achieving this objective.

Key Area #4

Rangesite: Limy Upland (Deep), (6 to 9 inch p.z.)

- Increase total ground cover to 25-40%.
- Maintain native perennial grass at 5-15% CBW (includes *Pleuraphis rigida, Achnatherum hymenoides, Sporobolis cryptandrus, Aristida longiseta and Dasyochloa pulchella*).
- Increase total shrubs/trees to 65-80% CBW (includes *Opuntia, Thamnosma, Krameria grayi, Acamptopappus sphaerocephalus, Ambrosia dumosa, Ephedra nevadensis, Krascheninnikovia lanata, Krameria parvifolia, Yucca brevifolia, Yucca schidigera, Larrea tridentata*, and other shrubs except *Gutierrezia*).
- Increase forbs to 5-10% CBW (excludes non-native invasive species).

Conclusion: These objectives are partially met. Ground cover (currently at 16%) does not meet the objective. Perennial grass exceeds the objective. Shrub species meet objectives and forb composition does not meet the objective; however, forbs

are close to meeting. This site is a stable shrub-dominated plant community with some occurrences of perennial grasses and forbs. The IAT feels these objectives are attainable within a few years.

Pakoon Allotment:

Key Area #1

Rangesite: Limy Upland (Deep), (6 to 9 inch p.z.)

- Maintain total ground cover at 25-40%.
- Increase native perennial grass to 5-15% CBW (includes *Pleuraphis rigida, Achnatherum hymenoides, Aristida longiseta, Muhlenbergia porteri and Dasyochloa pulchella*).
- Maintain total shrubs/trees at 65-80% CBW (includes *Acacia greggi, Ambrosia dumosa, Mimosa biundifera, Bebbia, Ephedra nevadensis, Hymenoclea salsola, Opuntia, Thamnosma, Krameria* parvifolia, *Acamptopappus sphaerocephalus, Krascheninnikovia lanata, Yucca brevifolia, Yucca schidigera, Larrea tridentata*, and other shrubs except *Chrysothamnus* and *Gutierrezia*).
- Increase forbs to 5-10% CBW (excludes non-native invasive species).

Conclusion: These objectives are partially met. Ground cover (currently at 29%) meets the objective. Shrub species composition also exceeds the objective at 82%. Perennial grass and forb composition do not meet DPC objectives. They are at 3 and 2% respectively; however, they are close to meeting. This site is a very stable shrub-dominated plant community.

Key Area #2

Rangesite: Limy Upland, (6 to 9 inch p.z.)

- Maintain total ground cover at 30-45%.
- Maintain native perennial grass at 1-7% CBW (includes *Pleuraphis, Achnatherum hymenoides, Achnatherum speciosum, Aristida, Muhlenbergia porteri, Tridens muticus and Dasyochloa pulchella*).
- Increase total shrub composition to 50-65% CBW (includes *Echinocactus, Ferocactus, Krameria, Krascheninnikovia lanata, Opuntia basilaris, Encelia frutescens, Ephedra viridis, Grayia spinosa, Psilostrophe cooperi, Hymenoclea salsola, Lycium andersonii, Opuntia, Thamnosma montana, Krameria, Acamptopappus* sphaeroce*phalus, Ambrosia dumosa, Ephedra nevadensis, Krascheninnikovia lanata, Yucca schidigera, Larrea tridentata*, and other shrubs *Gutierrezia*).
- Maintain trees at 2-7% CBW.
- Maintain forbs at 2-7% CBW (excludes non-native invasive species).

Conclusion: These objectives are met. Ground cover (currently at 42%) meets the objective. Perennial grass composition exceeds the DPC objective. Forbs and shrub composition meets DPC objectives.

Key Area #3

Rangesite: Limy Upland, (6 to 9 inch p.z.)

- Maintain total ground cover at 30-45%.

- Maintain native perennial grass at 1-7% CBW (includes *Pleuraphis, Achnatherum hymenoides, Achnatherum speciosum, Aristida, Muhlenbergia porteri, Tridens muticus, Sporobolus spp. and Dasyochloa pulchella*).
- Increase total shrubs to 50-65% CBW (includes *Echinocactus, Ferocactus, Opuntia basilaris, Encelia frutescens, Ephedra nevadensis, Ephedra viridis, Grayia spinosa, Psilostrophe cooperi, Hymenoclea salsola, Lycium andersonii, Opuntia, Thamnosma montana, Krameria, Acamptopappus* sphaeroce*phalus, Ambrosia dumosa, Ephedra nevadensis, Krascheninnikovia lanata, Yucca schidigera, Larrea tridentata*, and other shrubs *Gutierrezia*).
- Maintain trees at 2-7% CBW.
- Increase forbs to 2-7% CBW (excludes non-native invasive species).

Conclusion: These objectives are partially met. Ground cover (currently at 50%) exceeds the objective. Composition of perennial grasses also exceeds the objective at 32%. Forbs and shrubs do not currently meet objectives. The site burned in 2005. It was determined by the IAT that the causal factor for not meeting the shrub objective is fire and not current livestock grazing. The IAT feels this objective is attainable with the absence of fire over a period of time.

Rationale for all of the above objectives: Maintaining ground cover at the desired levels at the key areas will support stable soil conditions. Maintaining the desired composition of key browse and perennial grass species will ensure perennial forage for wildlife and livestock. The current functional groups of plants provide habitat for desert tortoises and other wildlife species in the area. Perennial grass and annual forbs are among the plant species considered important for the physiological requirements of the desert tortoise. In addition, the current functional groups of browse and shrubs provide cover for desert tortoise and other wildlife.

Table 15. Desired Plant Community Objectives Determination

Plant Group (or Ground Cover)	Current Composition	Desired Plant Composition	Objective Met or Not Met
Pakoon Springs Allotment			
Key Area #1 Ecological site: Limy Upland (Deep) 6-9" precipitation zone			
Ground Cover	42%	25-40%	Met (Exceeds)
Perennial Grass (PG)	84%	5-15%	Met (Exceeds)
Sporobolis flexuosus	54%		
Aristida longiseta	30%		
Total shrubs / trees	2%	65-80%	Not Met
Browse species			
Ephedra nevadensis	0%		
Other shrubs / trees			
Opuntia acanthocarpa	2%		
Forbs	15%	5-10%	Met (Exceeds)

Key Area # 2 Ecological Site: Limy Upland (Deep)			
Ground Cover	29%	25-40%	Met
Perennial Grass (PG)	10%	5-15%	Met
Pleuraphis rigida	7%		
Achnatherum hymenoides	2%		
Aristida longiseta	1%		
Total shrubs / trees	20%	65-80%	Not Met
Browse species			
Ephedra nevadensis	2%		
Other shrubs / trees			
Encelia frutescens	10%		
Ambrosia dumosa	1%		
Yucca baccata	2%		
Psilostrphe cooperi	5%		
Forbs	71%	5-10%	Met (Exceeds)
Key Area #3 Ecological Site: Sandy Wash			
Ground Cover	27%	15-30%	Met
Perennial Grass (PG)	0%	2-21%	Not Met
Total shrubs	99%	60-85%	Met (Exceeds)
Browse species			
Ambrosia dumosa	21%		
Krameria grayi	10%		
Other shrubs			
Larrea tridentata	65%		
Lycium andersonii	2%		
Opuntia acanthocarpa	1%		
Trees	0%	0-2%	Met
Forbs	0%	2-14%	Not Met
Key Area #4 Ecological Site: Limy Upland (Deep)			
Ground Cover	16%	25-40%	Not Met
Perennial Grass (PG)	23%	5-15%	Met (Exceeds)
Pleuraphis rigida	22%		
Achnatherum hymenoides	1%		
Total shrubs / trees	75%	65-80%	Met
Browse species			
Ambrosia dumosa	54%		
Krascheninnikovia lanata	3%		
Krameria parvifolia	9%		
Other shrubs			
Larrea tridentata	4%		
Hymenoclea salsola	1%		
Opuntia acanthocarpa	1%		
Yucca brevifolia	3%		
Forbs	3%	5-10%	Not Met

Pakoon Allotment			
Key Area #1 **Ecological Site: Limy Upland (Deep)**			
Ground Cover	29%	25-40%	Met
Perennial Grass (PG)	3%	5-15%	Not Met
Pleuraphis rigida	2%		
Muhlenbergia porteria	1%		
Total shrubs / trees	82%	65-80%	Met (Exceeds)
Browse species			
Ambrosia dumosa	42%	35-45%	Met
Krascheninnikovia lanata	2%		
Ephedra nevadensis	2%		
Krameria parvifolia	12%		
Other shrubs			
Larrea tridentata	10%		
Hymenoclea salsola	1%		
Bebbia	1%		
Opuntia acanthocarpa	1%		
Mimosa biuncifera	1%		
Acacia greggii	7%		
Yucca brevifolia	3%		
Forbs	2%	5-10%	Not Met
Key Area #2 **Ecological Site: Limy Upland**			
Ground Cover	42%	30-45%	Met
Perennial Grass (PG)	23%	1-7%	Met (Exceeds)
Aristida longiseta	7%		
Pleuraphis rigida	13%		
Muhlenbergia porteri	3%		
Total shrubs	52%	50-65%	Met
Browse species			
Krameria	4%		
Krascheninnikovia lanata	2%		
Other shrubs			
Larrea tridentata	31%		
Opuntia acanthocarpa	2%		
Hymenoclea salsola	5%		
Acamptopappus sphaerocephalus	6%		
Lycium andersonii	2%		
Trees	16%	2-7%	Met (Exceeds)
Yucca brevifolia	16%		
Forbs	2%	2-7%	Met

Key Area #3 Ecological Site: Limy Upland			
Ground Cover	50%	30-45%	Met
Perennial Grass (PG)	32%	1-7%	Met
Pleuraphis rigida	20%		
Aristida longiseta	9%		
Sporobolus cryptandrus	3%		
Total shrubs	6%	50-65%	Not Met
Browse species			
Ephedra nevadensis	Trace		
Other shrubs			
Bebbia juncea	2%		
Hymenoclea salsola	2%		
Yucca baccata	2%		
Trees	2%	2-7%	Met
Yucca brevifolia	2%		
Forbs	1%	2-7%	Not Met

It should be noted that the vegetative composition listed in the site guides is an average across the entire ecological site; variations in an ecological site (due to inclusions or transition zones) may result in an actual plant composition that is different from that listed in the site guide.

B. Response to Issues

1. Issues relating to Rangeland Health and Guidelines for Grazing Administration

a. Invasive non-native species may be causing a decrease in perennial vegetation. (Both Pakoon and Pakoon Springs Allotments)

A decrease in perennial vegetation due to invasive non-native species has not been documented in the monitoring data. Annual grasses tend to flourish during wetter winters and springs, increasing fuel load and potential for wildfire. Fire has an adverse effect on the native vegetation in the Mojave Desert Ecological Zone, resulting in a landscape dominated by these aggressive annual species due to their competitiveness and phenological characteristics. The BLM is actively participating in the Mojave Desert Initiative to find solutions for the growing number of large fires in the Mojave Desert in order to protect remaining unburned Mojave Desert vegetation and reduce reburning to prevent habitat conversion to non-native annual grasslands. Since it is difficult for the Mojave Desert plant community to recover when burned, especially where there are repeated fires, wildfires are aggressively fought to minimize their size.

Current livestock grazing is not believed to be the causal factor in any increase

in red brome or cheatgrass, since they have existed or become naturalized throughout the region since at least 1911 (Reid et. al. 2008). These species are dependent on precipitation (amount and seasonality). During wet years, these invasive annuals occur at levels that are noticeable; during normal and dry years, little tends to occur, as reflected in 2006-2009 which produced no widespread red brome or cheatgrass occurrences.

b. The impact area around livestock waters may be increasing and/or may already be in an unacceptable vegetation condition (lack of species/structural diversity). (Both Pakoon and Pakoon Springs Allotments)

There is no evidence to suggest that areas surrounding livestock waters are increasing in size.

c. Livestock water lot(s) are not accessible to wildlife on Middle Spring pipeline, at Middle Well and Upper Well. (Pakoon and Pakoon Springs Allotment)

On the Pakoon Springs Allotment, wildlife have free access to all available waters including the one trough and reservoir at the terminus of the pipeline where water flows freely outside the fenced area (gate is always open).

The Pakoon Allotment has six water troughs that are used when livestock are using the area. Five of the six troughs are not fenced, and the gate to the one trough in the corral is always open. If changes are made on how the water systems would be used, then changes would be coordinated with the AGFD.

d. Springs may be dewatered, not providing wildlife water or riparian vegetation potential. (Pakoon Springs Allotment)

Through restoration efforts, Pakoon Springs is providing wildlife water and habitat. The potential of the area is still unknown due to continued restoration efforts. Burro Spring is and has been dewatered since at earliest record 1986. The cause is unknown. We have no records showing Ed Spring ever had surface water present but there is sign of subsurface water based on present vegetation.

e. Excessive erosion is occurring in areas where there is a lack of cover relating to unnatural fire return interval. (Both Pakoon and Pakoon Springs Allotments)

Of the areas that have burned, only one area did not meet Standard 1, and that was a portion of the 950 acres of steep sided truncated alluvial fans in the Pakoon Allotment that burned during 2005. In the Pakoon basin, the first plants to come back from a clean burn are annuals. Wetter winters and springs encourage annual grasses to flourish. The winter of 2010 was wet and 2011 was even wetter. The July, 2011 site visit revealed that annuals, mainly bromes, have covered and stabilized most of the soils of concern.

f. Large area not meeting Standard #1. (Pakoon Allotment)

The many fires in the past 30 years have initiated a "grass-fire cycle," in which fire promotes resurgence of exotic grasses that fuel the fire to create a frequent-fire regime in areas where fire was historically infrequent. Based on several studies, natural reestablishment of late-successional species such as *Coleogyne ramosissima* or *Larrea tridentata* will require long time periods, often longer than 30 yr and possibly longer than 100 yr (Callison et al. 1985; Lei 1999; Lovich and Bainbridge 1999). Therefore, even if there are no future fires, it will still be decades before desirable species of brush and grass return to these burns. Drought events might prolong the recovery period and perhaps prohibit the return of some species altogether.

g. Desert Tortoise populations are still declining. (Both Pakoon and Pakoon Springs Allotments)

As discussed on pages 57-58 of this report, long-term monitoring of the Mojave population of the desert tortoise has been occurring for many years. Monitoring methodology changed in 2001 when line distance sampling began to be used. The first five years of monitoring (2001-2005) were not to document trends, but to gather information on baseline densities. Sample size was also increased to get statistically sound data. While it is too soon to make a definitive determination on population trends, recent monitoring data may indicate that the population of desert tortoise in the Northeastern Mojave Recovery Unit (of which this allotment is a part) may have stabilized (see Table 14).

As discussed on pages 42-47 of this assessment report, a variety of factors (including habitat degradation due to the proliferation of non-native plant species, an increase in fire frequency caused by non-native plants providing sufficient fuel to carry fires, disease, predation by ravens, livestock grazing, and off-road vehicle use) are considered threats to the Mojave population of the desert tortoise. Additionally, according to Bashor's 1991 report (see page 44), inadequate soil depth for burrows is a limiting factor on at least part of these allotments.

The BLM will continue to work with the USFWS to monitor this species and implement best management practices that will assist in the recovery of the Mojave desert tortoise.

h. Restoration project at Pakoon Springs, fencing and reconfiguration of allotment boundaries. (Pakoon Springs Allotment)

As described on page 58 – 59 and 76 of this assessment, substantial restoration work has occurred in the Pakoon Springs riparian area. This work will continue in order to completely restore the riparian area to a more natural condition.

The boundary between the areas where livestock is and is not authorized in the Pakoon Springs Allotment should be fenced. The western half (3 miles) was completed in 2009. An effort to secure funding for installing the eastern half of the boundary fence is underway.

i. Burros are still there. (Both Pakoon and Pakoon Springs Allotments)

Burros will be removed from both allotments, as funding allows, since both allotments are outside of the herd management area.

j. Unburned areas – Mojave Desert Initiative – DPC objective development. (Both Pakoon and Pakoon Springs Allotments)

Through its participation with the Mojave Desert Initiative, the BLM is helping to implement the Mojave Desert Initiative Research Project. The Research Project is focused on developing the information, methods and tools necessary to accomplish the following goals: 1) protect remaining unburned Mojave Desert vegetation and reduce reburning to prevent habitat conversion to non-native annual grasslands; and 2) restore strategically located islands, key habitat areas, and corridors that provide habitat connectivity to other areas of quality habitat. Results from this research will be used across the entire Mojave Desert, including within the Pakoon and Pakoon Springs allotments. Potential projects include "green" fuel breaks (i.e., fuel breaks populated by fire suppressant species to protect native, intact Mojave vegetation), seeding, plantings, and treating areas with pre-emergent herbicide to suppress growth of highly flammable annual non-native species.

k. Current season of use authorizes grazing until May 15 which is well into the tortoise active period (that begins March 15). (Both Pakoon and Pakoon Springs Allotments)

Based on the recommendations received in an email dated May 20, 2010 from the USFWS, the BLM is including as a Technical Recommendation to analyze a seasonal restriction in the Environmental Assessment as either an alternative or proposed action. In the case of the Pakoon Allotment the change in season of use will be analyzed in its EA for permit renewal. When the permit renewal comes due for the Mosby-Nay Allotment, the results and recommendations in this S&G for the two pastures available for grazing and formerly belonging to the Pakoon Springs Allotment will be used and analyzed in the Environmental Assessment for the permit renewal of Mosby-Nay.

The following is added for conclusions relative to implementation of the Standards for Rangeland Health and Guidelines for Grazing Administration.

Based on the analyses and supporting documentation referenced herein, resource conditions on the Pakoon allotment:

- ☐ Meet all applicable standards for rangeland health
- ☒ Are making significant progress toward meeting the applicable standards for rangeland health
- ☐ Do not meet the standards for rangeland health for:
  - ☐ No. 1: Upland sites
  - ☐ No. 2: Riparian-Wetland sites
  - ☐ No. 3: Desired Resource Conditions
- ☐ Have not been sufficiently documented to make a specific determination, but there is no reason to believe that current management would preclude meeting the standards for rangeland health.

Based on the analyses and supporting documentation referenced herein, resource conditions on the Pakoon Springs allotment:

- ☐ Meet all applicable standards for rangeland health
- ☒ Are making significant progress toward meeting the applicable standards for rangeland health
- ☐ Do not meet the standards for rangeland health for:
  - ☐ No. 1: Upland sites
  - ☐ No. 2: Riparian-Wetland sites
  - ☐ No. 3: Desired Resource Conditions
- ☐ Have not been sufficiently documented to make a specific determination, but there is no reason to believe that current management would preclude meeting the standards for rangeland health.

VI. Technical Recommendations

A. Renewal of grazing permit options:

1. Renew the ten-year grazing permit on the Pakoon Allotment with active AUMs and season of use as is.

   Pakoon Allotment:
   Active Grazing Use: 1,624 AUMs; Non-use: 223 AUMs

   Permit #1 - 240 cattle from January 1 to May 15

Permit #2 - 103 cattle from November 29 to May 15
6 horses from March 1 to March 31

2. Based on the recommendations received in an email dated May 20, 2010 from the USFWS, renew the ten-year grazing permit on the Pakoon Allotment but change the season of use. The recommendation of reducing stocking rates was considered; however, as shown in this evaluation report, the utilization data and trend data do not suggest a need to adjust stocking rates at this time. With the same authorized active AUMs this would change the number of cattle and the permit to:

Pakoon Allotment:
Permit #1 - 240 cattle from November 1 to February 28
241 cattle from March 1 to March 15

Permit #2 - 114 cattle from October 15 to March 15
5 horses from February 11 to March 15

B. That portion of Pakoon Springs Allotment unavailable for grazing no longer has a grazing preference and thus no permit renewal is necessary for the Pakoon Springs Allotment. The portion of Pakoon Springs Allotment that is available for grazing is now included as part of the Mosby-Nay permit. We recognize the fact that the current season of use is during the active season of the desert tortoise for the two pastures available for grazing in the Pakoon Springs Allotment, now currently in the Mosby-Nay Allotment. The BLM is working with the permittee to sign an agreement that cattle will be pulled out of desert tortoise critical habitat between the active season (March 15 to October 15). This would remain in effect until the Environmental Assessment (EA) is completed for the permit renewal for the Mosby-Nay Allotment. The seasonal restriction will be one of the alternatives or even proposed action analyzed in that EA.

C. BLM will consider and explore options for creating additional pastures in the Pakoon Allotment in order to implement a grazing rotation schedule.

D. Carry forward the new key area DPC objectives established in this evaluation into the Pakoon AMP and that portion of the Pakoon Springs Allotment still available for grazing into the Mosby Nay AMP.

E. Ensure fences around water sources in these allotments allow safe and reliable access for wildlife.

F. Develop State and Transition models for individual ecological sites for the Mojave Desert area.

G. Continue to work with the USFWS to monitor the desert tortoise and implement best management practices that will assist in the recovery of this species.

H. In the event of a fire, the BLM will form an ID Team which will include an employee of the USFWS. This team will determine (based on severity, size and

location of the fire) whether deferment of livestock grazing for a minimum of two growing seasons is needed. If needed, following the second growing season of deferment, the ID Team will reevaluate if standards are being met or progressing towards meeting and if livestock can return to the area.

I. The BLM, jointly with the USFWS and University of Arizona will work together to establish a monitoring protocol that captures cover (size and density) of shrubs in desert tortoise habitat. However, simply monitoring for cover is not the answer. First we must know from the USFWS what density and size of cover is appropriate for the tortoise recovery. The appropriate cover data provided to the BLM will establish the objectives and in turn help establish proper monitoring protocols for site specific areas in the future.

J. Analyze reducing the utilization level temporarily to speed up the recovery of shrubs cover until the objective is met. Refer above to Technical Recommendation I for information regarding shrub cover objectives.

AUTHORIZED OFFICER CONCURRENCE:

__x__ I concur with the recommendations as written.

_____ I do not concur.

_____ I concur, with the following modifications:

Pamela D. McAlpin 7/20/2012

Pamela D. McAlpin Monument Manager — Date
Grand Canyon-Parashant National Monument

VII. References Cited

Abella, S. R.; Engel, E. C.; Lund, C. L.; Spencer, J. E. 2009. "Early post-fire plant establishment on a Mojave Desert burn." *Madrono* 56(3):137-148.

Arizona Game and Fish Department (AGFD). 2003. *Euderma maculatum.* Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona.

Arizona-Sonora Desert Museum. 2011a. Animal Fact Sheet: California Leaf-Nosed Bat. Available at: http://www.desertmuseum.org/kids/bats/california_leaf_nosed_bat.php. Accessed March 24, 2011.

Arizona-Sonora Desert Museum. 2011b. Animal Fact Sheet: Townsend's Big-Eared Bat. Available at: http://www.desertmuseum.org/kids/bats/townsends.php. Accessed March 24, 2011.

Avery, H.W., and A.G. Neibergs. 1997. Effects of cattle grazing on the desert tortoise, *Gopherus agassizii*: Nutritional and behavioral interactions. Pages 13-20 *in* J. Van Abbema (ed.), Proceedings of the International Conference on Conservation, Restoration, and Management of Tortoises and Turtles. New York Turtle and Tortoise Society, New York.

Bashor, Arthur N. 1991. Desert tortoise population and habitat attributes on the Pakoon Basin trend plot, Mojave County, Arizona. Advantage Environmental Consulting, prepared for BLM Arizona Strip District.

Bean, Travis M., Smith, Steven E., and Karpiscak, Martin M. 2004. "Intensive revegetation in "ARIZONA'S HOT DESERT" The advantages of container stock." *Native Plants.* Fall 2004.

Berry, K.H. 1984. A description and comparison of field methods used in studying and censusing desert tortoises. Appendix 2. Pp 1-33 *in* K.H. Berry (ed.), The status of the desert tortoise (*Gopherus agassizii*) in the United States. Report to the U.S. Fish and Wildlife Service from the Desert Tortoise Council. Order No. 11310-0083-81.

Bighorn Sheep Core Team. 2006. *Arizona Strip Desert Bighorn Sheep Management Plan, as Amended.* Prepared for the Bureau of Land Management, U.S. Forest Service and Arizona Game and Fish Department, 18 pp.

Boarman, W.I. 1993. When a native predator becomes a pest: a case study. For: conservation and resource management (S K. Majumdar, *et al.*, eds.), pages 186-201. Pennsylvania. Academy of Science, Easton, PA.

Boarman, W. I. and K. H. Berry. 1995. Common ravens in the southwestern United States, 1968-92. Pages 73-75 in E. T. LaRoe, G. F. Farris, C. E. Puckett, P. D. Doran, and M. J. Mac, editors. Our living resources: A report to the nation on the distribution, abundance, and health of U.S. plants, animals, and ecosystems. National Biological Service. Washington, D.C.

Boarman, W.I. and W.B. Kristan. 2006. Trends in common raven populations in the Mojave and Sonora deserts: 1968-2004. Draft report to U. S. Fish and Wildlife Service, Ventura CA 93003.

Brooks, M.L. 1998. Alien annual grass distribution, abundance, and impact on deselt tortoise habitat in the western Mojave Desert. Ph.D. Dissertation. University of California at Riverside.

Brooks, M.L., and T.C. Esque. 2002. Alien plants and fire in desert tortoise *(Gopherus agassizii)* habitat of the Mojave and Colorado deserts. Chelonian Conservation and Biology 4:330-340.

Brown, D.R. , I. M. Schumaeher, G.S. McLaughlin, L.D. Wendland, M.B. Brown, P.A. Klein, and E.R. Jacobson. 2002. Application of diagnostic tests for mycoplasmal infections of the desert and gopher tortoises, with management recommendations. Chelonian Conservation and Biology 4:497-507.

Cabeza Prieta Natural History Association 2011. Western Mastiff Bat. Available at: http://cabezaprieta.org/mammal_page.php?id=2086. Accessed June 24, 2011.

Chambers, Jeanne C., and Mike Pellant. "Climate Change Impacts on Northwestern and Intermountain United States Rangelands." *Rangelands*, 2008: 29-33.

Cordery, T.E., Jr., T.A. Duck, T.C. Esque, and J.J. Slack. 1993. Vegetation needs of the desert tortoise, *Gopherus agassizii*, in the Sonoran and Mojave Deserts. In, pp. 61-80, D. D. Young (ed.), Proceedings: Symposium on Vegetation Management of Hot Desert Rangeland Ecosystems. Society for Range Management. Phoenix, Arizona.

Dantzler, W.H. and B. Schmidt-Nielsen. 1966. Excretion in fresh water turtle (*Pseudemys scripta*) and desert tortoise (*Gopherus agassizii*). American Journal of Physiology, 201:198-210

Ernst, C.H. and J.E. Lovich. 2009. *Turtles of the United States*. Johns Hopkins University Press. Baltimore, Maryland.

Haines, D.F., Esque, T.C., DeFalco, L.A., Scoles, S.J., Brooks, M.L., and Webb, R.H. 2003. "Fire and Exotics in the Mojave Desert: An Irreversible Change? A State-Transition Moddle for Blackbrush (Coleogyne Ramosissima) Habitat." *WERC Presentations at the 2003 Arid Southwest Lands Habitat Restoration Conference.* Sacramento, CA. Appendix D 31.

Haug, E.A., B.A. Milsap, and M.S. Martell. 1993. Burrowing owl (*Speotyto cunicularia*). In *The Birds of North America*, edited by A. Poole and F. Gill. No. 61. Philadelphia: The Birds of North America.

Henen, B.T. 2002. Reproductive Effort and Reproductive Nutrition of Female Desert Tortoises: Essential Field Methods. Integrative and Comparative Biology, 42:43-50. Oxford University Press.

Hohman, J. P.; Ohmart, R. D. 1980. Ecology of the desert tortoise on the Beaver Dam Slopes, Arizona. Contract YA-510-PH7-54. Report for the U.S. Department of the Interior, Bureau of Land Management, Arizona Strip District Office, St. George, Utah. 46 p. + appendix.

Jacobson, E. 1992. The Desert Tortoise and Upper Respiratory Tract Disease. A Special Report prepared for the Desert Tortoise Preserve Committee, Inc. and the Bureau of Land Management. University of Florida, Gainesville.

Jennings, W.B. 1993. Foraging ecology of the desert tortoise (*Gopherus agassizii*) in the western Mojave Desert. M.S. thesis, University of Texas, Arlington.

Jørgensen, C.B. 1998. Role of urinary and cloacal bladders in chelonian water economy: historical and comparative perspectives. Biol. Rev. 73:347–366.

Knight, R.L, H.A.L. Knight, and R. J. Camp. 1993. Raven populations and land-use patterns in the Mojave Desert, California. Wildlife Society Bulletin 22:469-471.

Kristan, W.B. III and W.I. Boarman. 2007. Effects of anthropogenic developments on common raven nesting biology in the west Mojave Desert. Ecological Applications 17:1703-1713.

Lovich, J. E. and D. Bainbridge. 1999. Anthropogenic degradation of the southern California desert ecosystem and prospects for natural recovery and restoration. Environmental Management 24:309-326.

Luckenbach, R.A. 1982. Ecology and management of the desert tortoise (*Gopherus agassizii*) in California. Pp 1-37 *in* R.B. Bury (ed.), North American Tortoises: Conservation and Ecology.

Mack, R.N. 1981. Invasion of *Bromus tectorum* L. into western North America: An ecological chronicle. Agro-Ecosystems 7:145-165.

Medica, P.A., Bury, R.B., Turner, F.B., 1975. Growth of the Desert Tortoise (*Gopherus agassizii*) in Nevada. Copeia, 639–643.

Oftedal, O.T. 2002. Nutritional ecology of the desert tortoise in the Mohave and Sonoran deserts. Pp. 194-241 in Van Devender, T.R. (ed) The Sonoran Desert Tortoise Natural History, Biology, and Conservation. University of Arizona Press, Tucson.

Oftedal, O.T., S. Hillard, and D.J. Morafka. 2002. Selective spring foraging by juvenile desert tortoises (*Gopherus agassizii*) in the Mojave Desert: Evidence of an adaptive nutritional strategy. Chel. Conservation & Biology 4(2): 341-352.

Oldemeyer, J.L. 1994. Livestock Grazing and the desert tortoise in the Mohave Desert. Pages 95-103 in R.B. Bury and D.J. Germano (eds.), Biology of North American Tortoises. National Biological Survey, Fish and Wildlife Research 13, Washington, D.C.

Pellant, M. 1996. Cheatgrass*: The Invader That Won the West* (citing Hull, A.C. Jr., 1965: *Cheatgrass – A Persistent Homesteader*, Proceedings-symposium on Management of Cheatgrass on Rangelands. US Department of the Interior, BLM. 20-28). Interior Columbia Basin Ecosystem Management Project. Bureau of Land Management, Idaho.

Pima County. 2011. 2011. Vulnerable Species Fact Sheets – California leaf-nosed bat. Accessed at: http://www.pima.gov/cmo/sdcp/species/fsheets/vuln/clnb.html. Accessed October 20, 2011.

Reid, C.R., S. Goodrich, J. Bowns. 2008. *Cheatgrass and Red Brome: History and Biology of Two Invaders. USDA Forest Service Proceedings RMRS--52.* 27-32.

Tracy, C.R., R. Averill-Murray, W.I. Boarman, D. Delahanty, J. I-leaton, E. McCoy, D. Morafka, K. Nussear, B. Hagerty, and P. Medica. 2004. Desert tortoise recovery plan assessment report. Unpublished report. 254 pages.

U.S. Department of the Interior, Bureau of Land Management (BLM). 2008. *Grand Canyon-Parashant National Monument Resource Management Plan.* Bureau of Land Management, St. George, Utah.

U.S. Department of the Interior, Fish and Wildlife Service (USFWS). 1994a. Desert tortoise (Mojave population) recovery plan. Portland, Oregon. 73 pages plus appendices.

U.S. Department of the Interior, Fish and Wildlife Service (USFWS). 1994b. Endangered and threatened wildlife and plants; determination of critical habitat for the Mojave population of the desert tortoise. Federal Register 59:5820-5866.

U.S. Department of the Interior, Fish and Wildlife Service (USFWS). 2006. *Range-wide Monitoring of the Mojave Population of the Desert Tortoise: 2001-2005 Summary Report.* Prepared by Desert Tortoise Monitoring Committee, Desert Tortoise Recovery Office. Reno, Nevada.

U.S. Department of the Interior, Fish and Wildlife Service (USFWS). 2007. Final Rule Removing the Bald Eagle in the Lower 48 States From the List of Endangered and Threatened Wildlife. *Federal Register* 72:37346-37372.

U.S. Department of the Interior, Fish and Wildlife Service (USFWS). 2009. *Range-wide Monitoring of the Mojave Population of the Desert Tortoise: 2007 Annual Report.* Prepared by Linda Allison, Desert Tortoise Monitoring Coordinator, Desert Tortoise Recovery Office. Reno, Nevada.

U.S. Department of the Interior, Fish and Wildlife Service (USFWS). 2010a. Email from Brian Wooldridge, Arizona Ecological Services, Flagstaff, Arizona Office.

U.S. Department of the Interior, Fish and Wildlife Service (USFWS). 2010b. DRAFT *Range-wide Monitoring of the Mojave Population of the Desert Tortoise: 2010*

Annual Report. Prepared by Linda Allison, Desert Tortoise Monitoring Coordinator, Desert Tortoise Recovery Office. Reno, Nevada.

U.S. Department of the Interior, Fish and Wildlife Service (USFWS). 2010c. DRAFT *Range-wide Monitoring of the Mojave Population of the Desert Tortoise: 2008 and 2009 Reporting*. Prepared by Linda Allison, Desert Tortoise Monitoring Coordinator, Desert Tortoise Recovery Office. Reno, Nevada.

U.S. Department of the Interior, Fish and Wildlife Service (USFWS). 2011. Revised recovery plan for the Mojave population of the desert tortoise (*Gopherus agassizii*). U.S. Fish and Wildlife Service, Pacific Southwest Region, Sacramento, California. 222 pp.

Wikipedia, The Free Encyclopedia. 2011a. American Peregrine Falcon. Available at: http://en.wikipedia.org/wiki/Peregrine_Falcon. Accessed June 24, 2011.

Wikipedia, The Free Encyclopedia. 2011b. Ferruginous Hawk. Available at: http://en.wikipedia.org/wiki/Ferruginous_Hawk. Accessed March 24, 2011.

Wikipedia, The Free Encyclopedia. 2011c. Western Mastiff Bat. Available at: http://en.wikipedia.org/wiki/Western_mastiff_bat. Accessed June 24, 2011.

Willey, D.W. and D. Spotshey. 1997. GIS habitat model for Mexican spotted owl habitat in Utah. Utah Division of Wildlife Resources. Unpublished Final Report. Salt Lake City, UT.

Willey, D. W., and D. Spotskey. 2000. Field test of a habitat model for Mexican spotted owl breeding habitat. Final Report; Arizona Heritage Program, Phoenix, AZ.

VIII. Plant Species List

Below is a list of plant species (common and scientific names) included in this assessment report.

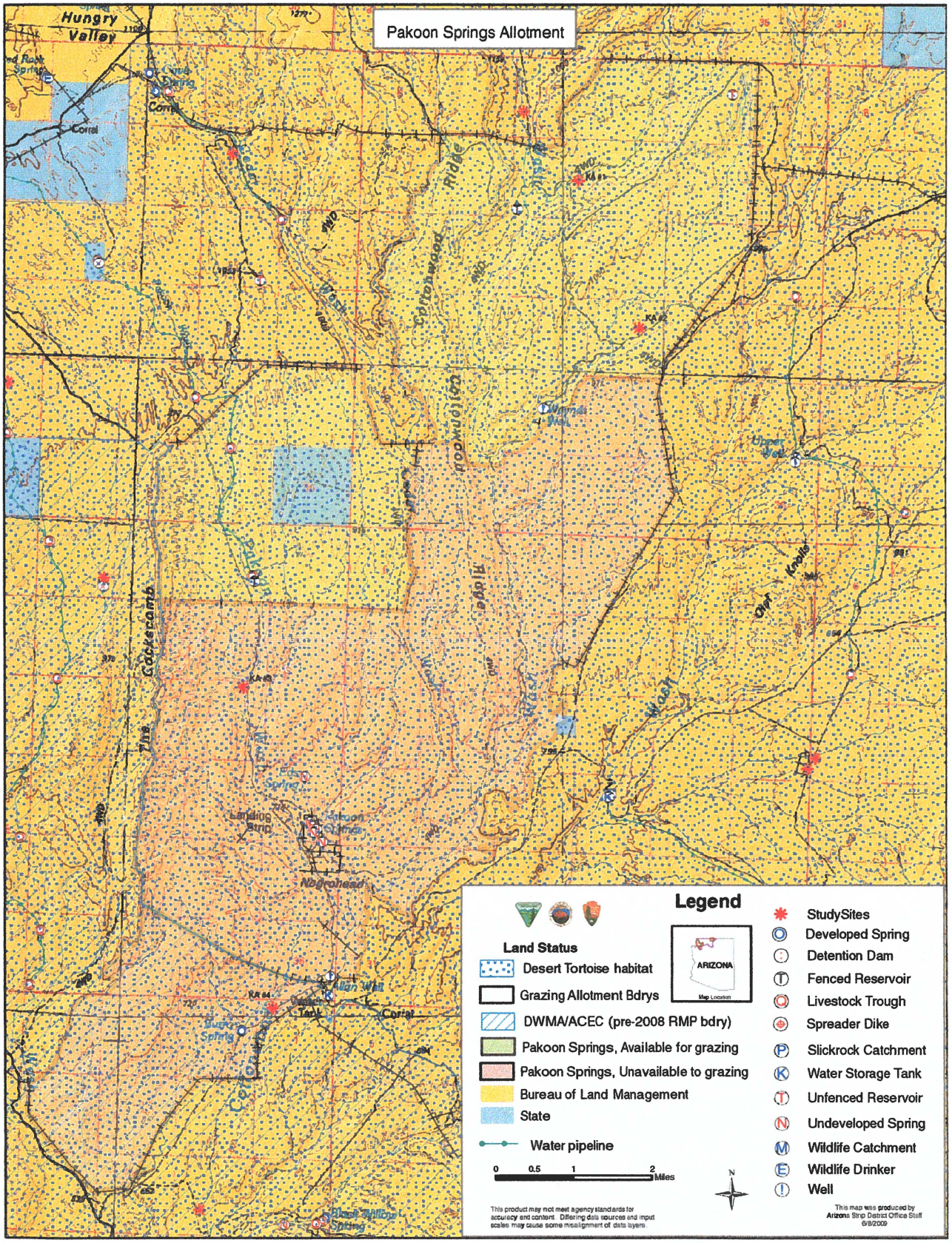
Table 16. List of Plant Species Included in this Assessment Report

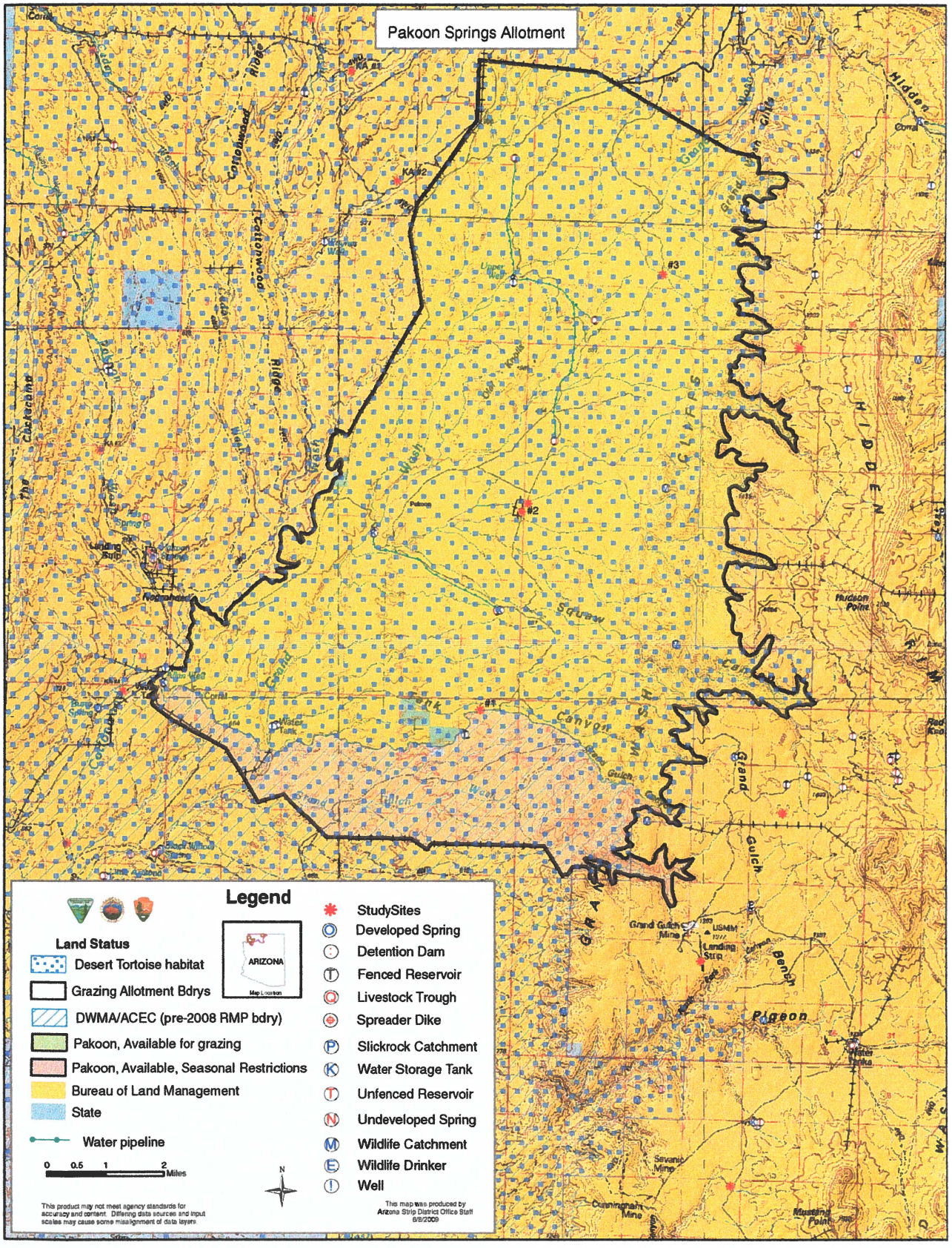
Grasses	
Perennial species	
Grama grass	***Bouteloua* ssp.**
Fluffgrass	***Dasyochloa pulchella***
Big galleta grass	***Pleuraphis rigida***
Bush muhly	***Muhlenbergia porteri***
Indian ricegrass	***Achnatherum hymenoides***
Desert needlegrass	***Achnatherum speciosum***
Sand dropseed	***Sporobolis cryptandrus***
Mesa dropseed	***Sporobolis flexuosus***
Threeawn	***Aristida longiseta***
Slim tridens	***Tridens muticus***
Desert needle grass	***Stipa speciosa***
Annual species	
Six-weeks three-awn	***Aristida adscensionis***
Red brome	***Bromus rubens***
Six-weeks fescue	***Vulpia octoflora***
Shrubs	
White bursage	***Ambrosia dumosa***
Rayless goldenhead	***Acamptopappus sphaerocephalus***
Catclaw acacia	***Acacia greggii***
Seep willow	***Baccharis salicifolia***
Sweetbush	***Bebbia***
Buttonbush	***Cephalanthus* ssp.**
Blackbrush	***Coleogyne ramosissima***
Cholla	***Cylindropuntia* ssp.**
Echinocactus	***Echinocactus***
Button brittlebush	***Encelia frutescens***
Mormon tea	***Ephedra nevadensis***
Mormon tea	***Ephedra viridis***
California buckwheat	***Eriogonum fasciculatum***
Ferocactus	***Ferocactus***
Spiny hopsage	***Grayia spinosa***
Burrobrush	***Hymenoclea salsola***
White ratany	***Krameria grayi***
Littleleaf ratany	***Krameria parvifolia***
Winterfat	***Krascheninnikovia lanata* (*Ceretoides lanata*)**
Creosote bush	***Larrea tridentata***
Anderson Wolfberry	***Lycium andersonii***
Catclaw mimosa	***Mimosa biuncifera***
Buckhorn cholla	***Opuntia acanthocarpa***
Beavertail pricklypear	***Opuntia basilaris***
Cottonwood	***Populus ssp.***

Whitestem paperflower	***Psilostrophe cooperi***
Indigobush	***Psorothamnus arborescens***
Willow	***Salix ssp.***
Tamarix	***Tamarix ssp.***
Grapevine	***Vitis ssp.***
Hairy crinklemat	***Tiquilia canescens***
Banana yucca	***Yucca baccata***
Joshua tree	***Yucca brevifolia***
Mojave yucca	***Yucca schidigera***
Forbs	
Annual species	
Filaree	***Erodium cicutarium***
Bottlestopper	***Eriogonum inflatum***
Pepperweed	***Lepidium* ssp.**
Plantain	***Plantago* ssp.**
Bi-annual or Perennial species	
Windmills	***Allionia incarnate***
Two-seeded milkvetch	***Astragalus didymocarpus***
Marigold	***Baileya* ssp.**
Sahara mustard	***Brassica tournefortii***
Woolly bottlebrush	***Camissonia boothii***
Sedges	***Carex* ssp.**
Desert pincushion	***Chaenactis fremontii***
Sandmat	***Chamaesyce* ssp.**
Evening primrose	***Camissonia claviformis***
Mohave croton	***Croton californicus***
Nievitas	***Cryptantha* ssp.**
Rattlesnake weed	***Euphorbia albomarginata***
Sandmat	***Euphorbia micromera***
Deervetch	***Lotus strigosus***
Desert dandelion	***Malacothrix glabrata***
Combbur	***Pectocarya recurvata***
Desert globemallow	***Sphaeralcea ambigua***
Goldeneye	***Viguiera* ssp.**

Appendix A

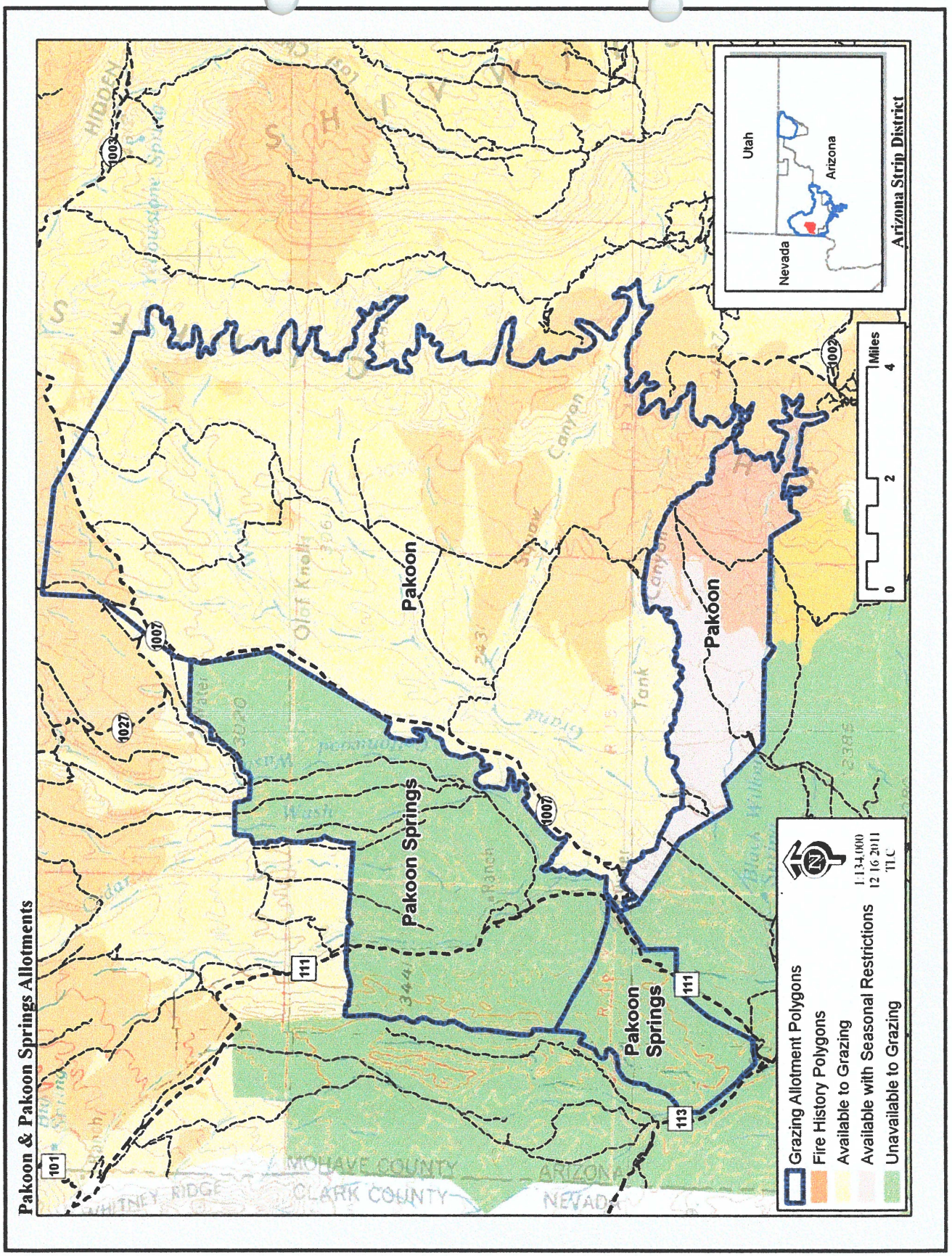
Location Maps


Pakoon Springs Allotment
Hungry Valley
Corral
Legend
Land Status
Desert Tortoise habitat
Grazing Allotment Bdrys
DWMA/ACEC (pre-2008 RMP bdry)
Pakoon Springs, Available for grazing
Pakoon Springs, Unavailable to grazing
Bureau of Land Management
State
Water pipeline
0 0.5 1 2 Miles
ARIZONA
StudySites
Developed Spring
Detention Dam
Fenced Reservoir
Livestock Trough
Spreader Dike
Slickrock Catchment
Water Storage Tank
Unfenced Reservoir
Undeveloped Spring
Wildlife Catchment
Wildlife Drinker
Well
This product may not meet agency standards for accuracy and content. Differing data sources and input scales may cause some misalignment of data layers.
This map was produced by Arizona Strip District Office Staff 6/8/2009


Pakoon Springs Allotment
Legend
Land Status
Desert Tortoise habitat
Grazing Allotment Bdrys
DWMA/ACEC (pre-2008 RMP bdry)
Pakoon, Available for grazing
Pakoon, Available, Seasonal Restrictions
Bureau of Land Management
State
Water pipeline
0 0.5 1 2 Miles
ARIZONA
Map Location
StudySites
Developed Spring
Detention Dam
Fenced Reservoir
Livestock Trough
Spreader Dike
Slickrock Catchment
Water Storage Tank
Unfenced Reservoir
Undeveloped Spring
Wildlife Catchment
Wildlife Drinker
Well
This product may not meet agency standards for accuracy and content. Differing data sources and input scales may cause some misalignment of data layers.
This map was produced by Arizona Strip District Office Staff 8/8/2009
#1
#2
#3
KA #1
KA #2
Grand Gulch Mine
USMM
Landing Strip
Pigeon
Water Tanks
Savanic Mine
Cunningham Mine
Mustang Point
Pigeon Point
Hidden
Cottonwood Ridge
Cottonwood Creek
Pakoon Ridge
Wash
Grand Gulch
Gulch
Bench
Canyon
Creek
Spring
Tank
Water Tank
Landing Strip

Appendix B

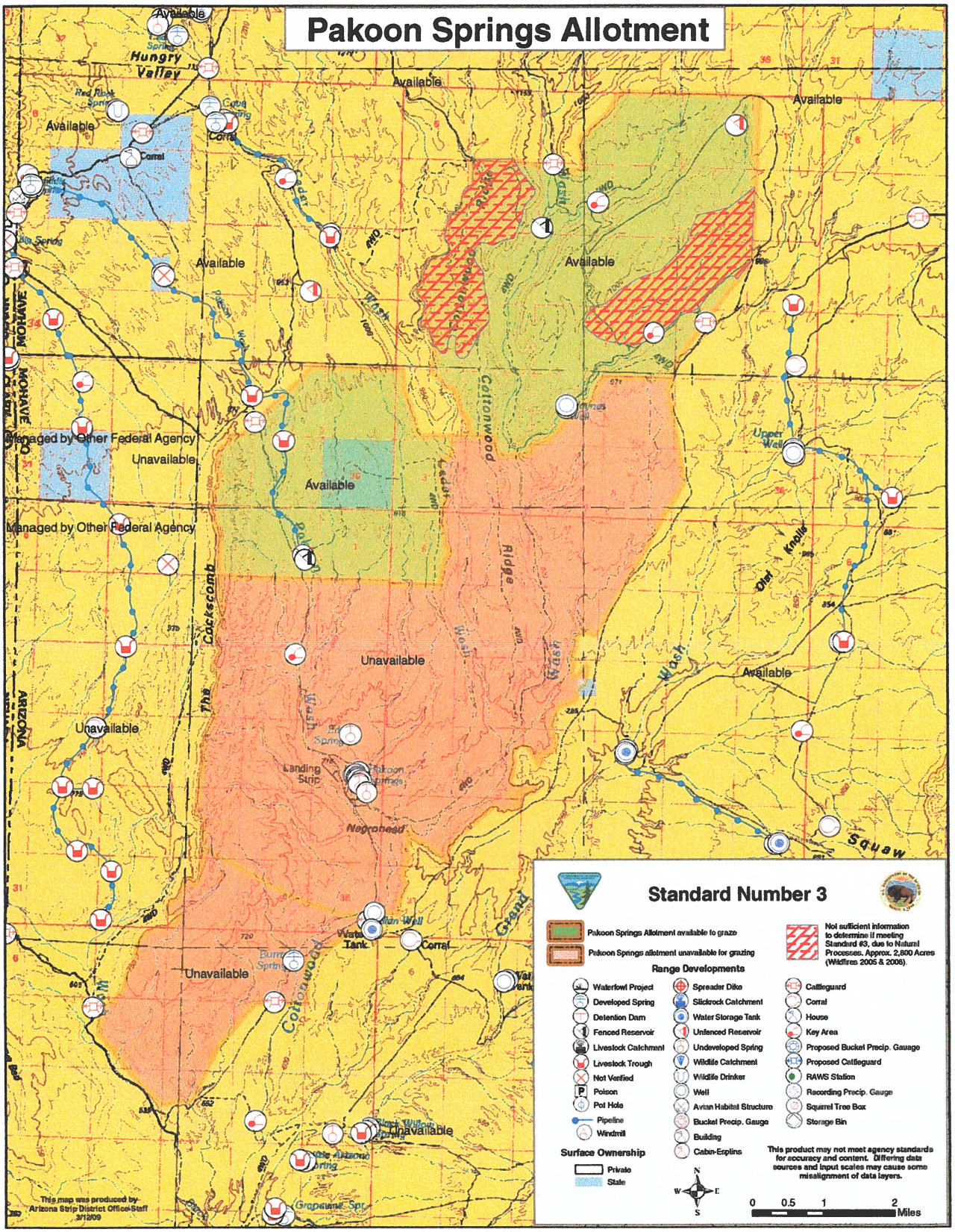
Wildfire History Map

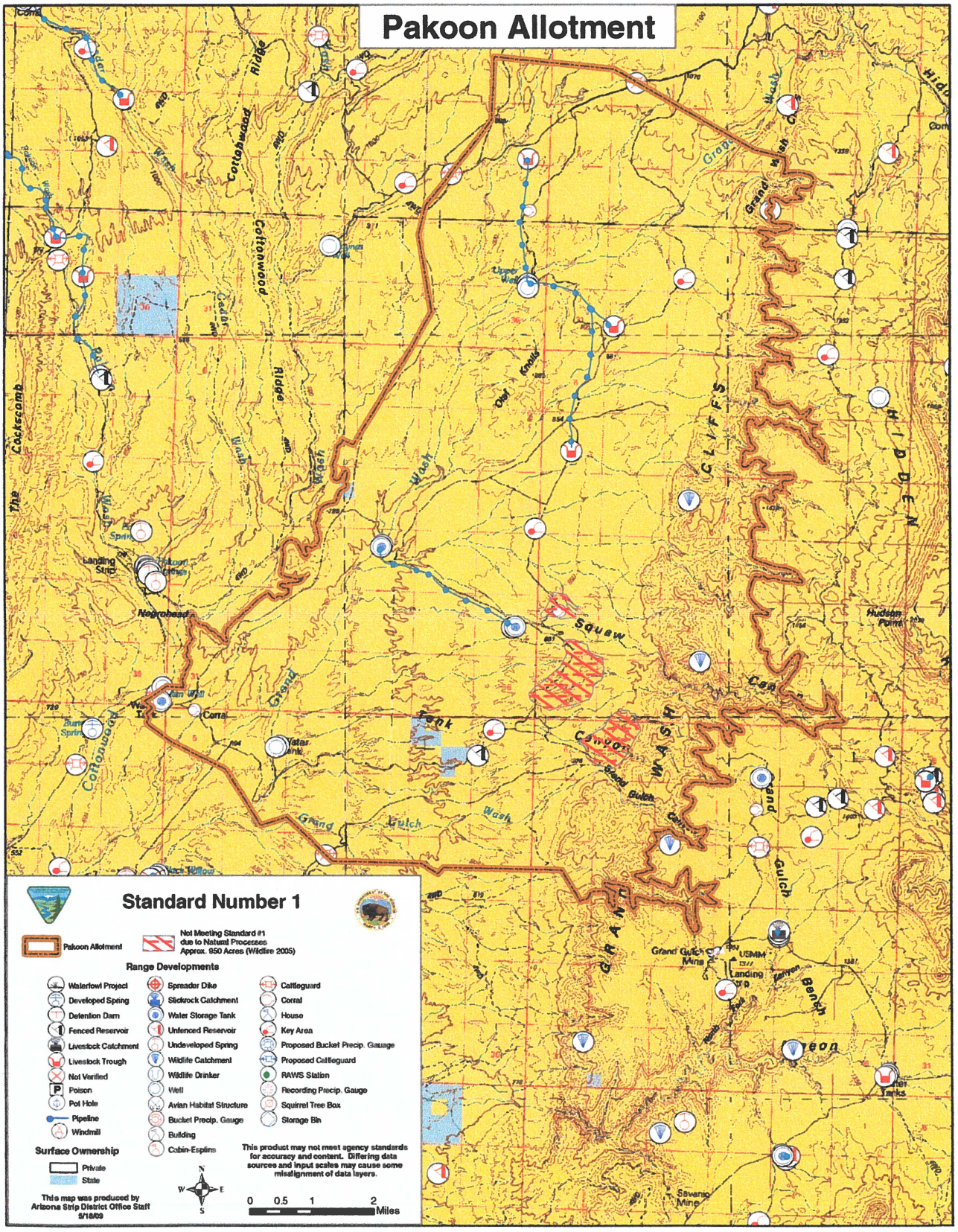


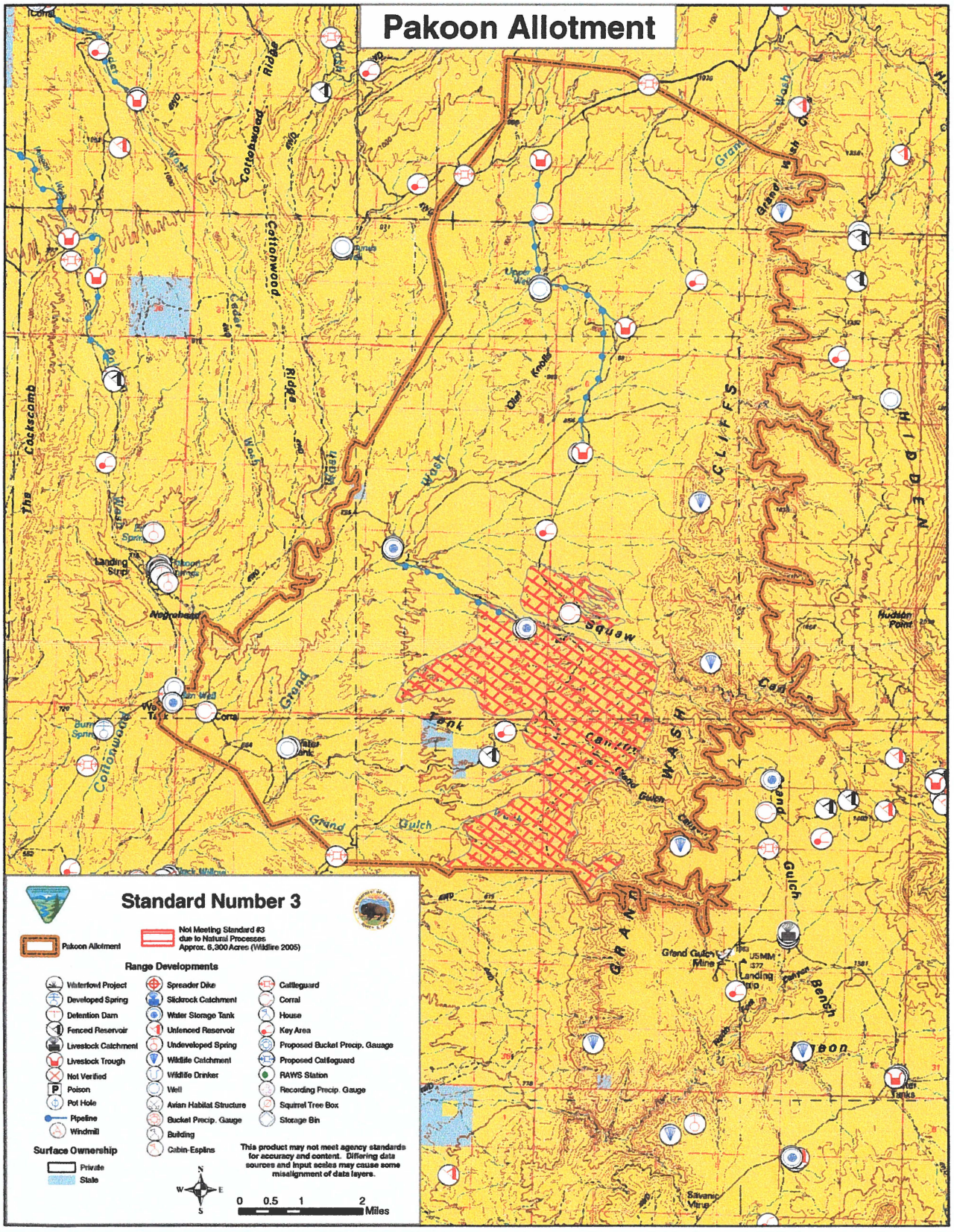
Areas Burned within Pakoon and Pakoon Springs Allotments

Appendix C

Meeting Standards Maps


Pakoon Springs Allotment
Available
Hungry Valley
Red Rock Spring
Corral
Unavailable
Managed by Other Federal Agency
Cottonwood Ridge
Cedar Ridge
Upper Well
Knoll
Cockscomb
Landing Strip
Pakoon Springs
Negrohead
Squaw
Grand Wash
Standard Number 3
Pakoon Springs Allotment available to graze
Pakoon Springs allotment unavailable for grazing
Not sufficient information to determine if meeting Standard #3, due to Natural Processes. Approx. 2,800 Acres (Wildfires 2005 & 2006).
Range Developments
Waterfowl Project
Developed Spring
Detention Dam
Fenced Reservoir
Livestock Catchment
Livestock Trough
Not Verified
Poison
Pot Hole
Pipeline
Windmill
Spreader Dike
Slickrock Catchment
Water Storage Tank
Unfenced Reservoir
Undeveloped Spring
Wildlife Catchment
Wildlife Drinker
Well
Avian Habitat Structure
Bucket Precip. Gauge
Building
Cabin-Esplins
Cattleguard
Corral
House
Key Area
Proposed Bucket Precip. Gauge
Proposed Cattleguard
RAWS Station
Recording Precip. Gauge
Squirrel Tree Box
Storage Bin
Surface Ownership
Private
State
This product may not meet agency standards for accuracy and content. Differing data sources and input scales may cause some misalignment of data layers.
N
W
E
S
0 0.5 1 2
Miles
This map was produced by Arizona Strip District Office Staff 3/12/09


Pakoon Allotment
Standard Number 1
Pakoon Allotment
Not Meeting Standard #1 due to Natural Processes Approx. 950 Acres (Wildfire 2005)
Range Developments
Waterfowl Project
Developed Spring
Detention Dam
Fenced Reservoir
Livestock Catchment
Livestock Trough
Not Verified
Poison
Pot Hole
Pipeline
Windmill
Spreader Dike
Sickrock Catchment
Water Storage Tank
Unfenced Reservoir
Undeveloped Spring
Wildlife Catchment
Wildlife Drinker
Well
Avian Habitat Structure
Bucket Precip. Gauge
Building
Cabin-Esplins
Cattleguard
Corral
House
Key Area
Proposed Bucket Precip. Gauge
Proposed Cattleguard
RAWS Station
Recording Precip. Gauge
Squirrel Tree Box
Storage Bin
Surface Ownership
Private
State
This map was produced by Arizona Strip District Office Staff 5/18/09
This product may not meet agency standards for accuracy and content. Differing data sources and input scales may cause some misalignment of data layers.
N
W
E
S
0 0.5 1 2 Miles
Cottonwood Ridge
Cedar Ridge
Cockscomb
Grand Wash
Hidden Cliffs
Squaw Canyon
Grand Gulch
Grand Gulch Mine
USMM Landing
Severio Mine


Pakoon Allotment
Standard Number 3
Pakoon Allotment
Not Meeting Standard #3 due to Natural Processes Approx. 6,300 Acres (Wildfire 2005)
Range Developments
Waterfowl Project
Developed Spring
Detention Dam
Fenced Reservoir
Livestock Catchment
Livestock Trough
Not Verified
Poison
Pot Hole
Pipeline
Windmill
Spreader Dike
Slickrock Catchment
Water Storage Tank
Unfenced Reservoir
Undeveloped Spring
Wildlife Catchment
Wildlife Drinker
Well
Avian Habitat Structure
Bucket Precip. Gauge
Building
Cabin-Esplins
Cattleguard
Corral
House
Key Area
Proposed Bucket Precip. Gauge
Proposed Cattleguard
RAWS Station
Recording Precip. Gauge
Squirrel Tree Box
Storage Bin
Surface Ownership
Private
State
This product may not meet agency standards for accuracy and content. Differing data sources and input scales may cause some misalignment of data layers.
N
W
E
S
0 0.5 1 2 Miles
Cottonwood Ridge
Cedar Ridge
Cockscomb
Grand Wash
Upper Wash
Deer Knoll
CLIFFS
HIDDEN
Squaw Canyon
Grand Gulch
Grand Gulch Mine
Landing Strip
Nephrohead
Burnt Spring
Corral
Tank
Hudson Point
Salvage Mine

Appendix D

ARIZONA STANDARDS FOR RANGELAND HEALTH AND GUIDELINES FOR GRAZING ADMINISTRATION

ARIZONA STANDARDS FOR RANGELAND HEALTH AND GUIDELINES FOR GRAZING ADMINISTRATION

INTRODUCTION

The Department of the Interior's final rule for Grazing Administration, issued on February 22, 1995, and effective August 21, 1995, requires that Bureau of Land Management (BLM) State Directors develop State or regional standards and guidelines for grazing administration in consultation with BLM Resource Advisory Councils (RAC), other agencies and the public. The final rule provides that fallback standards and guidelines be implemented, if State standards and guidelines are not developed by February 12, 1997. Arizona Standards and Guidelines and the final rule apply to grazing administration on public lands as indicated by the following quotation from the Federal Register, Volume 60, Number 35, page 9955.

> "The fundamentals of rangeland health, guiding principles for standards and the fallback standards address ecological components that are affected by all uses of public rangelands, not just livestock grazing. However, the scope of this final rule, and therefore the fundamentals of rangeland health of §4180.1, and the standards and guidelines to be made effective under §4180.2, are limited to grazing administration."

Although the process of developing standards and guidelines applies to grazing administration, present rangeland health is the result of the interaction of many factors in addition to grazing by livestock. Other contributing factors may include, but are not limited to, past land uses, land use restrictions, recreation, wildlife, rights-of-way, wild horses and burros, mining, fire, weather, and insects and disease.

With the commitment of BLM to ecosystem and interdisciplinary resource management, the standards for rangeland health as developed in this current process will be incorporated into management goals and objectives. The standards and guidelines for rangeland health for grazing administration, however, are not the only considerations in resolving resource issues.

The following quotations from the Federal Register, Vol. 60, No. 35, page 9956, February 22, 1995, describe the purpose of standards and guidelines and their implementation:

> "The guiding principles for standards and guidelines require that State or regional standards and guidelines address the basic components of healthy rangelands. The Department believes that by implementing grazing-related actions that are consistent with the fundamentals of §4180.1 and the guiding principles of §4180.2, the long-term health of public rangelands can be ensured.
>
> "Standards and guidelines will be implemented through terms and conditions of grazing permits, leases, and other authorizations, grazing-related portions of activity plans (including Allotment Management Plans), and through range improvement-related activities.
> "The Department anticipates that in most cases the standards and guidelines themselves will not be terms and conditions of various authorizations but that the terms and conditions will reflect the standards and guidelines.
>
> "The Department intends that assessments and corrective actions will be undertaken in priority order as determined by BLM.

"The Department will use a variety of data including monitoring records, assessments, and knowledge of the locale to assist in making the "significant progress" determination. It is anticipated that in many cases it will take numerous grazing seasons to determine direction and magnitude of trend. However, actions will be taken to establish significant progress toward conformance as soon as sufficient data are available to make informed changes in grazing practices."

FUNDAMENTALS AND DEFINITION OF RANGELAND HEALTH

The Grazing Administration Regulations, at §4180.1 (43 Code of Federal Regulation [CFR] 4180.1), Federal Register Vol. 60, No. 35, pg. 9970, direct that the authorized officer ensures that the following conditions of rangeland health exist:

(a) Watersheds are in, or are making significant progress toward, properly functioning physical condition, including their upland, riparian-wetland, and aquatic components; soil and plant conditions support infiltration, soil moisture storage, and the release of water that are in balance with climate and landform and maintain or improve water quality, water quantity, and timing and duration of flow.

(b) Ecological processes, including the hydrologic cycle, nutrient cycle, and energy flow, are maintained, or there is significant progress toward their attainment, in order to support healthy biotic populations and communities.

(c) Water quality complies with State water quality standards and achieves, or is making significant progress toward achieving, established BLM management objectives such as meeting wildlife needs.

(d) Habitats are, or are making significant progress toward being, restored or maintained for Federal threatened and endangered species, Federal Proposed, Category 1 and 2 Federal candidate and other special status species.

These fundamentals focus on sustaining productivity of a rangeland rather than its uses. Emphasizing the physical and biological functioning of ecosystems to determine rangeland health is consistent with the definition of rangeland health as proposed by the Committee on Rangeland Classification, Board of Agriculture, National Research Council (Rangeland Health, 1994, pg. 4 and 5). This Committee defined Rangeland Health ". . .as the degree to which the integrity of the soil and the ecological processes of rangeland ecosystems are sustained." This committee emphasized ". . .the degree of integrity of the soil and ecological processes that are most important in sustaining the capacity of rangelands to satisfy values and produce commodities." The Committee also recommended that "The determination of whether a rangeland is healthy, at risk, or unhealthy should be based on the evaluation of three criteria: degree of soil stability and watershed function, integrity of nutrient cycles and energy flow, and presence of functioning mechanisms" (Rangeland Health, 1994, pg. 97-98).

Standards describe conditions necessary to encourage proper functioning of ecological processes on specific ecological sites. An ecological site is the logical and practical ecosystem unit upon which to base an interpretation of rangeland health. Ecological site is defined as:

". . . a kind of land with specific physical characteristics which differs from other kinds of land in its ability to produce distinctive kinds and amounts of vegetation and in its response to management" (Journal of Range Management, 48:279, 1995). Ecological sites result from the interaction of climate, soils, and landform (slope, topographic position). The importance of this concept is that the "health" of different kinds

of rangeland must be judged by standards specific to the potential of the ecological site. Acceptable erosion rates, water quality, productivity of plants and animals, and other features are different on each ecological site.

Since there is wide variation of ecological sites in Arizona, standards and guidelines covering these sites must be general. To make standards and guidelines too specific would reduce the ability of BLM and interested publics to select specific objectives, monitoring strategies, and grazing permit terms and conditions appropriate to specific land forms.

Ecological sites have the potential to support several different plant communities. Existing communities are the result of the combination of historical and recent uses and natural events. Management actions may be used to modify plant communities on a site. The desired plant community for a site is defined as follows: "Of the several plant communities that may occupy a site, the one that has been identified through a management plan to best meet the plan's objectives for the site. It must protect the site as a minimum." (Journal of Range Management, 48:279, 1995.)

Fundamentals (a) and (b) define physical and biological components of rangeland health and are consistent with the definition of rangeland health as defined by the Committee on Rangeland Classification, Board on Agriculture, National Research Council, as discussed in the paragraph above. These fundamentals provide the basis for sustainable rangelands.

Fundamentals (c) and (d) emphasize compliance with existing laws and regulation and, therefore, define social and political components of rangeland health. Compliance with Fundamentals (c) and (d) is accomplished by managing to attain a specific plant community and associated wildlife species present on ecological sites. These desired plant communities are determined in the BLM planning process, or, where the desired plant community is not identified, a community may be selected that will meet the conditions of Fundamentals (a) and (b) and also adhere to laws and regulations. Arizona Standard 3 is written to comply with Fundamentals (c) and (d) and provide a logical combination of Standards and Guidelines for planning and management purposes.

STANDARD AND GUIDELINE DEFINITIONS

Standards are goals for the desired condition of the biological and physical components and characteristics of rangelands. Standards:

(1) are measurable and attainable; and
(2) comply with various Federal and State statutes, policies, and directives applicable to BLM Rangelands.

Guidelines are management approaches, methods, and practices that are intended to achieve a standard. Guidelines:

(1) typically identify and prescribe methods of influencing or controlling specific public land uses;
(2) are developed and applied consistent with the desired condition and within site capability; and
(3) may be adjusted over time.

IMPLEMENTING STANDARDS AND GUIDELINES

The authorized officer will review existing permitted livestock use, allotment management plans, or other activity plans which identify terms and conditions for management on public land. Existing management practices, and levels of use on grazing allotments will be reviewed and evaluated on a priority basis to determine if they meet, or are making significant progress toward meeting, the standards and are in conformance with the guidelines. The review will be interdisciplinary and conducted under existing rules which provide for cooperation, coordination, and consultation with affected individuals, federal, state, and local agencies, tribal governments, private landowners, and interested publics.

This review will use a variety of data, including monitoring records, assessments, and knowledge of the locale to assist in making the significant progress determination. Significance will be determined on a case by case basis, considering site potential, site condition, weather and financial commitment. It is anticipated there will be cases where numerous years will be needed to determine direction and magnitude of trend.

Upon completion of review, the authorized officer shall take appropriate action as soon as practicable but no later than the start of the next grazing year upon determining that the existing grazing management practices or level of use on public land are significant factors contributing to failure to achieve the standards and conform with the guidelines that are made effective under 43 CFR 4180.2. Appropriate action means implementing actions that will result in significant progress toward fulfillment of the standards and significant progress toward conformance with guidelines.

Livestock grazing will continue where significant progress toward meeting standards is being made. Additional activities and practices would not be needed on such allotments. Where new activities or practices are required to assure significant progress toward meeting standards, livestock grazing use can continue contingent upon determinations from monitoring data that the implemented actions are effective in making significant progress toward meeting the standards. In some cases, additional action may be needed as determined by monitoring data over time.

New plans will incorporate an interdisciplinary team approach (Arizona BLM Interdisciplinary Resource Management Handbook, April 1995). The terms and conditions for permitted grazing in these areas will be developed to comply with the goals and objectives of these plans which will be consistent with the standards and guidelines.

ARIZONA STANDARDS AND GUIDELINES

Arizona Standards and Guidelines (S&G) for grazing administration have been developed through a collaborative process involving the Bureau of Land Management State S&G Team and the Arizona Resource Advisory Council. Together, through meetings, conference calls, correspondence, and Open Houses with the public, the BLM State Team and RAC prepared Standards and Guidelines to address the minimum requirements outlined in the grazing regulations. The Standards and Guidelines, criteria for meeting Standards, and indicators are an integrated document that conforms to the fundamentals of rangeland health and the requirements of the regulations when taken as a whole.

Upland sites, riparian-wetland areas, and desired resource conditions are each addressed by a standard and associated guidelines.

Standard 1: Upland Sites

Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate and landform (ecological site).

Criteria for meeting Standard 1:

Soil conditions support proper functioning of hydrologic, energy, and nutrient cycles. Many factors interact to maintain stable soils and healthy soil conditions, including appropriate amounts of vegetative cover, litter, and soil porosity and organic matter. Under proper functioning conditions, rates of soil loss and infiltration are consistent with the potential of the site.

Ground cover in the form of plants, litter or rock is present in pattern, kind, and amount sufficient to prevent accelerated erosion for the ecological site; or ground cover is increasing as determined by monitoring over an established period of time.

Signs of accelerated erosion are minimal or diminishing for the ecological site as determined by monitoring over an established period of time.

As indicated by such factors as:

Ground Cover
- litter
- live vegetation, amount and type (e.g., grass, shrubs, trees, etc.)
- rock

Signs of erosion
- flow pattern
- gullies
- rills
- plant pedestaling

Exceptions and exemptions (where applicable):

None

Guidelines:

1-1. Management activities will maintain or promote ground cover that will provide for infiltration, permeability, soil moisture storage, and soil stability appropriate for the ecological sites within management units. The ground cover should maintain soil organisms and plants and animals to support the hydrologic and nutrient cycles, and energy flow. Ground cover and signs of erosion are surrogate measures for hydrologic and nutrient cycles and energy flow.

1-2. When grazing practices alone are not likely to restore areas of low infiltration or permeability, land management treatments may be designed and implemented to attain improvement.

Standard 2: Riparian-Wetland Sites

Riparian-wetland areas are in properly functioning condition.

Criteria for meeting Standard 2:

Stream channel morphology and functions are appropriate for proper functioning condition for existing climate, landform, and channel reach characteristics. Riparian-wetland areas are functioning properly when adequate vegetation, land form, or large woody debris is present to dissipate stream energy associated with high water flows.

Riparian-wetland functioning condition assessments are based on examination of hydrologic, vegetative, soil and erosion-deposition factors. BLM has developed a standard checklist to address these factors and make functional assessments. Riparian-wetland areas are functioning properly as indicated by the results of the application of the appropriate checklist.

The checklist for riparian areas is in Technical Reference 1737-9 "Process for Assessing Proper Functioning Condition." The checklist for wetlands is in Technical Reference 1737-11 "Process for Assessing Proper Functioning Condition for Lentic Riparian-Wetland Areas."

As indicated by such factors as:

Gradient
Width/depth ratio
Channel roughness and sinuosity of stream channel
Bank stabilization
Reduced erosion
Captured sediment
Ground-water recharge
Dissipation of energy by vegetation

Exceptions and exemptions (where applicable):

Dirt tanks, wells, and other water facilities constructed or placed at a location for the purpose of providing water for livestock and/or wildlife and which have not been determined through local planning efforts to provide for riparian or wetland habitat are exempt.

Water impoundments permitted for construction, mining, or other similar activities are exempt.

Guidelines:

2-1. Management practices maintain or promote sufficient vegetation to maintain, improve or restore riparian-wetland functions of energy dissipation, sediment capture, groundwater recharge and stream bank stability, thus promoting stream channel morphology (e.g., gradient, width/depth ratio, channel roughness and sinuosity) and functions appropriate to climate and landform.
2-2. New facilities are located away from riparian-wetland areas if they conflict with achieving or maintaining riparian-wetland function. Existing facilities are used in a way that does not conflict with riparian-wetland functions or are relocated or modified when incompatible with riparian-wetland functions.

2-3. The development of springs and seeps or other projects affecting water and associated resources shall be designed to protect ecological functions and processes.

Standard 3: Desired Resource Conditions

Productive and diverse upland and riparian-wetland plant communities of native species exist and are maintained.

Criteria for meeting Standard 3:

Upland and riparian-wetland plant communities meet desired plant community objectives. Plant community objectives are determined with consideration for all multiple uses. Objectives also address native species, and the requirements of the Taylor Grazing Act, Federal Land Policy and Management Act, Endangered Species Act, Clean Water Act, and appropriate laws, regulations, and policies.

Desired plant community objectives will be developed to assure that soil conditions and ecosystem function described in Standards 1 and 2 are met. They detail a site-specific plant community, which when obtained, will assure rangeland health, State water quality standards, and habitat for endangered, threatened, and sensitive species. Thus, desired plant community objectives will be used as an indicator of ecosystem function and rangeland health.

As indicated by such factors as:

Composition
Structure
Distribution

Exceptions and exemptions (where applicable):

Ecological sites or stream reaches on which a change in existing vegetation is physically, biologically, or economically impractical.

Guidelines:

3-1. The use and perpetuation of native species will be emphasized. However, when restoring or rehabilitating disturbed or degraded rangelands, non-intrusive, non-native plant species are appropriate for use where native species (a) are not available, (b) are not economically feasible, (c) cannot achieve ecological objectives as well as non-native species, and/or (d) cannot compete with already established non-native species.

3-2. Conservation of Federal threatened or endangered, proposed, candidate, and other special status species is promoted by the maintenance or restoration of their habitats.

3-3. Management practices maintain, restore, or enhance water quality in conformance with State or Federal standards.

3-4. Intensity, season and frequency of use, and distribution of grazing use should provide for growth and reproduction of those plant species needed to reach desired plant community objectives.

3-5. Grazing on designated ephemeral (annual and perennial) rangeland may be authorized if the following conditions are met:

ephemeral vegetation is present in draws, washes, and under shrubs and has grown to useable levels at the time grazing begins;

sufficient surface and subsurface soil moisture exists for continued plant growth;

serviceable waters are capable of providing for proper grazing distribution;

sufficient annual vegetation will remain on site to satisfy other resource concerns, (i.e., watershed, wildlife, wild horses and burros); and

monitoring is conducted during grazing to determine if objectives are being met.

3-6. Management practices will target those populations of noxious weeds which can be controlled or eliminated by approved methods.

3-7. Management practices to achieve desired plant communities will consider protection and conservation of known cultural resources, including historical sites, and prehistoric sites and plants of significance to Native American peoples.

Appendix E

TEAM MEMBERSHIP

Interdisciplinary Assessment Team

Linda Price	Former Project Coordinator (BLM)
Karen (Kitti) Jensen	Former Wildlife Biologist (BLM)
Diana Hawks	Team Lead, Wilderness/Recreation/Cultural Resources (BLM)
Brandon Boshell	Vegetation/Grazing Administration (BLM)
Robert Smith	Soil Scientist/Watershed Management (BLM)
Whit Bunting	Team Lead, Rangeland Resources (BLM)
Luke Thompson	Wildlife Manager (Arizona Game and Fish Department)
Kyle Spencer	Soils and Vegetation (Natural Resource Conservation Service)
Rob Grumbles	Vegetation and Social Economics (Mohave County Extension Service)
Brian Wooldridge	Fish & Wildlife Biologist (USFWS)

Rangeland Resource Team

Commodity Interests

Bill Gubler,
Grazing
Rancher, St. George, UT

Bill Howes
Off Road Vehicle Use
Wizards Motorcycle Club

Kent McComb,
Grazing
Retired, St. George, UT

Non-Commodity Interests

Scott Hansen,
Environmental Conservation
Retired, St. George, UT

Spence Esplin,
Historical
Retired, St. George, UT

Phil Squire,
Dispersed Recreation/Wildlife
Retired, St. George, UT

Local Area Interests

Frank Malan,
Public-at-Large
Retired, St. George, UT

Roger McPeek
Public-at-Large
Retired, St. George, UT

Dennis Becenti
Native American Interests
Hopi and Navajo Tribes, AZ

Alternates

Maggie Sacher,
CommErodium cicutariumal
Recreation/Tourism
Owner: Lee's Ferry Lodge,
Marble Canyon, AZ

Paul Weaver
Non-Commodity
St. George, UT

Appendix F:
PRECIPITATION DATA

Cottonwood Wash Ex Precipitation Rain Gauge #4										
	Fall	Winter	Spring	Summer	Annual	Fall % Avg	Winter % Avg	Spring % Avg	Summer % Avg	Annual % Avg
Annual Average	1.80	4.87	1.99	3.23	11.89					
Year										
1978	1.14	15.41	2.91	2.66	22.12	64%	325%	145%	81%	187%
1979	3.88	5.14	4.00	2.25	15.27	219%	108%	199%	69%	129%
1980	0.50	0.90	1.09	3.04	5.53	28%	19%	54%	93%	47%
1981	1.59	2.00	3.00	2.90	9.49	90%	42%	149%	89%	80%
1982	0.98	2.75	2.40	5.63	11.76	55%	58%	119%	172%	100%
1983	3.95	5.75	2.86	4.16	16.72	223%	121%	142%	127%	142%
1984	2.38	0.98	0.55	7.28	11.19	134%	21%	27%	223%	95%
1985	1.93	6.50	0.75	2.15	11.33	109%	137%	37%	66%	96%
1986	3.25	2.10	3.70	3.33	12.38	183%	44%	184%	102%	105%
1987	1.19	4.38	1.80	3.19	10.56	67%	92%	89%	98%	89%
1988	3.94	3.12	3.07	4.12	14.25	222%	66%	153%	126%	121%
1989	0.60	4.14	0.64	3.52	8.9	34%	87%	32%	108%	75%
1990	0.43	2.60	2.17	3.90	9.1	24%	55%	108%	119%	77%
1991	1.32	3.36	1.91	4.62	11.21	74%	71%	95%	141%	95%
1992	1.17	5.50	5.16	1.45	13.28	66%	116%	256%	44%	113%
1993	3.20	12.30	1.88	1.24	18.62	180%	259%	93%	38%	158%
1994	2.00	2.40	1.36	7.75	13.51	113%	51%	68%	237%	114%
1995	1.54	9.46	1.50	2.50	15	87%	200%	75%	76%	127%
1996	1.12	2.88	0.63	2.37	7	63%	61%	31%	72%	59%
1997	2.25	4.85	1.15	5.50	13.75	127%	102%	57%	168%	117%
1998	1.00	5.52	2.40	5.33	14.25	56%	116%	119%	163%	121%
1999	2.80	1.45	2.25	4.00	10.5	158%	31%	112%	122%	89%
2000	0.00	3.87	0.26	3.10	7.23	0%	82%	13%	95%	61%
2001	3.45	8.45	4.10	5.50	21.5	194%	178%	204%	168%	182%
2002	0.50	0.88	0.63	1.74	3.75	28%	19%	31%	53%	32%
2003	1.13	3.37	2.50	1.00	8	64%	71%	124%	31%	68%
2004	0.70	4.42	1.01	0.87	7	39%	93%	50%	27%	59%
2005	6.50	12.25	2.75	2.75	24.25	366%	258%	137%	84%	206%
2006	1.25	0.50	2.50	4.25	8.5	70%	11%	124%	130%	72%
2007	1.25	1.00	0.38	2.88	5.5	70%	21%	19%	88%	47%
2008	0.00	6.50	0.25	1.88	8.63	0%	137%	12%	57%	73%
2009	1.38	4.12	0.50	0.50	6.5	78%	87%	25%	15%	55%
2010	0.25	7.63	4.37	0.58	12.83	14%	161%	217%	18%	109%
2011	2.68	9.07	1.25	1.80	14.80	149%	186%	63%	56%	124%
2012	2.00	3.00				111%	62%			
Percent of Average by Season	15%	40%	17%	28%						

Pakoon Precipitation Rain Gauge #10										
	Fall	Winter	Spring	Summer	Annual	Fall % Avg	Winter % Avg	Spring % Avg	Summer % Avg	Annual % Avg
Annual Average	1.27	3.07	1.25	1.70	7.29					
Year										
1979	2.91	3.96	1.42	0.48	8.77	229%	129%	113%	28%	120%
1980	0.42	7.61	0.75	2.35	11.13	33%	248%	60%	138%	153%
1981	0.83	1.61	3.27	2.20	7.91	65%	52%	261%	130%	109%
1982	0.60	1.82	1.67	2.40	6.49	47%	59%	133%	141%	89%
1983	1.13	3.24	1.41	3.55	9.33	89%	106%	112%	209%	128%
1984	0.50	0.76	0.13	2.49	3.88	39%	25%	10%	147%	53%
1985	0.25	3.20	0.90	1.51	5.86	20%	104%	72%	89%	80%
1986	1.65	2.81	0.50	2.33	7.29	130%	92%	40%	137%	100%
1987	1.15	2.33	1.26	0.83	5.57	91%	76%	101%	49%	76%
1988	3.15	1.98	1.80	1.34	8.27	248%	65%	144%	79%	113%
1989	0.18	1.81	0.26	0.85	3.1	14%	59%	21%	50%	43%
1990	0.46	2.29	0.67	4.67	8.09	36%	75%	53%	275%	111%
1991	0.47	1.42	3.07	0.37	5.33	37%	46%	245%	22%	73%
1992	0.85	4.40	3.20	1.48	9.93	67%	143%	255%	87%	136%
1993	3.25	8.25	0.87	0.30	12.67	256%	269%	69%	18%	174%
1994	2.43	1.89	1.43	0.20	5.95	191%	62%	114%	12%	82%
1995	1.25	3.25	2.60	7.10	14.2	98%	106%	207%	418%	195%
1996	0.00	1.75	0.00	1.50	3.25	0%	57%	0%	88%	45%
2004				1.00					59%	
2005	6.00	7.00	1.63	1.59	16.22	472%	228%	130%	94%	222%
2006	1.13	0.12	1.00	0.50	2.75	89%	4%	80%	29%	38%
2007	0.75	0.25	0.25	1.75	3	59%	8%	20%	103%	41%
2008	0.00	4.00	0.25	1.00	5.25	0%	130%	20%	59%	72%
2009	1.00	3.25	0.25	0.25	4.75	79%	106%	20%	15%	65%
2010	0.13	4.62	1.50	0.38	6.63	10%	151%	120%	22%	91%
2011	2.38	3.88	0.00	0.75	7.00	181%	125%	0%	45%	96%
2012	2.25	.75				167%	25%			
Percent of Average by Season	17%	42%	17%	23%						

Olaf Knolls Precipitation Rain Gauge #9										
	Fall	Winter	Spring	Summer	Annual	Fall % Avg	Winter % Avg	Spring % Avg	Summer % Avg	Annual % Avg
Annual Average	1.33	3.72	1.89	2.04	8.98					
Year										
1988	0.00	1.84	2.60	3.10	7.54	0%	53%	140%	151%	87%
1989	0.54	2.02	0.77	3.10	6.43	41%	58%	41%	151%	74%
1990	0.33	2.27	1.48	3.64	7.72	25%	65%	80%	178%	89%
1991	0.99	1.84	2.93	1.08	6.84	75%	53%	158%	53%	78%
1992	0.67	4.33	3.85	1.71	10.56	51%	124%	207%	84%	121%
1993	2.17	10.31	1.52	0.50	14.5	165%	295%	82%	24%	166%
1994	1.89	2.45	1.47	0.69	6.5	143%	70%	79%	34%	75%
1995	0.80	4.95	5.23	1.75	12.73	61%	142%	281%	85%	146%
1996	0.53	3.00	0.52	1.68	5.73	40%	86%	28%	82%	66%
1997	2.25	3.80	0.57	2.96	9.58	171%	109%	31%	145%	110%
1998	0.93	4.36	2.52	4.74	12.55	71%	125%	136%	232%	144%
1999	2.88	1.17	1.46	5.34	10.85	218%	34%	79%	261%	124%
2000	0.00	2.82	1.01	1.85	5.68	0%	81%	54%	90%	65%
2001	3.99	3.88	3.65	1.48	13	303%	111%	196%	72%	149%
2002	0.14	1.10	0.11	0.34	1.69	11%	32%	6%	17%	19%
2003	0.33	2.77	3.59	1.38	8.07	25%	79%	193%	67%	93%
2004	0.59	3.48	0.60	1.81	6.48	45%	100%	32%	88%	74%
2005	6.67	9.31	2.56	2.35	20.89	506%	267%	138%	115%	240%
2006	1.05	0.55	3.06	1.64	6.3	80%	16%	165%	80%	72%
2007	1.84	0.94	0.51	2.30	5.59	140%	27%	27%	112%	64%
2008	0.00	2.42	0.28	1.88	4.58	0%	69%	15%	92%	53%
2009	1.41	3.93	0.57	0.72	6.63	107%	113%	31%	35%	76%
2010	0.32	6.76	1.91	1.04	10.03	24%	194%	103%	51%	115%
2011	1.71	8.92	2.55	1.87	15.05	128%	240%	135%	92%	168%
2012	2.8	1.52				201%	42%			
Percent of Average by Season	15%	40%	21%	24%						

Appendix G:
Frequency Data

PAKOON SPRINGS

Site History

Allotment: Pakoon Springs Pasture: Big Hole **Site: 1**

% Ground Cover

Category	2/4/82	3/1/85	3/28/87	8/18/93	10/11/96	1/8/98	6/14/99	7/31/01	5/13/08
Ground Cover									
Bare Ground	27	53	69	6	16	16	12	13	38
Litter									59
Rock	1	3	1	1	1	1	1		3
Live Basal Veg.	1	1		1	11	5	7	3	1
Litter - Non-Persistent	71	42	28	92	72	78	81	84	
Litter - Persistent	1	2	1			1			

% Plant Frequency

Quadrat Size: **40x40 cm**

Species	2/4/82	3/1/85	3/28/87	8/18/93	10/11/96	1/8/98	6/14/99	7/31/01	5/13/08
Woody Species									
Acamptopappus	1	1	1	1	1				
Artemisia filifolia							1		
Ephedra nevadensis	1	1	1	1	2		3	1	
Gutierrezia sarothrae		2	4	3	5	4	5	2	
Larrea tridentata		1				1	1	1	
Lycium andersonii	1	1	1		1				
Opuntia			1	1					
Opuntia - Cholla	1	2			2	1		1	
Opuntia acanthocarpa							2		1
Prunus fasciculata	1	2		1	1	1	1	2	
Psilostrophe cooperi				1			1		
Salazaria mexicana	1								
shrub/half-shrub							1		
Yucca brevifolia				1					
Grasses - Perennial									
Aristida longiseta	2	3	7	10	10		2	2	2
Hilaria rigida	1	3	1			1	1	1	
Oryzopsis hymenoides				1		1			
Sporobolus cryptandrus	15	6	3						
Sporobolus flexuosus				15	7	8	52	22	4
Tridens pulchellus	1						2		
Forbs - Perennial/Biennial									
Baileya multiradiata			1				1		1
Datura meteloides									1
Eriogonum inflatum								1	
Sphaeralcea					1	1	1	1	
Annuals									
Allionia incarnata									3
Annual forb(s)							2	1	
Bouteloua barbata						64			
Bromus rubens				88	62	30		84	28
Eriogonum - annual forb #1				5					
Eriogonum deflexum					10	4			
Eriogonum trichopes								1	
Erodium cicutarium			77			4		80	99
Pectis papposa						9			
Schismus barbatus									1
Unclassified									
Abronia					1				
Allionia						1	1		
Bromus			88						
Croton californicus					2	1	1		
Cruciferae									1
Euphorbia									1
Lepidium								3	
Pectis					5				
Tidestromia					6	34			

Site History

Allotment: Pakoon Springs Pasture: Waynes Well **Site: 2**

% Ground Cover

Category	2/4/82	3/1/85	3/28/89	1/8/98	12/7/00	5/13/08
Ground Cover						
Bare Ground	81	80	61	60	55	49
Litter						49
Rock	1	1	1			2
Live Basal Veg.	1	3	2	10	13	1
Litter - Non-Persistent	18	15	33	28	30	
Litter - Persistent	1	2	3	1	2	

% Plant Frequency

Species	2/4/82	3/1/85	3/28/89	1/8/98	12/7/00	5/13/08
Woody Species						
Acamptopappus					2	
Ambrosia dumosa	3	3	1	1	2	1
Coleogyne ramosissima	1	1		1	1	
Encelia farinosa	1	1				
Encelia frutescens				1		2
Ephedra nevadensis			14	19	13	1
Gutierrezia sarothrae		1		2	4	
Krameria parvifolia	3	2	1	1	2	
Larrea tridentata	9	6	8	5	5	
Lycium andersonii				1		
Opuntia	6					
Opuntia - Cholla		11	9			
Opuntia acanthocarpa				3	6	
Opuntia echinocarpa					1	
Psilostrophe cooperi				2		1
Salvia dorrii	1	1		1		
shrub/half-shrub			10			
Thamnosma montana	1	3	2	1	1	
Yucca baccata				1		1
Yucca brevifolia	3	7	7	7	9	
Grasses - Perennial						
Aristida	1	1				
Aristida longiseta			2	5	20	
Bouteloua gracilis		1				
Hilaria rigida	4	8	5	6	11	2
Muhlenbergia porteri					2	
Oryzopsis hymenoides	1	1	1	5		1
Tridens pulchellus		1			8	
Forbs - Perennial/Biennial						
Baileya multiradiata				6	9	11
Oenothera caespitosa						1
Sphaeralcea	29	27		1		
Annuals						
Bromus rubens				4	1	6
Eriastrum				1		2
Erodium cicutarium			21		3	88
Pectis papposa				15		
Phacelia crenulata						1
Schismus barbatus						81
Unclassified						
Bromus			47			
Croton californicus	12			8	2	
Ephedra	17	16				
Eriogonum						1
Euphorbia			5			11
Oenothera deltoides					1	

Site History

Allotment: Pakoon Springs Pasture: Pakoon Wash **Site: 3**

% Ground Cover

Category	2/4/82	3/1/85	2/28/89	1/13/98	4/17/08
Ground Cover					
Bare Ground	46	68	46	49	28
Cryptogam					4
Litter					23
Rock	50	15	11	41	45
Live Basal Veg.		1	2	6	1
Litter - Non-Persistent	4	15	42	4	
Litter - Persistent	1	2			

% Plant Frequency

Quadrat

Species	2/4/82	3/1/85	2/28/89	1/13/98	4/17/08
Woody Species					
Acamptopappus	1	1	1		
Ambrosia dumosa	5	5	5	5	7
Ephedra nevadensis		1	1		
Krameria grayi		1	2	1	3
Larrea tridentata	18	27	30	17	29
Lycium andersonii					1
Opuntia	2	3	4		
Opuntia acanthocarpa				2	1
Grasses - Perennial					
Tridens pulchellus		1	5		
Forbs - Perennial/Biennial					
Eriogonum inflatum		2			
Annuals					
Annual forb(s)					74
Bromus rubens					14
Erodium cicutarium			62		87
Plantago insularis					15
Schismus barbatus					99
Unclassified					
Amsinckia					15
Bromus			99		
Cruciferae-Annual					16
Plantago			6		

Site History

Allotment: Pakoon Springs Pasture: Burro Springs **Site: 4**

% Ground Cover

Category	5/15/90	1/13/98	4/17/08
Ground Cover			
Bare Ground	82	84	76
Litter			13
Rock	1	1	8
Live Basal Veg.	9	11	3
Litter - Non-Persistent	7	4	

% Plant Frequency

Species	5/15/90	1/13/98	4/17/08
Woody Species			
Ambrosia dumosa	29	20	36
Ceratoides lanata		3	3
Ephedra torreyana	2	1	
Hymenoclea salsola			1
Krameria parvifolia	4	4	5
Larrea tridentata	1		4
Opuntia acanthocarpa			1
Yucca brevifolia	2	5	1
Grasses - Perennial			
Aristida longiseta	3		
Hilaria rigida	16	12	11
Oryzopsis hymenoides	3	1	1
Sporobolus cryptandrus	1	1	
Forbs - Perennial/Biennial			
Oenothera caespitosa			2
Annuals			
Annual forb(s)			13
Bromus rubens			1
Chorizanthe rigida			1
Plantago insularis			1
Schismus barbatus			85
Unclassified			
Cuscuta			1
Euphorbia			1

PAKOON ALLOTMENT

Site History

Allotment: Pakoon Pasture: Pakoon **Site: 1**

% Ground Cover

Category	2/18/82	1/27/86	8/13/91	4/16/08
Ground Cover				
Bare Ground	46	45	48	42
Cryptogam				5
Litter				24
Rock	32	12	17	30
Live Basal Veg.	2	1	4	
Litter - Non-Persistent	16	43		
Litter - Persistent	5		32	

% Plant Frequency

Species	2/18/82	1/27/86	8/13/91	4/16/08
Woody Species				
Acacia greggii	2	2	1	3
Ambrosia dumosa	9	16	20	22
Bebbia				1
Ceratoides lanata	2	4	10	1
Chrysothamnus viscidiflorus	4		1	1
Ephedra nevadensis	1	1	4	2
Gutierrezia sarothrae	6	9	3	6
Hymenoclea salsola			1	1
Krameria parvifolia	4	8	11	8
Larrea tridentata	1	9	2	6
Mimosa biuncifera				2
Opuntia		4	2	
Opuntia acanthocarpa	1			1
shrub/half-shrub		2		
Yucca baccata			2	
Yucca brevifolia				2
Grasses - Perennial				
Aristida longiseta	3	2	6	
Bouteloua eriopoda	5			
Hilaria rigida	13	11	18	1
Muhlenbergia porteri		6	8	1
Oryzopsis hymenoides		2	3	
Tridens pulchellus	3	2	11	2
Forbs - Perennial/Biennial				
Baileya multiradiata		1	5	
Calochortus				1
Eriogonum inflatum		1	17	
Lesquerella				3
Sphaeralcea	2	1	2	
Annuals				
Annual forb(s)				56
Bromus rubens				37
Erodium cicutarium				97
Phacelia crenulata				1
Plantago insularis				9
Schismus barbatus				48
Unclassified				
Cruciferae-annual				36

Site History

Allotment: Pakoon Pasture: Pakoon **Site: 2**

% Ground Cover

Category	2/18/82	1/27/86	8/13/91	5/15/08
Ground Cover				
Bare Ground	72	58	63	57
Cryptogam				4
Litter				38
Rock	2	3	5	2
Live Basal Veg.	1	2	3	1
Litter - Non-Persistent	17	38		
Litter - Persistent	9		30	

% Plant Frequency

Species	2/18/82	1/27/86	8/13/91	5/15/08
Woody Species				
Acamptopappus sphaerocephalus				2
Ambrosia dumosa			1	
Ceratoides lanata	1	2	5	1
Chrysothamnus viscidiflorus	4	5	4	
Ephedra nevadensis	2	6	3	
Grayia spinosa		1	2	
Gutierrezia sarothrae	1	2	7	3
Hymenoclea salsola				2
Krameria parvifolia	2	1	1	2
Larrea tridentata	9	8	12	11
Lycium andersonii				1
Opuntia		2		
Opuntia acanthocarpa	1			1
shrub/half-shrub			1	
Yucca baccata			1	
Yucca brevifolia	2	4	3	5
Grasses - Perennial				
Aristida longiseta	1	3	1	2
Hilaria rigida	6	12	23	4
Muhlenbergia porteri	6	16	14	2
Oryzopsis hymenoides	1	2	1	
Sporobolus cryptandrus	1	4	1	
Tridens pulchellus			1	
Forbs - Perennial/Biennial				
Baileya multiradiata		3	1	
Eriogonum inflatum			23	
Sphaeralcea		1	5	1
Annuals				
Bromus rubens				3
Erodium cicutarium				88
Schismus barbatus				96
Unclassified				
Cruciferae				14
Eriogonum				3

Site History

Allotment: Pakoon Pasture: Pakoon **Site: 3**

% Ground Cover

Category	6/18/82	1/27/86	8/13/91	4/16/08
Ground Cover				
Bare Ground	41	29	37	44
Cryptogam				1
Litter				48
Rock		4	3	6
Live Basal Veg.		1	8	2
Litter - Non-Persistent	59	67		
Litter - Persistent			53	

% Plant Frequency

Species	6/18/82	1/27/86	8/13/91	4/16/08
Woody Species				
Bebbia juncea				2
Chrysothamnus viscidiflorus			1	
Ephedra nevadensis	1		3	1
Grayia spinosa			1	
Gutierrezia sarothrae	6	14	23	30
Hymenoclea salsola				1
Opuntia		1		
Psilostrophe cooperi	2	6	2	
shrub/half-shrub			1	
Yucca baccata				1
Yucca brevifolia	1	1	1	1
Grasses - Perennial				
Aristida	1			
Aristida longiseta		19	24	3
Hilaria rigida	4	11	27	10
Oryzopsis hymenoides			1	
Sporobolus cryptandrus	2	25	46	1
Tridens pulchellus	1	26	6	
Forbs - Perennial/Biennial				
Baileya multiradiata		2		
Eriogonum inflatum			1	
Sphaeralcea	1	2	2	1
Annuals				
Annual forb(s)				2
Bromus rubens				60
Erodium cicutarium				97
Schismus barbatus				49
Unclassified				
Baileya	1			
Cruciferae-Annual				17
Eriogonum-Annual				1

Site History

Allotment: Pakoon | Pasture: Pakoon | **Site: Joshua Tree Exclosure - inside burned**

% Ground Cover

Category	1/16/85	12/27/89	1/27/00
Ground Cover			
Bare Ground	72	89	60
Litter			36
Live Basal Veg.	1	1	5
Litter - Non-Persistent	24	6	
Litter - Persistent	1		
Rock	2	5	

% Plant Frequency

Quadrat Size: 40x40 cm

Species	1/16/85	12/27/89	1/27/00
Woody Species			
Ambrosia dumosa	3	2	5
Ephedra nevadensis	1	1	
Gutierrezia sarothrae		1	3
Hymenoclea salsola		1	
Krameria parvifolia	1	1	3
Larrea tridentata	2	4	1
Lycium andersonii		1	
Opuntia - Cholla		1	
Tridens muticus		1	
Grasses - Perennial			
Aristida longiseta	2	3	7
Hilaria rigida	1		
Tridens pulchellus	9	10	36
Forbs - Perennial/Biennial			
Eriogonum - perennial forb #1		41	
Eriogonum inflatum	1		
Sphaeralcea	1	4	9
Annuals			
Bouteloua barbata		40	32
Bromus rubens			3
Eriogonum - annual forb #1		1	
Unclassified			
Allionia			2
Baileya		1	
Euphorbia		2	
Tidestromia			8

Site History

Allotment: Pakoon | Pasture: Pakoon | **Site: Joshua Tree Exclosure - outside burned**

% Ground Cover

Category	1/16/85	12/27/89	1/27/00
Ground Cover			
Bare Ground	74	96	76
Live Basal Veg.		1	2
Litter - Non-Persistent	24	3	22
Litter - Persistent	1		
Rock	1	1	

% Plant Frequency

Quadrat Size: 40x40 cm

Species	1/16/85	12/27/89	1/27/00
Woody Species			
Ambrosia dumosa	3	2	2
Ephedra nevadensis	1	1	
Ephedra torreyana			1
Krameria parvifolia	1		1
Larrea tridentata	1	1	6
Lycium andersonii	1	1	1
Opuntia - Cholla	1	1	
Opuntia acanthocarpa			1
Grasses - Perennial			
Aristida longiseta	1	5	6
Sporobolus flexuosus			1
Tridens pulchellus	9	16	45
Forbs - Perennial/Biennial			
Balleya multiradiata		2	1
Eriogonum - perennial forb #1		44	
Sphaeralcea		1	6
Annuals			
Bouteloua barbata		36	24
Bromus tectorum		3	
Eriogonum - annual forb #1		1	
Unclassified			
Tidestromia			1

Allotment:	Pakoon	Pasture: Pakoon			
Category	Site:	Joshua Tree Exclosure - inside unburned			
Ground Cover	1/16/85	12/27/89	1/27/00	6/9/04	5/15/08
Bare Ground	82	64	57	33	28
Cryptogam					15
Litter					33
Rock	1	5	2	9	24
Live Basal Veg.	1	2	9	1	1
Litter - Non-Persistent	16	29	31	18	
Litter - Persistent			1	40	
% Ground Cover	18	36	43	68	73
% Plant Frequency	1/16/85	12/27/89	1/27/00	6/9/04	5/15/08
Woody Species					
Acamptopappus			1		
Acamptopappus sphaerocephalus				1	1
Ambrosia dumosa	4	1	5	5	2
Bebbiaa juncea					2
Krascheninnikovia lanata	1		1	1	1
Chrysothamnus	1				
Chrysothamnus viscidiflorus		1			
Encelia frutescens					3
Encelia virginensis				2	
Ephedra nevadensis	1		1	2	
Eriogonum - shrub #1				1	
Gutierrezia sarothrae	3	1	6	4	11
Hymenoclea salsola				1	1
Krameria parvifolia	1	4	6	7	7
Larrea tridentata	7	7	7	6	6
Lycium andersonii				1	
Opuntia	1	2			
Opuntia acanthocarpa			1	2	4
Opuntia echinocarpa				1	2
Psilostrophe cooperi				1	1
Tridens muticus			1		
Yucca brevifolia	2	2	7	3	5
Grasses - Perennial					
Aristida longiseta	2	2	3	1	2
Hilaria rigida	4	2	5	5	
Muhlenbergia porteri	5	5	3	2	3
Sporobolus cryptandrus		2			
Tridens pulchellus		3	6		
Forbs - Perennial/Biennial					
Baileya multiradiata		1	3		
Eriogonum - perennial forb #1		1			
Eriogonum inflatum		1	4	1	
Sphaeralcea	1		1	1	1
Annuals					
Allionia incarnata			3		
Bouteloua barbata		21	25		
Bromus rubens		1			16
Erodium cicutarium					94
Plantago insularis					6
Schismus barbatus					64
Unclassified					
Cruciferae					26
Encelia		1	1		
Tidestromia			3		

Site History

Allotment: Pakoon | Pasture: Pakoon | **Site: Joshua Tree Exclosure - outside unburned**

% Ground Cover

Category	1/16/85	12/27/89	1/27/00	6/9/04
Ground Cover				
Bare Ground	58	66	55	27
Live Basal Veg.	1	2	8	1
Litter - Non-Persistent	37	27	33	15
Litter - Persistent			1	50
Rock	3	5	3	8

% Plant Frequency

Quadrat Size: 40x40 cm

Species	1/16/85	12/27/89	1/27/00	6/9/04
Woody Species				
Acamptopappus		1	1	
Acamptopappus sphaerocephalus				2
Ambrosia dumosa	3	1	1	3
Ceratoides lanata	1		1	2
Chrysothamnus viscidiflorus		1	1	
Encelia virginensis				1
Ephedra nevadensis		1	1	
Gutierrezia sarothrae	4	6	8	7
Hymenoclea salsola				1
Krameria parvifolia	3	4	7	5
Larrea tridentata	3	5	2	5
Lycium andersonii	1		1	1
Opuntia	1	1		
Opuntia acanthocarpa			1	
Opuntia echinocarpa				1
shrub/half-shrub	1		1	
Stephanomeria pauciflora				1
Tridens muticus				1
Yucca brevifolia	3	4	3	1
Grasses - Perennial				
Aristida longiseta		1	3	3
Hilaria rigida	1	2	1	2
Muhlenbergia porteri	9	5	4	3
Sporobolus cryptandrus	1	1		
Sporobolus flexuosus			1	
Tridens pulchellus	2	5	23	
Forbs - Perennial/Biennial				
Baileya multiradiata		2	3	1
Eriogonum - perennial forb #1		12		
Eriogonum inflatum			3	1
Sphaeralcea	2	2		1
Annuals				
Allionia incarnata			8	
Bouteloua barbata		21	51	
Bromus rubens		1	1	
Unclassified				
Composite perennial forb #1				1
Encelia			1	
Euphorbia		3		
Tidestromia			3	

Appendix H:
Ecological Data

PAKOON SPRINGS

Key Area: #1	Allotment:	Pakoon Springs			
	Pasture:	Bighole			
	Range Site:	Map Unit #77; Limy Upland (Deep) 6-9" pz			
Plant Species	Site-Guide Allowable Percent Composition	1993	1994	2008	Desired Percent Composition Objective
Grasses	5-15%	14%	21%*	84%*	5-15%
Sporobolus flexious	PPGG	8%	15%*	54%*	
Aristida	0-2%	6%	4%*	30%*	
Pleuraphis rigida	1-5%				
Dasyochloa pulchella	0-2%				
Achnatherum hymenoides	1-5%				
Other perennial grasses (PPGG)	Not listed				
Sporobolus spp	PPGG		2%		
Forbs	5-10%	77%	76%*	15%*	5-10%
Baileya multiradiata				10%	
Datura		1%		5%	
Bromus rubens		72%	67%		
Erodium cicutarium					
Eriogonum		4%			
Eriogonum deflexum			1%		
Euphorbia			6%		
Other annual forbs (AAFF)	1-5%				
Shrubs/Trees	80-91%	9%	3%	2%	65-80%
Prunus fasciculata	SSSS		1%		
Psilostrophe cooperi	SSSS				
Opuntia	1-6%		1%	2%	
Croton californicus			1%		
Acamptopappus sphaerocephalus	3-8%	1%			
Yucca brevifolia	0-1%	1%			
Salazaria mexicana	SSSS				
Ephedra nevadensis	1-3%	1%	1%		
Gutierrezia sarothrae	SSSS	6%			
Larrea tridentata	25-35%				
Other Shrubs/Trees (SSSS)	1-5%				
	Similarity Status	18% Early	17% Early	14% Early	

* Changes in composition of a single plant species or group of plants (i.e., forb composition) in response to wet or dry years (or wildfires), will result in skewing other plant composition, as such DPC objectives set may not be attainable and other factors should be considered when evaluating DPC objectives in the future.

Key Area # 2		Allotment: Pakoon Springs			
		Pasture: Waynes Well			
Range Site:		Map Unit # 77; Limy Upland (Deep) 6-9" pz			
Plant Species	Site-Guide Allowable Percent Composition	1989	2000	2008	Desired Percent Composition Objective
Grasses	5-15%	4%	44%*	10%*	5-15%
Pleuraphis rigida	1-5%	3%	22%*	7%*	
Achnatherum hymenoides	1-5%	1%		2%	
Aristida	0-2%		20%*	1%*	
Bouteloua gracilis					
Dasyochloa pulchella	0-2%		2%		
Muhlenbergia poteri	Group PPGG				
Sporobolus flexious	Group PPGG				
Other perennial grasses (PPGG)	Not listed				
Forbs	5-10%	16%	12%*	71%*	5-10%
Sphaeralcea	1-5%	8%			
Erodium cicutarium	Group AAFF	3%	4%		
Euphorbia	Group AAFF				
Bromus rubens	-	6%			
Baileya multiradiata			6%	69%	
Oenothera deltoides	Group AAFF				
Oenothera caespitosa	Group AAFF			2%	
Other annual forbs (AAFF)	1-5%				
Shrubs/Trees	80-91%	80%	44%*	19%*	65-80%
Encelia frutescens	Group SSSS	19%		10%	
Gutierrezia sarothrae	Group SSSS				
Croton californicus	Group SSSS	20%	1%		
Yucca brevifolia	0-1%	11%	11%		
Opuntia	1-3%	5%			
Ephedra nevadensis	1-3%	17%	12%*	2%*	
Krameria erecta	Group SSSS		1%		
Larrea tridentata	25-35%	3%	12%		
Ambrosia dumosa	35-45%	3%		1%	
Coleogyne ramosissima	Group SSSS				
Thamnosma montana	Group SSSS	3%			
Salvia dorrii	Group SSSS				
Psilostrophe cooperi	Group SSSS			5%	
Yucca baccata	Group SSSS			2%	
Other Shrubs/Trees (SSSS)	1-5%				
Cylindropuntia acanthocarpa	Group Opuntia		6%		
Opuntia echinocarpa	Group Opuntia				
	Similarity	32%	35%	22%	
	Status	Mid	Mid	Early	

* Changes in composition of a single plant species or group of plants (i.e., forb composition) in response to wet or dry years (or wildfires), will result in skewing other plant composition, as such DPC objectives set may not be attainable and other factors should be considered when evaluating DPC objectives in the future.

Key Area # 3		Allotment: Pakoon Springs		
10/15/2008		Pasture: Pakoon Wash		
Ecological Site	Sandy Wash 6-9		Map Unit #	5
Plant Species	Site-Guide Allowable Percent Composition	1989	2008	Desired Percent Composition Objective
Grasses	6%-13%	2%	0%	2-21%
Dasyochloa pulchella	Group PPGG	2%	0%	
Other perennial grass (PPGG)	6-13%	0%	0%	
Pleuraphis	Group PPGG			
Aristida	Group PPGG			
Sporobolus	Group PPGG			
Forbs	6%-9%	52%*	0%*	2-14%
Erodium cicutarium	Group AAFF	11%	0%	
Plantago ovata	Group AAFF	0%	0%	
Bromus rubens	Group AAGG	40%	0%	
annual forbs (AAFF)	1%-5%	0%	0%	
annual grass (AAGG)	1%-5%	0%	0%	
Shrubs	76%-87%	46%*	100%*	60-85%
Larrea tridentata	10%-20%	27%	65%*	
Ambrosia dumosa	0%-2%	13%	21%	
Krameria grayi	Group SSSS	2%	10%	
Lycium andersonii	1%-5%	0%	2%	
Opuntia	0%-3%	4%	0%	
Acamptopappus sphaerocephalus	0%-2%	0%	0%	
Gutierrezia sarothrae	Group SSSS	0%	0%	
Ephedra nevadensis	1%-5%	0%	0%	
Opuntia acanthocarpa	0%-3%	0%	1%	
other shrubs (SSSS)	1%-5%	0%	0%	
	Similarity	38%	30%	
	Status	Mid	Mid	

* Changes in composition of a single plant species or group of plants (i.e., forb composition) in response to wet or dry years (or wildfires), will result in skewing other plant composition, as such DPC objectives set may not be attainable and other factors should be considered when evaluating DPC objectives in the future.

Key Area # 4		Allotment: Pakoon Springs		
9/20/2008		Pasture: Burro Springs		
		Range Site:	Map Unit #44; Limy Upland (Deep) 6-9" pz	
Plant Species	Site-Guide Allowable Percent Composition	Percent Composition for the Year Read		Desired Percent Composition Objective
		1990	2008	
Grasses	5-15%	45%	23%	5-15%
Pleuraphis rigida	1-5%	33%	22%	
Achnatherum hymenoides	1-5%	12%	1%	
Forbs	5-10%		3%	5-10%
Oenothera caespitosa			3%	
AAFF	1-5%			
Bromus rubens				
Chorizanthe rigida				
Plantago ovata				
Schismus barbatus				
Cuscuta				
Euphorbia				
Shrubs/Trees	80-91%	55%	74%	65-80%
Ambrosia dumosa	35-45%	40%	53%	
Krascheninnikovia lanata	Group 24		3%	
Hymenoclea salsola	SSSS			
Krameria erecta	1-5%	6%	9%	
Larrea tridentata	25-35%		4%	
Cylindropuntia acanthocarpa	1-6%			
Yucca brevifolia	0-1%	9%	3%	
Group 24 (see site guide)	1-5%			
	Similarity	56%	70%	
	Status	Late	Late	

* Changes in composition of a single plant species or group of plants (i.e., forb composition) in response to wet or dry years (or wildfires), will result in skewing other plant composition, as such DPC objectives set may not be attainable and other factors should be considered when evaluating DPC objectives in the future.

PAKOON ALLOTMENT

Key Area #	1	Allotment:	Pakoon
9/20/2008		Pasture:	
		Range Site:	Map Unit #77; Limy Upland (Deep) 6-9" pz
Plant Species	Site-Guide Allowable Percent Composition	2008	Desired Percent Composition Objective
Grasses	5-15%	4%	5-15%
Pleuraphis rigida	1-5%	2%	
Muhlenbergia porteri	Not listed	1%	
Dasyochloa pulchella	0-2%		
Forbs	5-10%	3%	5-10%
Calochortus	AAFF	1%	
Eriogonum inflatum	2%	1%	
AAFF	1-5%		
Shrubs/Trees	80-91%	94%	65-80%
Acacia greggii	Not listed	7%	
Ambrosia dumosa	35-45%	42%	
Bebbia	Not listed	1%	
Krascheninnikovia lanata	Group 24	2%	
Chrysothamnus viscidiflorus	Not listed		
Ephedra nevadensis	1-3%	2%	
Gutierrezia sarothrae	SSSS	10%	
Hymenoclea salsola	Not listed	1%	
Krameria erecta	1-5%	12%	
Larrea tridentata	25-35%	10%	
Mimosa aculeaticarpa	Not listed	1%	
Cylindropuntia acanthocarpa	1-3%	1%	
Yucca brevifolia	0-1%	3%	
Group 24 (see site guide)	1-5%		
	Similarity	72%	
	Status	Late	

* Changes in composition of a single plant species or group of plants (i.e., forb composition) in response to wet or dry years (or wildfires), will result in skewing other plant composition, as such DPC objectives set may not be attainable and other factors should be considered when evaluating DPC objectives in the future.

Key Area #	2	Allotment:	Pakoon
		Pasture:	
Ecological Site	Limy Upland 6-9 " pz		Map Unit # 98
Plant Species	Site-Guide Allowable Percent Composition	2008	Desired Percent Composition Objective
Grasses	1%-4%	23%	1-7%
Grass and Grasslike (PPGG)	1-4%	0%	
Pleuraphis rigida	Group PPGG	13%	
Aristida	Group PPGG	7%	
Muhlenbergia poteri	Group PPGG	3%	
Sporobolus spp	Group PPGG		
Achnatherum hymenoides	Group PPGG		
Forbs	3%-4%	2%	2-7%
Sphaeralcea	1%-3%	2%	
Shrubs	87%-92%	60%	50-65%
Acamptopappus sphaerocephalus	Group SSSS	6%	
Krascheninnikovia lanata	0%-5%	2%	
Gutierrezia sarothrae	Group SSSS	7%	
Hymenoclea salsola	Group SSSS	5%	
Krameria erecta	1%-5%	4%	
Larrea tridentata	15%-25%	31%	
Lycium andersonii	1%-3%	2%	
Opuntia	2%-6%	2%	
other shrubs Group (SSSS)	5%-10%	0%	
Trees	3%-4%	16%	2-7%
Yucca brevifolia	3%-5%	16%	
	Similarity	58%	
	Status	Late	

* Changes in composition of a single plant species or group of plants (i.e., forb composition) in response to wet or dry years (or wildfires), will result in skewing other plant composition, as such DPC objectives set may not be attainable and other factors should be considered when evaluating DPC objectives in the future.

Key Area #	3	Allotment:	Pakoon
10/15/2008		Pasture:	
Ecological Site	Limy Upland 6-9" pz		Map Unit #98
Plant Species	Site-Guide Allowable Percent Composition	2008	Desired Percent Composition Objective
Grasses	1%-4%	32%	1-7%
Grass and Grasslike (PPGG)	1%-4%	0%	
Aristida	Group PPGG	9%	
Pleuraphis rigida	Group PPGG	20%	
Sporobolus Cryptandrus	Group PPGG	3%	
Achnatherum hymenoides	Group PPGG		
Forbs	3%-4%	0%	2-7%
Sphaeralcea	1%-3%	0%	
Shrubs	87%-92%	66%	50-65%
Bebbia juncea	1%-5%	2%	
Ephedra nevadensis	1%-5%	0%	
Gutierrezia sarothrae	Group 17	59%	
Hymenoclea salsola	1%-5%	2%	
Yucca baccata	1%-5%	2%	
Psilostrophe cooperi	1-5%		
Group 17 (see site guide)	5%-10%	0%	
Trees	3%-4%	2%	2-7%
Yucca brevifolia	3%-5%	2%	
	Similarity	16%	
	Status	Early	

* Changes in composition of a single plant species or group of plants (i.e., forb composition) in response to wet or dry years (or wildfires), will result in skewing other plant composition, as such DPC objectives set may not be attainable and other factors should be considered when evaluating DPC objectives in the future.

Appendix I
Wildlife Data

Arizona Game & Fish Unit 13B Mule Deer Population Counts				
Year	**Number of Animals Surveyed**	**Bucks/100 Does**	**Fawns/100 Does**	**Population Estimate**
1985	108	30	50	1000-1500
1986	41	29	18	1000-1500
1987	63	31	44	1163
1988	--	No Data	No Data	No Data
1989	112	71	31	900
1990	63	68	32	900
1991	85	27	37	900
1992	31	24	59	<1000
1993	117	126	52	800-1000
1994	143	69	52	No Estimate
1995	88	183	79	No Estimate
1996	154	87	33	No Estimate
1997	64	77	29	No Estimate
1998	156	43	45	No Estimate
1999	145	51	35	No Estimate
2000	155	49	36	No Estimate
2001	275	34	67	No Estimate
2002	118	46	20	No Estimate
2003	84	29	46	No Estimate
2004	102	34	57	No Estimate
2005	128	65	72	No Estimate
2006	143	68	64	No Estimate
2007	152	79	41	No Estimate
2008	158	45	63	No Estimate
2009	150	28	42	No Estimate
2010	183	39	57	No Estimate
2011	176	58	83	No Estimate

Arizona Game & Fish Unit 13B Pronghorn Population Counts				
Year	**Total Animals Surveyed**	**Fawns / 100 does**	**Bucks / 100 does**	**Population Estimate**
1985	---	N/A	39	N/A
1986	---	N/A	35	156
1987	129	N/A	28	N/A
1988	192	N/A	54	172
1989	142	N/A	38	256
1990	131	N/A	34	166
1991	51	21	55	189
1992	77	26	69	192
1993	151	67	58	253
1994	84	17	58	210
1995	81	34	43	203
1996	119	13	27	295
1997	79	42	33	196
1998	76	45	100	190
1999	58	6	65	121
2000	23	0	229	58
2001	60	27	55	N/A
2002	60	14	53	121
2003	70	50	69	139
2004	104	51	32	163
2005	75	60	54	218
2006	68	38	62	192
2007	75	4	40	216
2008	82	36	38	216
2009	61	28	26	137
2010	74	30	28	143
2011	63	22	18	

Arizona Game & Fish Unit 13B North Desert Bighorn Sheep Population Counts							
Year	**Total Rams**	**Ewes**	**Lambs**	**Yearling Male**	**Yearling Female**	**Unclassified**	**Total**
2003	Insufficient Data						
2004	Insufficient Data						
2005	35	58	19	3	6	0	121
2006	32	90	18	3	10	0	153
2007	36	93	17	6	8	0	160
2008	34	44	8	0	0	0	86
2009	No data						
2010	No data						