U.S. Department of the Interior
Bureau of Land Management

Cerbat, Quail Springs, and Fort MacEwen

Proposed Grazing Management Plan and Permit Renewal

Environmental Assessment

DOI-BLM-AZ-C010-2015-0029-EA

Lucky Boy, Cerbat Allotment

Fall Spring, Cerbat Allotment

June 2015

BLM - ARIZONA - COLORADO RIVER DISTRICT
Kingman Field Office, 2755 Mission Blvd., Kingman, AZ (928) 718-3700

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BLM Mission Statement

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1 INTRODUCTION

Introduction

This Environmental Assessment (EA) discloses and analyzes the potential environmental consequences associated with proposed grazing permit renewals and range improvements for the Cerbat, Quail Springs, and Fort MacEwen (CQFM) grazing allotments located 20 miles northwest of Kingman, Arizona (Figure 1: Map 1). The Bureau of Land Management (BLM) Kingman Field Office (KFO) manages portions of the allotments which also include private and Arizona State Trust Lands. The CQFM Allotments are managed as a complex divided by U.S. Highway 93 and combined together into the West and East Unit. CQFM covers approximately 131,700 acres with BLM managing 86,122 acres, Arizona State Land Department managing 4,731 acres, and 40,849 acres of private land (acreage values calculated by GIS). Each of these allotments is in the "Improve" (I) management category, a rating assigned by the BLM to designate projects that have the greatest potential for improving existing resource conditions and that are expected to show the highest return on range improvement investments. Allotments in this category are expected to have first priority for range improvements, monitoring, and development of Allotment Management Plans (AMPs; USDI BLM 1980) as resources and funding are available. Rangeland Health Standards (USDI BLM 1997) are not being met at some key areas within these allotments due to the combination of livestock grazing management, drought, wildfire, and burro management.

This EA is intended to include the five mandates of NEPA in the following ways:

Supplemental Mandate of NEPA is met by considering the regulations, laws, acts, and other directives set forth by the Federal government, State, county, and other appropriating or governing sources as they are applicable (i.e., the Wild and Free-Roaming Horses and Burros Act of 1971, etc.).

Procedural Mandate of NEPA is met when using an interdisciplinary process that includes scoping internally and externally. Internal scoping includes, but is not limited to input from natural resource specialists with expertise in the management of range, vegetation, non-native and native invasive plants, riparian, soils, socio-economics, recreation, wilderness, archaeology, wildlife, threatened or endangered species, fire and fuels, wild horse and burros, and hydrology. External scoping included working with the livestock grazing permittee, members of the ranching community, the Mohave Livestock Association, Arizona Game and Fish Department (AZGFD), and Western Watersheds Project. A public review copy of the Cerbat, Quail Springs, and Fort MacEwen Allotments Grazing Permit Renewal EA (DOI-BLM-AZ-C010-2011-0017-EA) was released in 2013. A continued interdisciplinary team process occurred when engaging the Resource Advisory Council (RAC) to address public comments received throughout the processing for the permit renewal associated with this EA. The RAC selected a grazing subcommittee in November 2013 to address preparing a new alternative for a revised EA that included seeking input from representatives in the environmental, business, and ranching communities. The members selected included local ranchers, and agency representatives from Arizona Cattle Growers, AZGFD, Mojave Livestock Association, and Natural Resource Conservation Service (NRCS). The RAC Subcommittee designed and submitted Alternative 1: The Proposed Adaptive Management Alternative.

Substantive Mandate: Four alternatives are considered in this EA. Analysis for each one discusses topics such as desired plant species, conditions on the landscape, and overall landscape health ranging from periods of past evaluation up through the next decade.

In Alternative 1: The Proposed Adaptive Management Alternative, the RAC Subcommittee members effectively considered the environment where grazing was occurring. Factors analyzed and incorporated into Alternative 1 included changing the management structure to one of adaptive management. Planning

includes establishing trigger points of observation through monitoring such that BLM and the permittee can work collaboratively to avoid and minimize deteriorating land health conditions. It also highlights successful types of monitoring for the area, adds design criteria and mitigation measures and/or other options to consider for improving land health, including implementing range improvements and/or adding water developments when feasible, to respond to different landscape conditions.

Alternative 2: The Reduced Permitted Use Alternative proposes to reduce livestock numbers. It has specific range improvements and recommendations (i.e., no ephemeral use for additional livestock allowed [base livestock allowed]).

Alternative 3: The No Action Alternative, No Change to Current Terms and Conditions is provided as an "Current situation – As is Scenario" for readers to understand the existing situation on the public lands and what the potential conditions could progress toward, if none of the other alternatives are selected. Under the current conditions Rangeland Health Standards (USDI BLM 1997) are not being met for Standard 3 (Uplands: Productive and diverse upland and riparian-wetland communities of native species exist and are maintained) at some of the key areas. It is for this reason that other alternatives were sought.

Alternative 4: No Grazing. Although this alternative does not meet the objectives in the Kingman Resource Management Plan (1995), an amendment could be initiated if this alternative is selected.

Integration Mandate: BLM has scoped both internally and externally, has developed multiple documents since completing the 2010 Rangeland Health Evaluation, solicited the assistance of a facilitation lead with the RAC Subcommittee to develop Alternative 1 included in this EA, and has incorporated many of comments received throughout the scoping process.

Affirmative Mandate: Each of the above efforts and the in-depth analysis in this document are to provide the Authorized Officer with enough information to make the most informed decision.

Allotment Summary

The following is a summary of the current situation for the CQFM Allotments (Table 1).

Table 1. Current situation summary for allotments.

Public land acres in allotments	86,122 acres
Arizona State Land Department acres in allotments	4,731 acres
Private land acres in allotments	40,849
Kind of livestock	Cattle
ephemeral or perennial	Perennial/Ephemeral[1]
Plan area	Kingman Field Office
Current active use[2] in animal units (AUs)[3] and animal unit months (AUMs)[4]	578 AUs or 6,344 AUMs
Suspended use[5] (AUMs)	745 AUMs
Category[6]	Improve

[1] Perennial/ephemeral: ephemeral rangelands means areas of the Hot Desert Biome (Region) that do not consistently produce enough forage to sustain the livestock operation, but may briefly produce unusual volumes of forage to accommodate livestock grazing. (A definition for ephemeral drainages is proved under footnote reference #14)

[2] Active use means that portion of the grazing permitted use that is: (a) Available for livestock grazing use under a permit or lease based on livestock carrying capacity and resource conditions in an allotment: and (b) Not in suspension (43 CFR 4100.0-5).

[3] AU is an animal unit, which is equivalent to one cow.

[4] AUM is the amount of forage needed for the sustenance of one cow or its equivalent for a one month (43 CFR 4100.0-5).

[5] Suspended use means the temporary withholding from active use, through a decision issued by the authorized officer or by agreement, of part or all of the permitted use in a grazing permit or lease (43 CFR 4100.0-5).

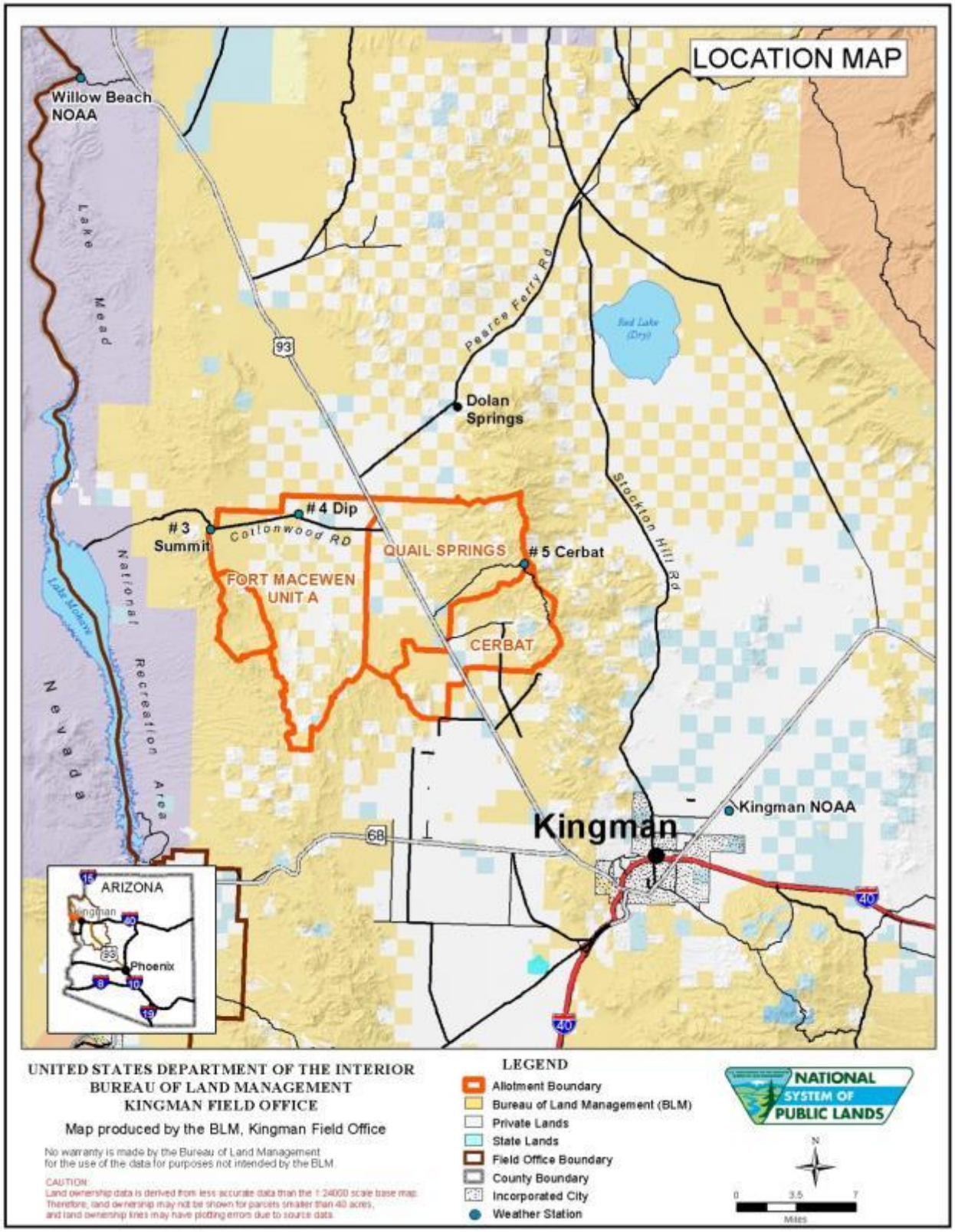

Figure 1: Map 1. Location of Cerbat, Quail Springs, and Fort MacEwen Unit A allotments.

[6] Category: All allotments are categorized as either improve, maintain, or custodial.

Purpose and Need for the Proposed Action

1.1.1 Background

The BLM is proposing to fully process the term grazing permits on the Cerbat (00020), Quail Springs (00062), and Fort MacEwen Unit A (00034) (CQFM) allotments in accordance with all applicable laws, regulations, and policies. BLM renewed the permits with the same terms and conditions pursuant to Section 426 of Public Law 111-88, pending compliance with applicable laws and regulations for a 10-year term beginning October 1, 2009. Compliance with all applicable laws and regulations includes consultation, coordination and cooperation with affected individuals, interested public, State, and Indian Tribes; completion of the applicable level of National Environmental Policy Act (NEPA) review; consultation with the United States Fish and Wildlife Service under Section 7 of the Endangered Species Act; and ensuring that allotments are achieving or making significant progress toward achievement of the *Arizona Standards for Rangeland Health and Guidelines.*

1.1.2 Purpose and Need

The purpose of this action is to provide for economically viable livestock grazing opportunities on public lands where consistent with meeting BLM management and environmental objectives, including the *Arizona Standards for Rangeland Health and Guidelines for Grazing Administration* (Rangeland Health Standards—USDI BLM 1997).

The need for this action is established by the Taylor Grazing Act (1934), the Federal Land Policy and Management Act (1976), and the *Kingman Resource Area Proposed Resource Management Plan* (RMP)/*Final Environmental Impact Statement* (USDI BLM 1995), which require that the BLM respond to applications to fully process permits to graze livestock on public land. The analysis of the actions identified in the applications for grazing permit renewals and the alternative actions is needed because:

- The Kingman Field Office (KFO) completed a rangeland health assessment titled *Cerbat, Quail Springs, and Fort MacEwen Allotments Rangeland Health Evaluation* (USDI BLM 2010). The assessment indicated that some conditions in the allotments are in need of management changes to meet rangeland health objectives and standards as defined by the Rangeland Health Standards (USDI BLM 1997). The study evaluated key areas and set Desired Plant Community (DPC) objectives. The DPC objectives for each key area are carried forward in Appendix B of this document. Guidelines direct the selection of grazing management practices and, where appropriate, livestock facilities to promote significant progress toward or the attainment and maintenance of the standards.

- The Kingman RMP identifies resource management objectives and management actions that establish guidance for managing a broad spectrum of land uses and allocations for public lands in the KFO. The Kingman RMP allocated public lands within the CQFM Allotments as available for domestic livestock grazing. Where consistent with the goals and objectives of the RMP and Rangeland Health Standards (USDI BLM 1997), allocation of forage for livestock use and the issuance of grazing permits to qualified applicants are provided for by the Taylor Grazing Act (1934) and the Federal Land Policy and Management Act (1976).

1.1.3 Decision to be Made

The Colorado River District Manager, Roxie Trost, is the Authorized Officer responsible for the decisions regarding management of public lands within these allotments. Based on the results of the NEPA

analysis, the Authorized Officer will issue a determination of the significance of the environmental effects and whether an Environmental Impact Statement (EIS) would be required. If the Authorized Officer determines that it is not necessary to prepare an EIS, the EA will provide information to make an informed decision whether to renew, renew with modifications, or not renew the permit and if renewed, which management actions, mitigation measures, and monitoring requirements will be prescribed for the CQFM Allotments to ensure management objectives and Rangeland Health Standards (USDI BLM 1997) are achieved.

Conformance with Land Use Plan and Other BLM Plans

1.1.4 Kingman Resource Area RMP

The following Rangeland Management Decisions which pertain to the Proposed Action are taken verbatim from the Kingman RMP:

GM-01[7] Management of rangeland resources will be guided by the Cerbat/Black Mountains (1978) and Hualapai Aquarius (1981) grazing Environmental Impact Statements and Range Program Summaries (RMP page 24). The objectives for the rangeland management program are listed in the Cerbat/Black Mountains (1978) and Hualapai Aquarius (1981) grazing Environmental Impact Statements (RMP page 39).

GM-10 Manage 21 allotments in the Improve (I) category (RMP page 461).

GM-13 Improve wildlife habitat by providing more forage, cover, and water (RMP page 461 and objective from the Cerbat/Black Mountains (1978) grazing EIS Program Document pg.1).

GM-14 Reduce soil erosion and increase water infiltration by increasing vegetative ground cover and litter (RMP page 461 and objective from the Cerbat/Black Mountains (1978) grazing EIS Program Document page 1).

GM-16 Sustain livestock production by providing more and better quality forage (RMP page 461 and objective from the Cerbat/Black Mountains (1978) grazing EIS Program Document page 1).

GM-18 The proposed Allotment Management Plans (AMP, as described in the EIS, will be reviewed and rewritten to provide for less complex and less costly plans based on site-specific conditions. This revision will be made in cooperation with the allottees, the Kingman Grazing Advisory Board, the State Land Department, the State Game Fish Department, and other concerned individuals and agencies. The AMPs will be dynamic documents, changing as necessary in response to the special conditions of each allotment (Program Document page 2).

GM-20 Utilization of key species [plant] will be limited to 50%. Annual adjustments in stocking numbers may be made on the basis of actual use experience acquired in reaching the 50% utilization level of the current year's growth of key species within sample areas. If required, adjustments will be made in authorized grazing use during subsequent billing period (Program Document page 2).

GM-53 Development or revision of allotment management plans would be accomplished through consultation, cooperation, and coordination with affected interests and other agencies.

[7] RMP decisions are numbered and listed in a land use plan evaluation (USDI BLM 2006).

Management goals would be met through grazing programs including systematic, timed periods of grazing and rest from grazing, designed to meet the phenological needs of key forage plants and improve soil stability and watershed conditions. A specific grazing system would be designed to meet the needs of the public land resources and the rancher using public lands on each allotment or group of allotments under a single rancher's control. Changes necessary to meet vegetation, soil, watershed, water quality, wildlife and wild horse and burro goals may include, but are not limited to, season of use, livestock numbers, kind or class of livestock and development of new range improvements (fences, waters, etc.). All actions would occur only after compliance with the National Environmental Policy Act (RMP page 71–72).

LH-1. Standard 1: Upland Sites. Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate and landform (ecological site).

LH-2. Standard 2: Riparian-Wetland Sites. Areas are in properly functioning condition.

LH-3. Standard 3: Desired Resource Conditions. Productive and diverse upland and riparian-wetland plant communities of native species exist and are maintained.

1.1.5 **Other BLM Plans**

The allotments addressed in this EA are located within the planning area of three different activity level plans which established forage allocations and adjusted utilization limits. The *Black Mountain Ecosystem Management Plan* (BMEMP—USDI BLM 1996) allocated forage for big game, wild horses and burros, and livestock within a Joint Use Area including part of CQFM. The following goals and objectives apply to public land in the Joint Use Area within the CQFM Allotments.

Goals for the management of vegetation resources in the BMEMP include:

1. Ensure that the physiological needs of plants are met.
2. Increase the diversity of the native vegetative community.
3. Increase the abundance of highly palatable (and therefore heavily used) native species.

Objectives for management of vegetation resources in the BMEMP include:

1. Limit utilization within key areas (areas between 0.25 to 0.75 miles of permanent water sources) in the Black Mountain ecosystem over the life of the plan. Utilization limits or proper use factors for key plant species by big game, wild horses and burros, and livestock were set to meet the management objective as follows:[8]

    - White bursage 20%
    - Flat-top buckwheat 15%
    - Big galleta 35%
    - Mormon tea 40%
    - Globemallow 40%
    - Desert rock-pea 30%
    - Chuckwalla's delight 15%
    - Shrubby buckwheat 40%[9]

[8] The utilization limits set in the BMEMP apply to CQFM Key Areas 8, 11, 18, 20, and 21 located within the Joint Use Area and were used as one of the criteria for determining if Standard 3 is met.
[9] See Appendix A for a list of the common and scientific plant names.

2. BMEMP forage allocations: 30% burros, 30% cattle, 40% big game for a total of 9,500 AUMs.

   The *Wabayuma Peak & Mount Tipton Wilderness Management Plan, Environmental Assessment, and Decision Record* (USDI BLM 1995a) contains the following objective:

   > Conduct routine inspection and maintenance of range improvements (fences, spring developments, etc.) located within the wilderness area, using non-motorized and non-mechanized means. According to the plan, all other maintenance will require prior BLM approval and additional environmental assessment. Emergency repair to range improvements using motorized or mechanized equipment shall require prior written approval by the BLM (USDI BLM 1995a, page 25).

   Cerbat-Music Mountains Habitat Management Plan (USDI BLM 1983):

   > Improve mule deer habitat by relieving limiting habitat factors such as water, forage, or cover (USDI BLM 1983, page 13).

Scoping and Issues

In response to an application for grazing, KFO resource specialists completed the *Cerbat, Quail Springs, and Fort MacEwen Allotments Rangeland Health Evaluation* (USDI BLM 2010) to determine whether Rangeland Health Standards (USDI BLM 1997) are being met.

The start of work on the CQFM allotment rangeland health evaluation was announced at a project coordination meeting on December 2, 2008 in the KFO. The evaluation was conducted by a BLM interdisciplinary team in accordance with BLM policy and procedures, and in cooperation, coordination, and consultation with the U.S. Fish and Wildlife Service, Arizona Game and Fish Department, the permittee and interested publics. Results of the Rangeland Health Evaluation were used to formulate an original Proposed Action and alternatives. The evaluation found that Arizona Rangeland Health Standards (USDI BLM 1997) were not being met at some key areas because plant frequency data trend was down or static for warm and cool season grass species at some of the key areas across all three allotments. The evaluation concluded that current management practices was not allowing for progress to be made towards achieving Standard 3. This was evident at various key areas across all three allotments. Actual use for all three allotments averaged about 44% (2,248 AUMs) of total permitted use over a 13-year period that was analyzed.

Issues discovered through scoping, field visits, and a thorough review of the CQFM Rangeland Health Evaluation by the interdisciplinary team, other agencies, the interested public, and the grazing permittee for re-authorizing a permit on the *Cerbat, Quail Springs, and Fort MacEwen Allotments* suggest that causal factors for not meeting some of the Rangeland Health Standards (USDI BLM 1997) includes: ongoing impacts from wildfire, drought, burros, and existing grazing management practices. Initial internal recommendations presented by the interdisciplinary team included a change in grazing permitted use, stocking rate, utilization limits, and periodic rest during the growing seasons for cool and warm season plants in all three allotments to provide the opportunity for ground conditions to move toward meeting the Rangeland Health Standards (USDI BLM 1997). External outreach for comments resulted in the same recommendations, but required the development of this EA with an additional proposed alternative and considerably more involvement from the Resource Advisory Council (RAC), other agencies, and the public.

1.1.6 **Consultation, Cooperation, and Coordination**

A draft evaluation was sent out for public review and comment to individuals, organizations, and agencies. Comments were received from the grazing permittee, Mohave Livestock Association, Arizona Game and Fish Department (AZGFD), and Western Watersheds Project. Comments were reviewed by an interdisciplinary team and incorporated into the final evaluation report where appropriate. A timeline of eighteen different meetings between the permittee, BLM, and the interested public is found in the evaluation.

A preliminary EA titled *Cerbat, Quail Springs, and Fort MacEwen Allotments Grazing Permit Renewal* numbered DOI-BLM-AZ-C010-2011-0017-EA was posted for public review on May 1, 2013 for a 24-day comment period ending on May 24, 2013. The KFO received nine public comment letters, including those from the permittee, members of the ranching community, the Mohave Livestock Association, AZGFD, and Western Watersheds Project.

Comments from the ranching community supported the No Action Alternative from the 2013 CQFM EA, which did not reduce the permitted use on the permit and followed the 1980 Allotment Management Plan (AMP) which recommended the Best Pasture Method Grazing System, originally outlined in the Jornada Experimental Range Report #1 (Herbel and Nelson 1969). AZGFD supported the original Proposed Action from the 2013 CQFM EA, but added that a contingency plan was needed to account for vegetation to recover after destructive natural events such as drought and wildfire. Western Watersheds Project specifically commented on the alternatives in the 2013 CQFM EA, the stocking rate, and supported the No Grazing Alternative based on their analysis of data from the land health evaluation.

The Colorado River District Manager approached the State Director and the RAC about forming a subcommittee to evaluate the 2013 CQFM EA and requested that further recommendations be provided. A competitive application process was formed by the RAC in November 2013 to identify a panel from interested public to address seven major areas. The seven concerns needing representation were: 1) county, 2) private property, 3) soil and water, 4) environmental, 5) grazing and ranching, 6) game and fish, and 7) the RAC. The RAC committee selected the panel members from the applications received.

The RAC selected a subcommittee that represented the seven major areas shown above. The public and affected parties, including the permittee were invited to all subcommittee meetings. Agendas, meeting notes, and participant rosters (many of which included the permittee) from the meetings are available for review in the Kingman Field Office. The Designated Federal Official for the RAC Subcommittee was Colorado River District Manager Roxie Trost. Official delegates for the subcommittee are found in Chapter 5 List of Preparers.

The RAC Subcommittee was facilitated by professional third-party facilitators, Southwest Decision Resources, through a BLM-University of Arizona Cooperative Ecosystem Studies Unit Assistance Agreement. Eight meetings (which included two field trips) occurred from December 17, 2013 to June 24, 2014. Agreements from those meetings were based on a consensus process with operational protocols agreed upon by all members. Documents from the process can be found on the subcommittee website: https://sites.google.com/site/kingmangrazingsubcommittee/.

Subcommittee tasks included: 1) review the 2013 CQFM EA, 2) identify scoping issues and expand existing issues in the 2013 CQFM EA, 3) identify additional alternatives or expand existing alternatives in the 2013 CQFM EA, and 4) provide consensus recommendations through the RAC to the BLM Designated Federal Official.

Through the collaborative process, the RAC Subcommittee chose to develop a new Adaptive Management Alternative. As part of the collaborative process, the RAC Subcommittee developed adaptive management scenarios, thresholds, and subsequent management actions for the CQFM Allotments.

A subsequent EA was developed; titled *Cerbat, Quail Springs, and Fort MacEwen Allotments Proposed Grazing Permit Renewal* numbered DOI-BLM-AZ-C010-2014-0036-EA (2014 CQFM EA, July 2014) and was posted for public review on July 3, 2014 for a 15-day comment period ending on July 18, 2014. The KFO received fifteen public comment letters, including those from the permittee, members of the ranching community, the Mohave Livestock Association, interested publics, AZGFD, Arizona Department of Water Quality (ADEQ), and Western Watersheds Project. This EA responds to and/or includes (by addressing the issues) many of the comments that were received during the 15-day comment period for the 2014 CQFM EA.

1.1.7 Native American Consultation and Coordination

Consultations have occurred throughout the process per Section 106 requirements, NEPA recommendations, and the Colorado River District BLM Memorandum of Understanding (MOU) written with the Hualapai Tribe (USDI BLM 2012). Proposed range improvements do not require consultation unless located on an archaeological site or area of cultural significance.

1.1.8 Issues Identification

The interdisciplinary team carefully considered comments by BLM specialists, the interested public, the permittee, and affected agencies in order to identify issues relevant to issuing a 10-year grazing permit for the CQFM Allotments. The following issues were identified during team meetings and in the process of the rangeland health evaluation development dated March 12, 2010 (USDI BLM 2010).

Area of Critical Environmental Concern (ACEC)

How will ACEC values of desert bighorn sheep, mule deer, and burros be affected by changes to grazing management in the BMEMP ACEC by competition for forage?

Would changes to grazing management cause competition for forage, space and water within the Black Mountains Ecosystem Management ACEC designated to protect values of desert bighorn sheep, mule deer, and burros?

Climate Change

How would permit renewal of a livestock operation contribute to greenhouse emissions?

How can the grazing management plan best address the effects of climate change (i.e., higher temperatures and drought) on the production of key species?

Would a change to the stocking rate help reduce effects of climate change on the condition of the key species?

Cultural Resources

Would cultural resources be affected by livestock grazing either from direct trampling and/or the construction and maintenance of proposed range improvements?

Invasive Non-Native Species

What effect would the reduction of key species by livestock have on the spread of invasive and non-native plant species?

There is an assumption that when key species are grazed to the extent that vigor is poor, invasive plant species will increase in abundance. Is this happening on the allotment? What invasive species are present and how are they affecting the allotment? Will grazing management change the amount and types of invasive species?

Does evidence support the assumption that the threat of wildfire is reduced when cattle graze red brome?

Lands and Realty

Can the terms and conditions of the 1980 AMP still be implemented in areas where residential development is occurring such as in the Town of Chloride and Detrital Valley?

Would new fencing help to keep cattle off Lake Mead National Recreation Area (LMNRA)?

Livestock Grazing Management

How would combining the allotments, resting/deferring the different pastures or changing livestock stocking rates affect the economics of the permittee's ranching operation (i.e., calf crops, calf weights at sale, total numbers of calves, total number of employees) and the local economy?

Can we ensure all three of these "I" (Improve) Category allotments have an upward trend?

If range improvements were maintained, would there be better control of livestock?

What mitigations can reduce residential development and recreation use impacts to range improvements?

Would the implementation of the BMEMP objectives through the terms and conditions of the grazing permit (i.e., grazing decisions) help improve habitat and rangeland health?

How would a change in the kind of livestock in the Quail Springs allotment (to provide for 15 horses) affect the permittee's grazing operation?

How would the development of new water facilities affect livestock grazing management?

How would the development of exclosures affect livestock grazing management?

Riparian

How would changes to grazing management affect riparian habitat at springs located in the allotments?

Vegetation

What effect would the proposed changes in utilization limits have on vegetation?

Would vegetative control sites, i.e., exclosures, near key areas help to evaluate the effects of the proposed management actions?

How is yearlong grazing affecting the plant community's recovery from wildfire?

Are the vegetative objectives identified in the BMEMP plan being met?

How would resting/deferring the different pastures or adjusting livestock stocking rates affect the productivity of the key species?

Wild Horses and Burros

How would wild horses and burros in the Black Mountain Herd Management Area and the Cerbat Herd Area be affected by proposed changes in grazing management?

Wildfire

Could grazing management reduce the potential of wildfire by red brome? Red brome is a driver of wildfire in wet years.

How would closing pastures burned by wildfire affect grazing management and vegetation?

Wilderness

What type of access is allowed in wilderness for livestock management?

Would values for wilderness change as a result of changing livestock management?

Wildlife including Special Status Species

How would wildlife (special status species) be affected by proposed changes in grazing management?

Would the Sonoran desert tortoise, primarily found in the Twin Mills Pasture, be affected if this pasture is temporarily closed to grazing to allow native vegetation recovery after wildfire?

What species of wildlife, including special status species and migratory birds, would be affected by proposed changes in grazing management?

Would wildlife benefit from an improved grazing management plan that provides rest and deferment and accommodates climatic conditions such as drought?

Are there any federally listed species present in the allotments that would be affected by changes to grazing management?

Would resting the Twin Mills Pasture from livestock grazing benefit post-fire recovery of wildlife habitat?

Could fencing be repaired in order to manage cattle and keep waters operating in all pastures for wildlife even when cattle are excluded from the area?

Are all stock waters accessible to wildlife?

How would leaving range waters on public lands open to wildlife year round affect wildlife?

Relationships to Statutes, Regulations, or Other Plans

Table 2 lists statutes, regulations, policy and local area planning documents germane to the analysis area, the Proposed Action, and the alternatives identified as feasible to satisfy the Proposed Action.

2 PROPOSED ACTION AND ALTERNATIVES

Action alternatives were developed to address the need for changes in grazing management to move Rangeland Health Standards more toward being met than they currently are under the 1980 Allotment Management Plan. Rangeland Health Standards (USDI BLM 1997) are not being met at some key areas within the CQFM Allotments due to the combination of livestock grazing management, drought, wildfire, and burro management.

The current grazing system is described under Alternative 3 - No Action Alternative as a baseline for comparison to the other action alternatives. Alternatives 1, 2, and 4 were designed to manage the allotments for livestock grazing, provide for a diversity of wildlife and plant species, maintain functioning ecosystems, and maintain or improve ecological condition to meet Rangeland Health Standards (USDI BLM 1997).

Below are summary descriptions of each alternative. Detailed descriptions for each of the alternatives begin in Section 2.1. Table 3 summarizes each of the alternatives offered, that are analyzed in this EA.

Table 2. Supplemental Authorities relevant to the proposed action and alternatives.

Proposed Action Element	Authority
Air Quality	Clean Air Act of 1970
Climate Change	Department of Interior Order No. 3225 "Evaluating Climate Change Impacts in Management Planning"
Cultural Resources	National Historic Preservation Act of 1966
Cultural Resources	Native American Graves Protection and Repatriation Act of 1990
Livestock Grazing	National Environmental Policy and Management Act of 1969
Livestock Grazing	Taylor Grazing Act of 1934 as amended
Livestock Grazing	Federal Land Policy and Management Act of 1976 as amended
Livestock Grazing	Public Rangelands Improvement Act of 1978
Livestock Grazing	Grazing regulations under 43 CFR 4100 and associated BLM Manual policy
Water Quality	Arizona Water Quality Standards, Revised Statute Title 49, Chapter II
Wild Horses and Burros	Wild Free-Roaming Horse and Burro Act of 1971
Wildlife	Endangered Species Act of 1973
Wildlife	Migratory Bird Treaty Act of 1918
Wildlife	Executive Order 13186–Responsibilities of Federal Agencies to Protect Migratory Birds
Wildlife	Sonoran Desert Tortoise Interagency Management Plan
Wilderness	The Wilderness Act of 1974

Table 3. Summaries of the grazing strategies for each of the alternatives.

Alternative	Number of Livestock	Deferment	Moves	Proposed Range Improvements
Alternative 1 Proposed Action Adaptive Management Alternative	Grazing Permitted Use: 578 AUs (559 cattle and 15 horses) Initial Stocking Rate: 455 AUs	**Growing Season Deferment/per 4 Years WEST UNIT** **<u>Black Tank/Valley</u>** 2 of 4 (spring deferment) 1.5 of 4 (summer deferment) (the above includes one back to back spring/summer rest in one year) **<u>Sugarloaf</u>** Same as Black Tank/Valley **<u>Squaw Pocket/Lost Cabin</u>** 2 of 4 (spring deferment) 2.5 of 4 (summer deferment) (the above includes one back to back spring/summer deferment in one year) **<u>Highway 93</u>** Same as Squaw Pocket/Lost Cabin **<u>Twin Mills</u>** 4 of 4 years (spring and summer deferment, except when ephemeral grazing is authorized, then grazing would occur in the spring) **Growing Season Deferment/per 9 Years EAST UNIT** **<u>Upper Pastures</u>*** 4.5 of 9 (spring deferment) 4.5 of 9 (summer deferment) 1 of 9 (no spring or summer deferment) **<u>Lower Pastures</u>*** 4.5 of 9 (spring deferment) 5 of 9 (summer deferment)	2 per year	Reconstruct fences to ensure pasture integrity Install new cattleguards Propose new wells with associated storage tanks and troughs Construct exclosures Reconstruct one riparian exclosure Reconstruct one water pipeline

*Upper Pastures = Cerbat, East Big Wash, Marble Canyon; Lower Pastures = House, Big Wash, Quail Springs

Table 3. Summaries of the grazing strategies for each of the alternatives (continued).

Alternative	Number of Livestock	Deferment	Moves	Proposed Range Improvements
Alternative 2 Reduced Permitted Use Alternative	Grazing Permitted Use: 237 AUs Initial Stocking Rate: 203 AUs (includes 10 horses for two months)	**Growing Season Deferment/per 3 Years WEST UNIT** **<u>All Pastures (except Twin Mills)</u>** 2 of 3 years spring and summer deferment **<u>Twin Mills</u>** 3 of 3 years spring and summer deferment **EAST UNIT** **<u>House and Big Wash</u>** 2 of 3 years spring deferment 2.5 of 3 years summer deferment **<u>East Big Wash and Quail Springs</u>** 2 of 3 years spring and summer deferment **<u>Marble Canyon and Cerbat</u>** 2 of 3 years spring deferment 1.5 of 3 years summer deferment	3 per year	Reconstruct fences to ensure pasture integrity Install one new cattleguard Construct 3 exclosures Reconstruct one riparian exclosure
Alternative 3 No Change to Current Conditions (No Action Alternative)	Grazing Permitted Use 578 AUs Initial Stocking Rate: 578 AUs	**<u>All pastures</u>**: Provide rest (non-use) on 20-50% of the allotment at any given period during the year. This allotment management plan was largely based on the Best Pasture Grazing System from the Jornada Experimental Range Report No. 1 (Herbel and Nelson 1969).	Use "work-arounds" from year to year	Construct and repair range improvements on BLM portion of allotments as authorized in 1980 AMP
Alternative 4 No Grazing Alternative	0	N/A	N/A	None

Alternative 1 Proposed Action Adaptive Management Alternative

BLM supports the concept of Adaptive Management. A complete technical guide, prepared by the Department of Interior is available for review at the following web link: http://www.doi.gov/initiatives/AdaptiveManagement/documents.html

Alternative 1 was submitted by the RAC Subcommittee, via the following sequence of events:

a. The *Cerbat, Quail Springs, and Fort MacEwen Allotments Grazing Permit Renewal* EA (DOI-BLM-AZ-C010-2014-0036), was posted for public review on July 3, 2014 for a 15-day comment period ending on July 18, 2014),
b. The BLM interdisciplinary team received, reviewed, considered, analyzed, and incorporated comments (where appropriate) received during the above stated comment period into this EA,
c. Consensus was reached within the RAC Sub-committee for the Adaptive Management Proposal they prepared to be submitted to the RAC as a completed document,
d. The RAC members voted on whether or not to offer the Adaptive Management Proposal as a Proposed Alternative to BLM for incorporation into this EA,
e. The RAC members voted unanimously "FOR" the Motion of asking BLM to accept the Adaptive Management Alternative as a Proposed Alternative,
f. The Adaptive Management Proposal received by the RAC was reviewed for BLM acceptance per regulations 40 CFR 1506.5(b) and (c),
g. Minor changes made to the Adaptive Management Proposal by BLM were returned to the RAC Sub-committee members for their review and concurrence,
h. The Proposed Alternative as accepted by the RAC sub-committee was added to this EA as Alternative 1.
   As such, it is analyzed along with the other alternatives by the BLM interdisciplinary team for direct, indirect, and cumulative impacts associated with the Proposed Action.

Throughout preparation for this EA there has been a dynamic process of different interdisciplinary team meetings, thus complying with the Substantive Mandate in NEPA that many voices are heard and that concerns for the environment were brought forth in this document "to the fullest extent possible". Within BLM the members have included the District Manager, Field Manager, Assistant Field Manager, and Grazing Strike Team members, each of which represents a different natural resource. While preparing Alternative 1-the Proposed Action in this EA, participants at various meetings have included one or more of the aforementioned BLM staff, the Southwest Decision Resources Facilitator, the RAC Sub-committee team members, and the permittee and his affiliated and assigned representatives, and members of public. Different RAC members have also been involved throughout other processes in the creation of this EA.

The adaptive management process undertaken for the CQFM EA by the BLM and the RAC sub-committee provided a framework for collaboration, cooperation, and communication whereby all members and participants were encouraged to voice their opinions, discuss their concerns, and debate different issues in a professional forum. Developing the Proposed Action included going on field trips and attending meetings held at the KFO during the winter and spring of 2013–2014.

The Adaptive Management Proposed Action Alternative consists of the following parts which incorporate each of the steps identified in the graphic below: 1) identification of goals and objectives and 2) renewal of the grazing permits following a rotational grazing plan that provides periodic growing season rest for both the East and West Management Units, 3) construction of new range improvements needed to implement the grazing plan including water facilities, cattleguards, and fencing, 4) construction of

vegetation monitoring exclosures, and 5) implementation of adaptive management and monitoring. For a detailed description refer to Section 2.1.

"Adaptive management" is explained by Glick et al. (2011) in "Scanning the Conservation Horizon" in the following graphic:

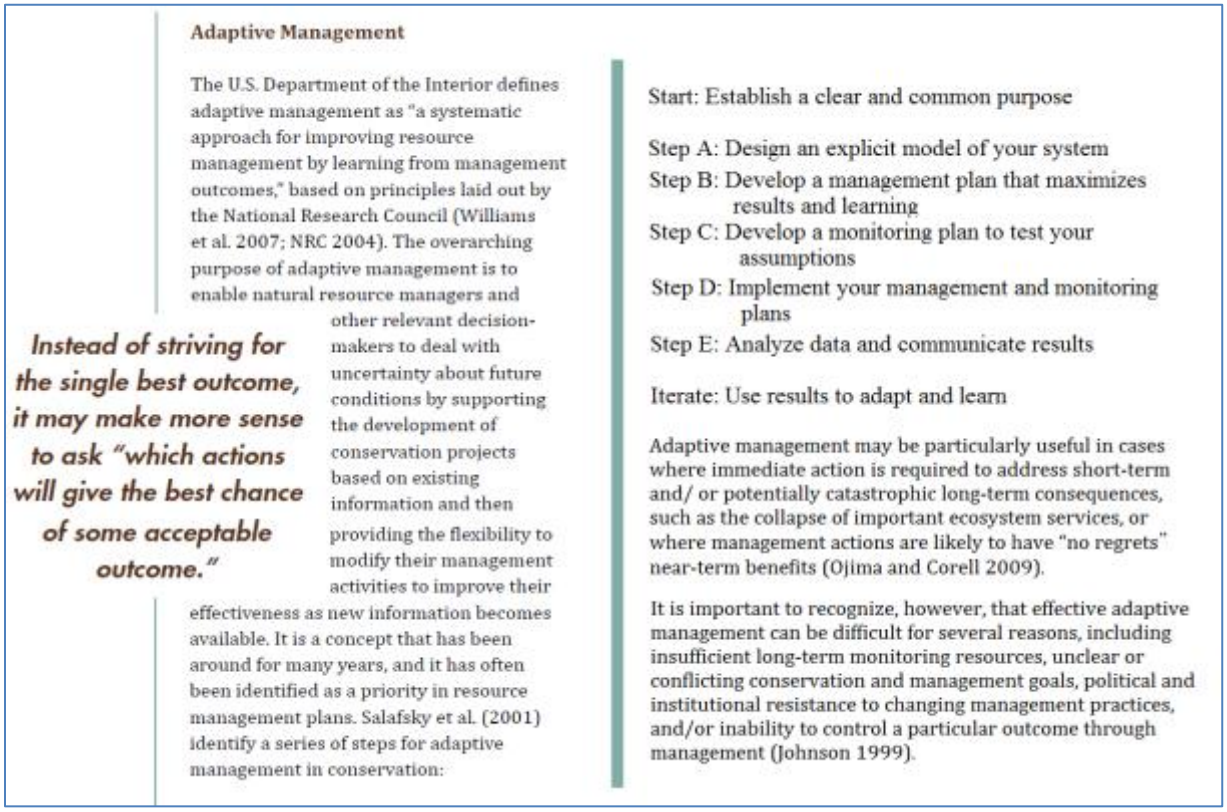

Figure 2: Adaptive Management defined by Glick et al., 2011.

Alternative 2 Reduced Permitted Use Alternative

Alternative 2 is to reissue a 10-year grazing permit for each of the three allotments in conformance with the Kingman RMP and related plans. This alternative replaces the 1980 AMP (USDI BLM 1980).

Alternative 2 consists of three parts: renewal of the grazing permits, construction of new and maintenance of existing range improvements needed to implement the grazing plan, and construction of three exclosures to separate the effects of management, weather, and other factors.

The CQFM Allotments would be managed as two units, one east and one west of U.S. Hwy 93 (US-93). The grazing schedule is in Table 10. A detailed description of Alternative 2 is found in Section 2.2.

Alternative 3 No Action Alternative–No Change to Current Terms and Conditions

An AMP was approved in 1980 which stated the permittee would implement a Best Pasture Grazing System from the Jornada Experimental Range Report No. 1 (Herbel and Nelson 1969) for the CQFM Allotments. According to the AMP, BLM and the permittee would meet two times per year to decide which pastures should be rested during the year. A detailed description of Alternative 3 is in Section 2.3.

Alternative 4 No Grazing Alternative

Under this alternative, the permits would be cancelled and livestock grazing would not be authorized for the CQFM Allotments. More about the No Grazing Alternative is found in Section 2.4.

Alternatives Considered but Eliminated From Detailed Analysis

The CQFM Rangeland Health Evaluation (USDI BLM 2010) provides several grazing management scenarios for consideration. One of the scenarios was carried forward into this document as Alternative 2. Three other scenarios were not carried forward because they were similar in scope.

Alternative 1 - Proposed Action-Adaptive Management Alternative

2.1.1 Goals and Objectives

The allotments would be managed under the following goals and objectives:

Goal 1	The public land grazing allotments are managed for an economically viable ranch while meeting environmental objectives.
Goal 2	Grazing allotments are managed through partnerships to leverage available funding for new range improvements and to accomplish NEPA clearances required for range improvement implementation.
Goal 3	BLM responsibilities under Federal Land Policy and Management Act (1976) for managing public land under the principles of multiple-use and sustained yield are upheld throughout the grazing permit renewal process.
Goal 4	Adaptive management is followed when making changes to the grazing plan, stocking rate, and range improvements.
Objective 1	The allotment would be managed to achieve the Arizona Standards for Rangeland Health (USDI BLM 1997).
Objective 2	Utilization Criteria Objectives Utilization guidelines would allow either 40% or 50% use by cattle, burro, and/or wildlife depending on location within the CQFM. All key species, at key areas outside of the Joint Use Area of the Black Mountain Ecosystem, would have a 50% utilization limit. Inside the Joint Use Area the utilization limit would be 40%. The key areas located in the Joint Use Area are 8, 11, 18, 20, and 21 (Figure 15: Map 11).

2.1.2 Adaptive Management Strategies

Adaptive management allows for flexibility in stocking rate in the following ways:

1. Adjustments are made in timing, intensity, frequency and duration of grazing, the grazing management system, and livestock numbers according to resource conditions and allows for the flexibility necessary to meet utilization guidelines and long-term desired conditions.
2. The exact number of livestock authorized to graze on an annual basis would depend on such things as resource condition of the allotment, available water, annual forage production, condition of structural facilities, and range readiness.

3. Anything less than the full permitted livestock numbers represents a condition in which capable acres and other integral components of the range management, such as livestock waters, are producing less than required to support full permitted livestock numbers.

The following adaptive management strategies are applied to decision-making:

1. Due to annual climatic variability, the length of time livestock are allowed in the pastures varies from year to year. Length of time may be altered by changing both entry and exit dates.
2. Stocking rate, grazing strategies, and season of use are all tools to implement the decision.
3. Levels of livestock use (e.g., livestock numbers, maximum or a range of livestock number and/or AUMs, etc.) and seasons of use described are only approximations and recognize the natural ecological fluctuation in forage production.
4. When indicated by monitoring, changes in management strategy should be considered. The permittee's ability to adjust quickly is integral to the adaptive management strategy.
5. Other livestock and resource management practices such as excluding or closing areas to domestic livestock grazing, herding, changing salt locations, supplementing with nutrients, and adding rangeland improvements may also be considered.
6. Based on monitoring results of the previous season, and observed trends towards the accomplishment of resource management objectives, permitted numbers, length of stay, and method of management can be reasonably predicted for the next grazing season.

2.1.3 Terms and Conditions

Mandatory

Grazing permitted use: The combined authorized grazing permitted use for both the West and East Management units under adaptive management would be 578 AUs, 559 cattle, and 15 horses. Horses would be authorized under a rest rotation grazing schedule in the Quail Springs Pasture and Big Wash Pastures. One horse equals 1.25 AUs.

Other Terms and Conditions

Stocking Rate: The initial stocking rate would be 458 AUs based on calculations using the Desired Stocking Rate Formula (USDI BLM 1985). After applying a rotation, there would be three AUs less as a result of pasture production differences, consequently the initial stocking rate would be 455 AUs. Calculations for the stocking rate analysis for the Proposed Action are available at KFO. The stocking level could be adjusted either up or down using an adaptive approach which focuses on monitoring data in relationship to resource management objectives. The adaptive management response, which specifies how adjustments would be made to the stocking rate using triggers, is outlined in this plan.

Fuels management and ephemeral use: Intensive grazing management may be used to control red brome and reduce fuel loads. Therefore, ephemeral use could be authorized during the 10-year grazing period in accordance with applicable laws, regulations, and other guidance, including Instruction Memorandum AZ-94-018. In these cases, cattle would be moved to areas of red brome, and their movement would be restricted via water hauls, temporary fencing, etc. Ephemeral use could occur on the east or west side of the CQFM allotment depending on location of available ephemeral vegetation.

2.1.4 Grazing System Schedule

The grazing schedules shown on Tables 5 and 6 show pasture deferment and rotation scheduling. The schedules are subject to change year to year, based on climatic conditions, physiological needs of the plants, site specific monitoring data, and range improvements.

The allotments would be managed as two units, one east and one west of U.S. Highway 93. The names of the pastures in the East and West Management units are listed in Table 4, and the locations are shown in Figure 3: Map 2. Livestock management under the Adaptive Management Alternative provides grazing deferment in spring and summer growing seasons as presented in Tables 5 and 6.

Table 4. Pastures in the West and East Management Units.

West Management Unit Pastures	Total Acres	East Management Unit Pastures	Total Acres
Twin Mills	13,568	Big Wash	5,766
Lost Cabin/Squaw Pocket	16,776	East Big Wash	4,920
Black Tank/Valley	15,107	Quail Springs	6,000
Sugarloaf	7,518	Marble Canyon	9,697
Highway 93	5,449	House	5,581
		Cerbat	9,071

West Management Unit

The West Management Unit is made up of five pastures as follows: Twin Mills, Lost Cabin/Squaw Pocket, Black Tank/Valley, Sugarloaf, and Highway 93. Cattle are planned to be moved twice a year in accordance with Table 5.

Twin Mills Pasture would be grazed in the winter outside the growing seasons or when an abundant ephemeral growth year occurs and ephemeral grazing is authorized in accordance with applicable laws, regulations, and other guidance, including Instruction Memorandum AZ-94-018. Prior to cattle turnout, ephemeral production would have to exceed 280 pounds to the acre.

East Management Unit

The East Management Unit is made up of six pastures combined into upper and lower areas due to differences in vegetation types related to higher or lower amounts of precipitation as a result of elevation differences. The three lower pastures are House, Big Wash, and Quail Springs. The three upper pastures are Cerbat, East Big Wash, and Marble Canyon. Cattle are planned to be moved twice a year (Table 6).

Responsibility: The permittee would provide actual use information by pasture including number of animals, kind and class of livestock, and period of use.

Communication: The permittee would contact the BLM prior to making moves outside of the grazing system schedule, keep records of when and where livestock were actually moved, and provide the actual use information to the BLM seasonally by pasture. Moves outside the scheduled use periods would be made using adaptive management principles. Meetings between BLM and the grazing permittee would

be conducted prior to each scheduled move to discuss previous year's monitoring, moves, etc. and the coming year's grazing schedule and climatic conditions.

The only exception would be in an emergency situation (i.e., eminent death of livestock, e.g., water structure is broken and livestock need to be moved immediately.). In this case, the permittee still needs to contact BLM as soon as possible, after the situation has been resolved, to inform them of the situation.

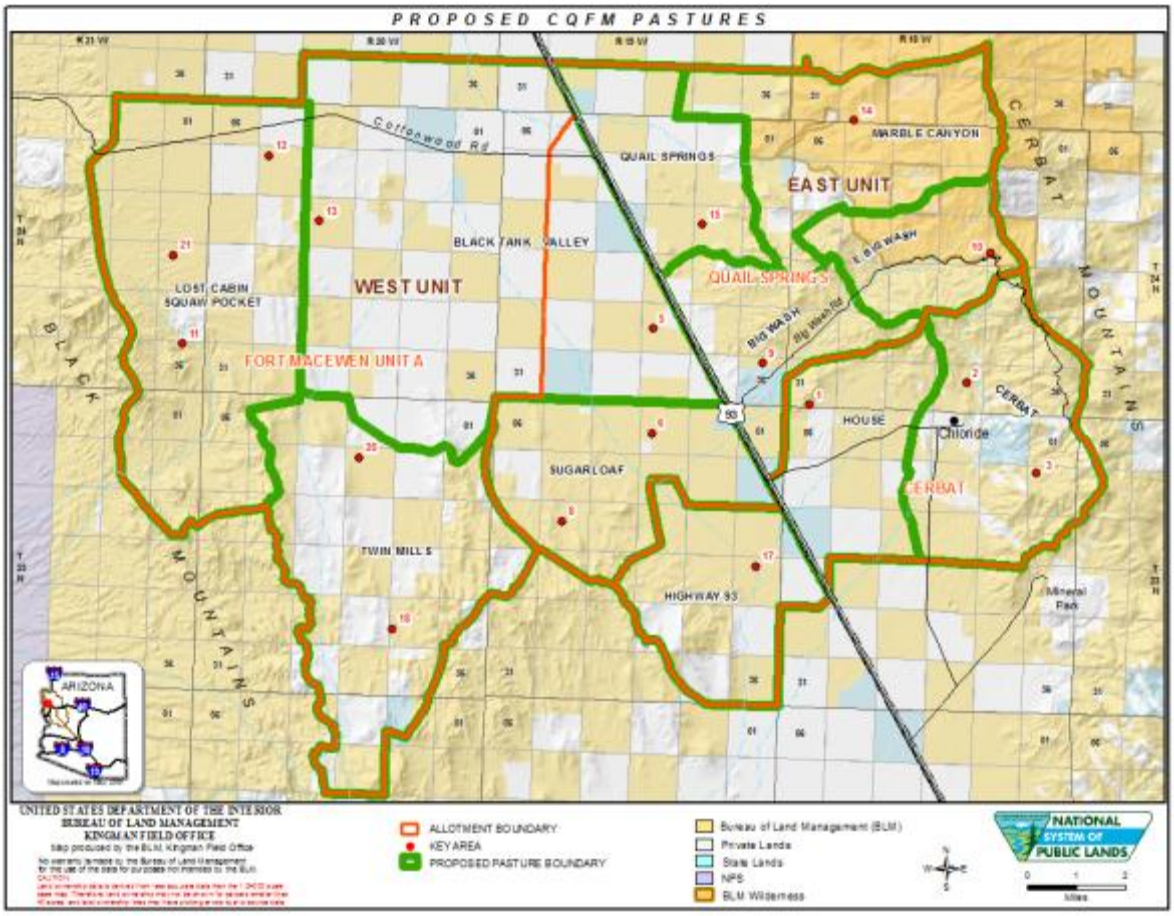

Figure 3: Map 2. Location of East and West Management units and pasture boundaries within the allotments.

Table 5. Grazing system schedule for West Management Unit.

YEAR 1	West Management Unit												
Months	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec. 1 wk	Dec . 3 wks	Jan	Feb	Mar	Apr
Pastures													
Black Tank/Valley	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest
Sugarloaf	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest
Squaw P./Lost C.	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed
Hwy 93	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed
Twin Mills	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Rest	Rest

YEAR 2	West Management Unit												
Months	May	Jun	Jul	Aug	Sep	Oct	Nov. 2 wks	Nov. 2 wks	Dec	Jan	Feb	Mar	Apr
Pastures													
Black Tank/Valley	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Rest
Sugarloaf	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed
Squaw P./Lost C.	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed
Hwy 93	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Rest
Twin Mills	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Rest	Rest

Table 5. Grazing system schedule for West Management Unit (continued).

YEAR 3	West Management Unit												
Months	May	Jun	Jul	Aug. 1 wk	Aug. 3 wks	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Pastures													
Black Tank/Valley	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed
Sugarloaf	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed
Squaw P./Lost C.	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Rest
Hwy 93	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Rest
Twin Mills	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Rest	Rest

YEAR 4	West Management Unit												
Months	May	Jun	Jul	Aug	Sep	OCT. 2 wks	OCT. 2 wks	Nov	Dec	Jan	Feb	Mar	Apr
Pastures													
Black Tank/Valley	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed
Sugarloaf	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Rest	Rest
Squaw P./Lost C.	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Rest	Rest
Hwy 93	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed
Twin Mills	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Rest	Rest

Table 6. Grazing system schedule for East Management Unit.

YEAR 1 — ***East Management Unit***

Pastures	May	Jun	Jul	Aug	Sep	Oct	Nov. 3 wks	Nov. 1 wk	Dec	Jan	Feb	Mar	Move Apr
House	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Rest
Big Wash	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Rest
Quail Springs	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Rest
Cerbat	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed
East Big Wash	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed
Marble Canyon	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed

YEAR 2

Pastures	Move May	Jun	Jul	Aug	Sep	Move Oct. 3wks	Move Oct. 1 wk	Nov	Dec	Jan	Feb	Move Mar	Move Apr
House	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Rest	Grazed
Big Wash	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Rest	Grazed
Quail Springs	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Rest	Grazed
Cerbat	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest
East Big Wash	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest
Marble Canyon	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest

YEAR 3

Pastures	May	Jun	Jul	Move AUG. 3 wks	Move AUG. 1 wk	Sep	Oct	Nov	Dec	Move Jan	Move Feb	Mar	Apr
House	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed
Big Wash	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed
Quail Springs	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed
Cerbat	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest
East Big Wash	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest
Marble Canyon	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest

Table 6. Grazing system schedule for East Management Unit (continued)

East Management Unit

YEAR 4		Move	Move					Move	Move				
Pastures	May	June 3 wks	June 1 wk	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
House	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed
Big Wash	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed
Quail Springs	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed
Cerbat	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest
East Big Wash	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest
Marble Canyon	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest

YEAR 5	Move	Move					Move	Move					
Pastures	May 3 wks	May 1 wk	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	April
House	Grazed	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed
Big Wash	Grazed	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed
Quail Springs	Grazed	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed
Cerbat	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Rest
East Big Wash	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Rest
Marble Canyon	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Rest

YEAR 6	Move	Move					Move	Move					Move
Pastures	May 3 wks	May 1 wk	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr. 3 wks
House	Grazed	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed
Big Wash	Grazed	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed
Quail Springs	Grazed	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed
Cerbat	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Rest
East Big Wash	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Rest
Marble Canyon	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Rest

Table 6. Grazing system schedule for East Management Unit (continued)

YEAR 7	***East Management Unit***												
	Move				Move	Move				Move	Move		
Pastures	May	May	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb. 3 wk	Feb. 1 wk	Mar	Apr
House	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest
Big Wash	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest
Quail Springs	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest
Cerbat	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed
East Big Wash	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed
Marble Canyon	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed

YEAR 8			Move	Move				Move	Move				
Pastures	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec. 3 wks	Dec. 1 wk	Jan	Feb	Mar	Apr
House	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest
Big Wash	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest
Quail Springs	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest
Cerbat	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed
East Big Wash	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed
Marble Canyon	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed

YEAR 9	Move	Move					Move	Move					Move
Pastures	May	Jun	Jul	Aug	Sep	Oct	Nov. 3 wks	Nov. 1 wks	Dec	Jan	Feb	Mar	Apr
House	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Rest
Big Wash	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Rest
Quail Springs	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed	Rest	Rest	Rest	Rest	Rest	Rest
Cerbat	Grazed	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed
East Big Wash	Grazed	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed
Marble Canyon	Grazed	Rest	Rest	Rest	Rest	Rest	Rest	Grazed	Grazed	Grazed	Grazed	Grazed	Grazed

2.1.5 **Range Improvements**

The permittee would be responsible for installing, reconstructing, relocating, and maintaining all range improvements and may work in cooperation with partners such as BLM, NRCS, and AZGFD for assistance. Range improvement functionality would influence the stocking rate.

Fences

1. Relocate the existing fence, and realign the road across Lost Cabin Wash along the west boundary of the Lost Cabin Pasture out of the wash to a nearby upland location. The gate would be replaced with a cattleguard (see Figure 9: Map 8). The road in Lost Cabin Wash provides remote access to the LMNRA and, therefore, receives frequent vehicle use. Consequently, the gate at this location is often left open which allows cattle to wander onto the LMNRA.
2. Maintain the fence between Squaw Pocket and Lost Cabin pastures as the fence may be needed in the future (Figure 4: Map 3).
3. Realign the pasture boundary fence between Sugarloaf and Twin Mills pastures to incorporate Pilgrim Mine area into Sugarloaf Pasture (see Figure 4: Map 3).
4. The boundary fence to the west of Lost Cabin Spring would be extended approximately 0.5 mile to the south and tied into a natural boundary. The location of this fence is T24N, R21W, Sections 22, 23, and 26 (see Figure 9: Map 8).
5. Reconstruct the fence between House and Cerbat pastures. This fence would be realigned from private uncontrolled land to land owned by the permittee in T23N, R18W, Section 9.
6. Repair the fence between the Sugarloaf and Highway 93 pastures.
7. Repair the fence along the south and southeast portion of the Highway 93 Pasture.
8. Remove portions of the fence between Black Tank and Valley pastures to create one pasture.

Standard Operating Procedures (fences)

1. When fences are realigned, extended, or reconstructed they would be built and then maintained using BLM fencing standards (1989 BLM Fencing Manual H-1741-1). Standards would differ depending on the big game species present (bighorn sheep or mule deer).

2. Maintenance or reconstruction of fences in tortoise habitat would be conducted from existing roads or on foot or horseback where road access is not available.

Cattleguards

Install cattleguards as shown in Figure 5: Map 4 and Figure 6: Map 5.

Standard Operating Procedures (cattleguards)

All new cattleguards would be constructed and designed to prevent entrapment of small animals including desert tortoise.

Water Facilities (wells, storage tanks, troughs, and pipelines)

Drill and equip up to eight new wells as shown in Figure 5: Map 4 and Figure 6: Map 5. The wells would have an approximately 12 foot windmill; solar, or other appropriate energy source; 10,000 gallon storage tank; and a 500 gallon trough for livestock, wildlife, wild horses and burros (areas in the Herd Management Area or Herd Area). Until the new wells are developed, the permittee may haul water to the

locations of the proposed new wells in order to implement the grazing system. The Adaptive Management Plan can be implemented with or without the development of any one of the eight wells.

Reconstruct approximately 4.5 miles of Wooten pipeline starting in T23N, R18W, Section 05. Water to this pipeline would be provided by Wooten Well which has been repaired and is operational. The pipeline would follow the existing pipeline alignment in a west-southwesterly direction crossing under US-93 in T23N, R18W, Section 18 and end at a trough in the Hwy 93 Pasture in T23N, R19W, Section 24 (Figure 4: Map 3). The permittee would be responsible for obtaining any required authorization for the pipeline from private landowners, the Arizona State Land Department, and the Arizona Department of Transportation.

Reconstruct the earthen reservoir in T23N, R19W, Section 24 (Figure 4: Map 3).

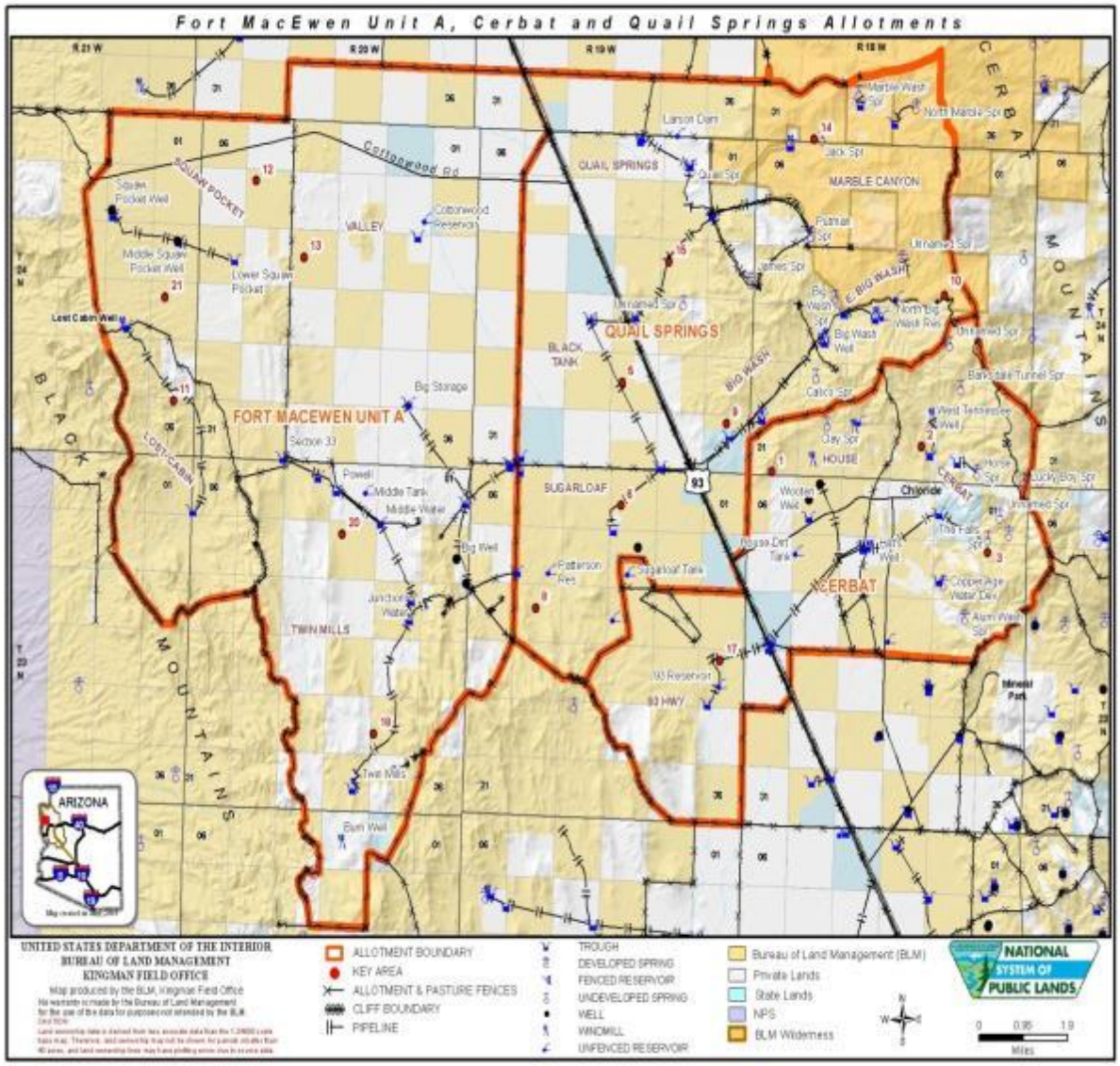

Figure 4: Map 3. Existing range improvements.

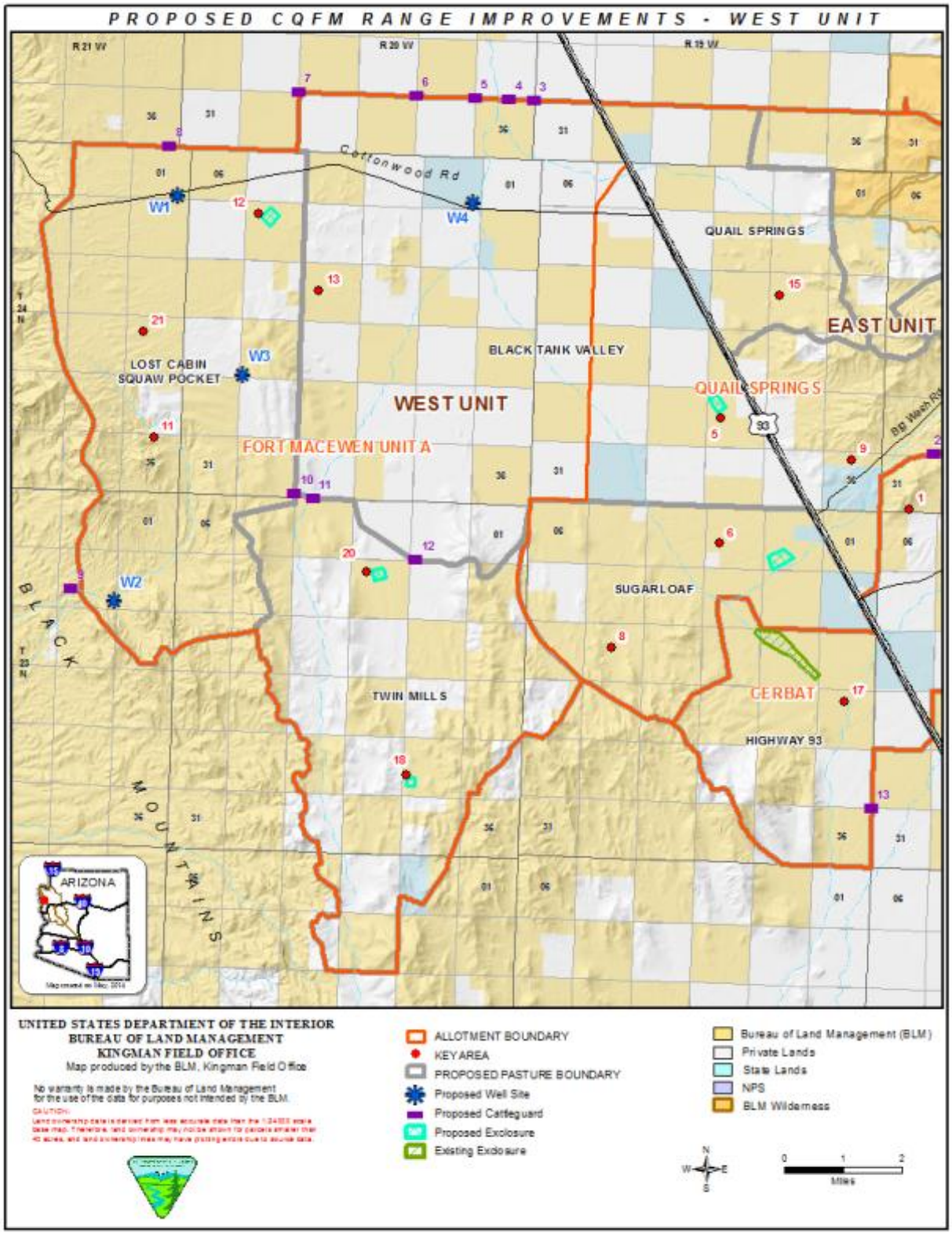

Figure 5: Map 4. Proposed wells, cattleguards, and exclosures in the West Unit.

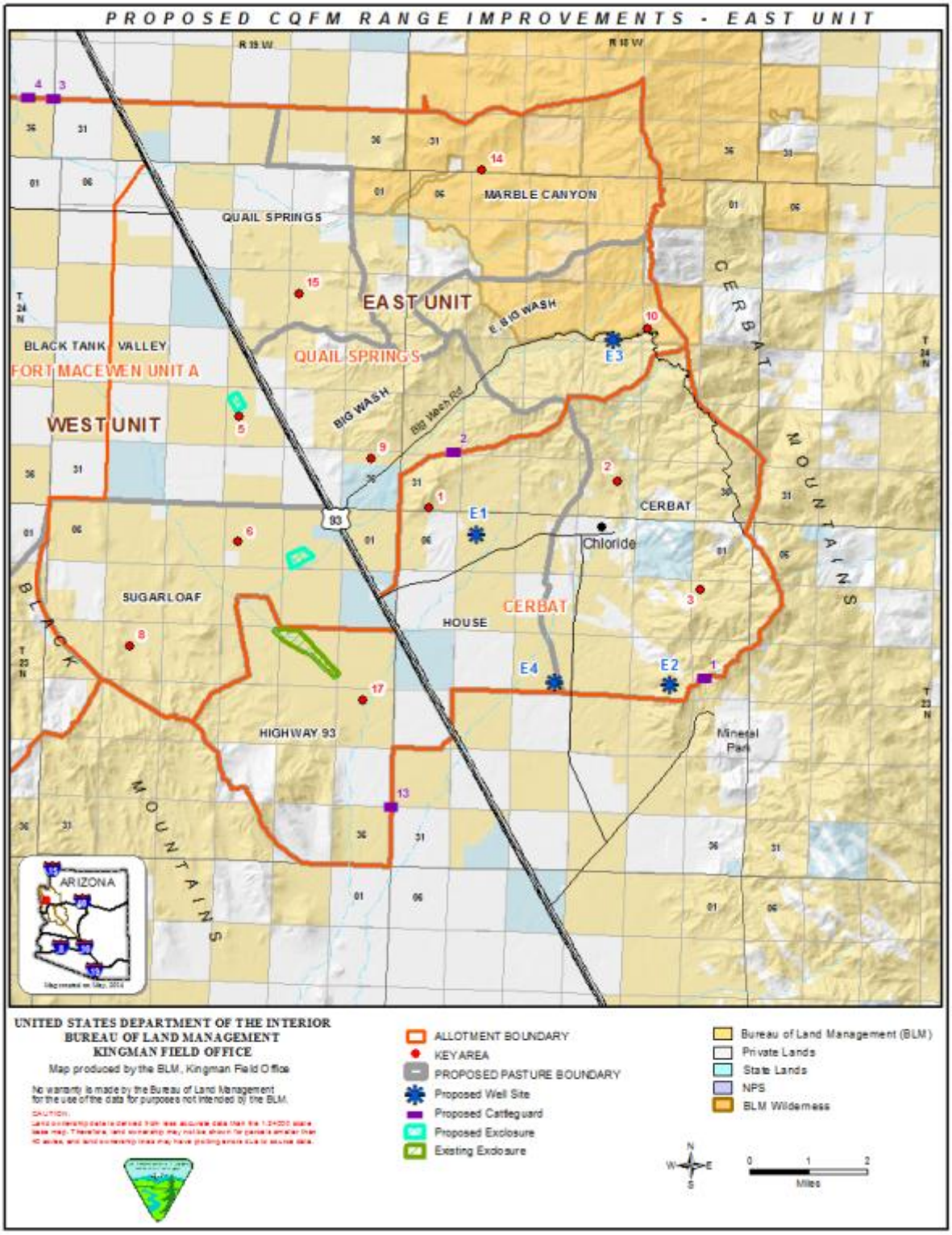

Figure 6: Map 5. Proposed cattleguards, wells, and exclosures in the East Unit.

Well Development Option
To reduce the effects and economic costs associated with developing eight new well sites, other options considered in consultation with the permittee are described below.

East Management Unit: An existing well, located in T23N, R18W, Section 15, could be developed in the Cerbat Pasture rather than drilling and equipping the proposed wells at E2 and E4. This existing well is located approximately one mile from either E2 or E4. The existing Wooten Well has been repaired and could be used rather than drilling and equipping the proposed E1well in the House Pasture. Wooten Well and E1 are located within 0.5 mile of each other. The existing permitted Calico Well could be repaired which would eliminate the need to drill and develop the proposed E3 well in the East Big Wash Pasture. Calico Well and E3 are located less than one mile from each other.

West Management Unit: The Lost Cabin pipeline could be extended approximately one mile along the road through Lost Cabin Wash to the proposed W2 well and a trough added rather than drilling and equipping W2. The existing Lost Cabin and Squaw Pocket wells could be drilled deeper to improve volume and reliability. If successful, proposed new wells W1 and W3 would not be needed.

Standard Operating Procedures (troughs)
Upon discussion and approval from the Authorized Officer, waters could be turned on and off (or access could be restricted) to facilitate movement and management of cattle and domestic horses. Facility fencing would be modified to allow wildlife access.

The watering troughs would meet BLM wildlife design standards and not stand higher than 20 inches from ground level and be equipped with a wildlife escape ramp. All of the facilities would be colored to blend with the surrounding landscape.

Upland Exclosures
Several exclosures (approximately 10 acres in size each) would be constructed. The exclosures would be used as control areas to compare grazed and ungrazed areas within pastures. The BLM would build and maintain the exclosure fences following BLM fencing standards (1989 BLM Fencing Manual H-1741-1). Exclosures would be constructed and/or maintained at the following locations (Figure 5: Map 4):

1. near Key Area 5 in the Black Tank Pasture;
2. near Key Area 12 in the Squaw Pocket Pasture;
3. near Key Area 6 in the Sugarloaf Pasture;
4. near Key Area 17 in the Highway 93 Pasture (existing exclosure);
5. near Key Area 18 in the Twin Mills Pasture; and
6. near Key Area 20 in the Twin Mills Pasture.

Riparian Exclosures
The existing exclosure around Big Wash Spring (T24N, R18W, Section 17) would be reconstructed (Figure 4: Map 3). The BLM would build and maintain the exclosure fence following BLM fencing standards (1989 BLM Fencing Manual H-1741-1).

Rain Gauges and Soil Moisture Probes
The BLM has three existing rain gauges, along with soil moisture probes, located on the allotments. To more effectively monitor actual rainfall and soil moisture conditions across the allotments, the BLM and permittee would determine locations for additional rain gauges and soil moisture probes. These would be

installed where needed. The permittee would read the rain gauges. Mohave County Automated Weather Stations would provide additional rainfall data.

2.1.6 Adaptive Management: Monitoring, Communication, and Response

Adaptive management is an iterative learning process which promotes improved understanding and improved management decision making over time; it emphasizes responsiveness to monitoring outcomes and underscores a collaborative process in order to achieve land health objectives. The Department of Interior has offered the following operational definition of adaptive management (Williams et al. 2009):

> *Adaptive management [is a decision process that] promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an iterative learning process. Adaptive management also recognizes the importance of natural variability in contributing to ecological resilience and productivity. It is not a 'trial and error' process, but rather emphasizes learning while doing. Adaptive management does not represent an end in itself, but rather a means to more effective decisions and enhanced benefits. Its true measure is in how well it helps meet environmental, social, and economic goals, increases scientific knowledge, and reduces tensions among stakeholders.*

Effective monitoring is essential to adaptive management. It provides the data with which to assess resource conditions, determine if objectives are being met, and periodically refine and update desired conditions and management strategies. If monitoring indicates that desired conditions are not being achieved and current livestock grazing practices are causing non-attainment of resource objectives, livestock grazing management on the allotment would be modified in cooperation with the permittee. Adaptive management allows the BLM to adjust the timing, use levels, intensity, frequency and duration of grazing, and livestock numbers temporarily or on a more long-term basis.

2.1.6.1 Rangeland Monitoring

Rangeland monitoring requires repeated observations or measurements of fixed locations, for multiple years, to determine trends. The types of monitoring that would be conducted include utilization, long-term trend, and precipitation (see Table 7). Monitoring is designed to observe changes in plant communities, allow evaluation into the cause(s) of change, and address changes through appropriate management actions. Monitoring helps reduce uncertainty and improve rangeland management. Monitoring also allows all parties to understand how grazing strategies can be responsive to long-term stewardship objectives (Peterson 2006, USDI BLM 2004). Clear, achievable objectives for monitoring have been developed for these allotments (USDI BLM 2010, see Section 2.1.1 Goals and Objectives).

Utilization and Long-term Trend Monitoring

Forage utilization would be monitored to ensure livestock numbers are in balance with available forage, and that adequate vegetation remains at the end of the grazing period to meet soil, watershed, and wildlife requirements. These measurements would be taken periodically throughout the year and at the end of winter prior to spring green-up. Utilization data represents only one piece of information that would be considered prior to making livestock management determinations. Seasonal use, trend, climate patterns, historic impacts, and local experience should all be considered with utilization data when making grazing management determinations (Smith et al. 2005). Additionally, soil moisture, localized drought, rainfall conditions, and onsite vegetation assessments (including ephemeral vegetation) would be considered.

Long-term trend monitoring at key areas would continue to be conducted once every five years. Established key areas would be evaluated to determine if they are still valid in accordance with BLM Handbook 4400-1 (USDI BLM 1998). Additional key areas may be added. Monitoring data includes frequency, dry-weight rank (relative composition), cover, utilization, and repeat photography.

Exclosure Vegetation Monitoring

Monitoring studies would be set up in each exclosure.

Table 7. Data Monitoring Protocol.

Data Monitoring Protocol			
What	**Where**	**When**	**Who**
Utilization	Within pastures at Key Areas and other locations to determine livestock use patterns	Minimum of two to three times/year	Partnership (see Collaborative Monitoring Section 2.1.6.2)
Long-term Vegetation Trend (includes frequency, dry-weight rank, and cover)	Within pastures at Key Areas	One time/five years	Partnership (see Collaborative Monitoring Section 2.1.6.2)
Precipitation (existing and new rain gauges, Mohave County Automated Weather Stations)	Within vicinity of allotments	Seasonally and after large storm events	Permittee BLM would compile precipitation data from Mohave County Automated Weather Stations
Invasive Plant Species (map extent of populations)	Within pastures	When other vegetation data is collected	Partnership (see Collaborative Monitoring Section 2.1.6.2)
Gates	Pasture and allotment boundaries Exclosures	As part of day to day ranch operations	Permittee
Riparian monitoring (springs)	Springs	One time/three to five years	Partnership (see Collaborative Monitoring Section 2.1.6.2)
Exclosure vegetation monitoring (frequency, dry-weight rank, and cover)	At established exclosures	One time/five years	Partnership (see Collaborative Monitoring Section 2.1.6.2)

Precipitation and Soil Moisture Monitoring
Precipitation and soil moisture data would be monitored across the allotments. The permittee would collect rainfall data on the allotments and provide that information to the BLM. BLM would provide the permittee the forms to document rainfall data. Precipitation data from the Mohave County Automated Weather stations would be compiled by BLM.

2.1.6.2 Collaborative Monitoring

Collaborative monitoring increases common understanding of resource conditions and support for management decision-making, shares workloads among partners, and builds trust for decisions made. Therefore, a collaborative monitoring program would be implemented on the CQFM between the BLM, the permittee, and other partners to coordinate the collection of appropriate monitoring data, discuss management implications of the data, and adapt decision making accordingly. Information sharing and relationships built through a collaborative monitoring program invariably leads to better management of the resources as parties work together to document good stewardship. Partners for collaborative monitoring partnership would include, but are not limited to:

- BLM (Responsible Authority; 40 CFR 1506.5(b) and (c))
- Livestock Permittee
- AZ Game and Fish Department
- Mohave Livestock Association
- Arizona Cattle Growers Association
- Arizona State Land Department
- Natural Resource Conservation District
- Natural Resource Conservation Service
- University of Arizona
- US Fish and Wildlife Service
- Non-Governmental Organizations
- Interested public

The collaborative monitoring program may have the following general structure:

1. Formal Advisory Group

   Under the auspices of the Arizona Resource Advisory Council, a formal advisory group may be formed to serve as a Grazing Review Team (GRT). Or optionally, another type of formal advisory group could be formed as provided by 43 CFR 1784.6-2(iv).

   a. GRT members would represent federal (e.g., BLM, NRCS) and state agencies as well as experts which have a broad range of expertise in resource management, especially range management.

   b. The GRT would be charged with providing input on monitoring protocols, gathering and analyzing data, reviewing upland monitoring data, and making recommendations to aid the BLM's decision making process for the permittee's annual grazing plan.

2. Collaborative Partnership

   The CQFM Collaborative Partnership, hereafter referred to as "the Partnership" would be comprised of the BLM, the permittee, and other partners previously listed. This Partnership would be formed through an open, public process. The roles and responsibilities of the partnership could be formalized through a signatory agreement.

   a. The Partnership would be charged with rangeland monitoring (see below) using an adaptive management approach (see Section 2.1.2) and making recommendations for changes to livestock grazing management, etc.

   b. The Partnership would operate under protocols for decision making and could be facilitated by a neutral third party, or led by agreed upon partnership members.

   c. Annual and semi-annual meeting will be convened by partnership members or third party facilitator. Additional meetings could take place as requested by BLM, the permittee, or other partners.

   The Partnership would meet at least twice per year (in February or March before the spring growing season and in September following the monsoon rains) to monitor and evaluate:

   - Current precipitation and trends
   - Predictions of drought and response to climate change
   - Rangeland ecological site (range) condition
   - Vegetation trends
   - Vegetation utilization
   - Soil cover
   - Livestock pasture use records
   - Livestock pasture recovery (new production)
   - Changes to infrastructure
   - Annual grazing management practices and grazing use levels
   - Recommend adjustments to grazing management

   After review of existing data collected by the Partnership, in combination with recommendations from the Grazing Review Team, the BLM Authorized Officer would make any necessary adaptive management changes related to the CQFM grazing allotments.

2.1.6.3 Adaptive Management Response

Both short-term and long-term monitoring is necessary to gather reliable data from which adaptive management determinations can be made. Monitoring data along with communication, local knowledge, and predictions are used to make adjustments on the range. This adjustment is called an adaptive management response. Several important terms are frequently used in any adaptive management strategy, three of which include: Objective, Indicator, and Trigger point.

1. *Objectives* should be specific, measurable, achievable, realistic, and time-sensitive (SMART). The desired outcomes can be stated in terms of specific resources, ecosystems, or economic.
2. *Indicator* is used to determine whether an objective is being met. Indicators may include cover, frequency, and composition, and should be selected and monitored to measure short- and long-term changes.

3. *Trigger* as defined in Nie and Schultz (2012), is a pre-negotiated commitment within an adaptive-management or mitigation plan that specifies what actions will be taken if monitoring results reveal particular resource outcomes. Adaptive Management approaches can identify both soft and hard triggers.
    a. A *soft trigger* signifies that an initial action is needed to keep from reaching the hard trigger.
    b. A *hard trigger* signifies that a critical threshold has been met, and immediate management action is needed.
    c. Reaching a soft trigger would prompt immediate discussion regarding range condition and adjustments to the grazing management to avoid exceeding the hard trigger point.

Table 8 identifies adaptive management responses and actions that would be taken based on monitoring data and evaluation.

Climatic Conditions Adaptive Management Response

Precipitation data and soil moisture data would be used in conjunction with drought condition and outlook predictions from the USDA/NOAA Drought Monitor (http://droughtmonitor.unl.edu/). This information would be used to indicate the climatic conditions in the area of the allotments. When there are indicators of below normal or above normal conditions for the CQFM Allotments, the partnership would assess local conditions and outlooks and determine what management adjustments are needed, such as pasture deferment, rest, livestock rotation, change in numbers, etc. Although drought identification would be based on the Drought Monitor, the actual management actions would be based on site specific conditions within the allotments as shown in Table 9.

The Society for Range Management has defined drought as receiving 75% or less precipitation than the long-term average (SRM 1989). For the purposes of an adaptive management response the following general guidance would be used:

Normal: 75–125% of long-term average.

Above normal: Greater than 125% of long-term average.

Below normal **(abnormally dry to moderate drought**): **Less than 75%** of long-term average.

Below normal (**severe to exceptional drought**): **Less than 65%** of long-term average, soil moisture approaching 0%, prediction of drought to continue or become more severe.

Additionally, more specific definitions and criteria can be found from the USDA/NOAA Drought Monitor (http://droughtmonitor.unl.edu/) and Svoboda et al. (2002).

The long-term average precipitation amount for each month and season would be calculated for the CQFM Allotments using data collected from three rain gauges within the allotments. The seasons are Spring (February through April), Summer (July through September), and Fall/Winter (October through January). Anomalies, i.e., the influence from hurricanes that can cause heavy rains in September and October, would be omitted from the average.

The CQFM receives precipitation in two distinct seasons which have a direct correlation to growth of cool and warm season plants. For the purposes of this document, the season having effect on cool season perennial plant growth and on spring ephemeral production is October to April. The season of rainfall having effect on warm season perennials and summer ephemeral vegetation is July through September.

Table 8. Triggers and management actions based on key species utilization, long-term trend data, and ephemeral forage.

Triggers and Management Actions						
Location	**Monitoring Method**	**Monitoring Frequency**	**Soft Trigger**	**Soft Trigger Management Actions**	**Hard Triggers**	**Hard Trigger Management Actions**
Within Black Mountain Joint Use Area	Key Species Utilization (Key species are listed in Appendix B for each Key Area) Apparent trend Or any other accepted BLM methodology	As needed to assess soft and hard triggers. Expected to be measured 2x/year or more. Potential monitoring periods: prior to break of plant dormancy, end of spring, end of summer, during and/or at the end of a pasture grazing period. The pasture grazing period is the timeframe when livestock are scheduled to be grazing in a pasture.	>30% utilization during a pasture grazing period. Reaching the soft trigger would prompt immediate discussion regarding range condition and adjustments to the grazing management to avoid exceeding the hard trigger point.	Move livestock to areas showing less utilization within the same pasture by one or more of the following (or other recommended action[s] to avoid exceeding hard trigger): *-Turn off waters (or restrict access to)* *-Remove/redistribute salt* *-Herd cattle* *-Temporary fencing* Adjust numbers Use pattern mapping may be conducted to investigate distribution issues and/or utilization levels.	>40% utilization during a pasture grazing period. >40% utilization during the pasture grazing period for 3 consecutive years, or cattle moved early for 3 consecutive years. <40% utilization for 3 consecutive years.	Move cattle, shorten time within a given pasture, and/or voluntarily adjust numbers for the next grazing period. *Adjust numbers, move cattle, or shorten time within a given pasture. Increase time within a pasture, keep current management without changes, or *adjust numbers.

Adjustment in stocking rates based on utilization data: see example on following page (Scenario 1)

[1]AU days ÷ [^]30.4 = adjusted AUMs for the next grazing period (AUMs that would be expected to not exceed utilization trigger)

[1]AU days = actual days to meet utilization level x number of AUs

[^]30.4 = average number of days per month; calculated as 365 days per year ÷ 12 months per year

*Note: Two scenarios are presented on the following page, each of which is for one year only.
The hard utilization trigger would have to be exceeded for 3 consecutive years.

Table 8. Triggers and management actions based on key species utilization, long-term trend data, and ephemeral forage (continued).

Triggers and Management Actions						
Location	**Monitoring Method**	**Monitoring Frequency**	**Soft Trigger**	**Soft Trigger Management Actions**	**Hard Triggers**	**Hard Trigger Management Actions**
Outside Black Mountain Joint Use Area	Key Species Utilization (Key species are listed in Appendix B for each Key Area) Apparent trend Or any other accepted BLM methodology	As needed to assess soft and hard triggers. Expected to be measured 2x/year or more. Potential monitoring periods: prior to break of plant dormancy, end of spring, end of summer, during and/or at the end of a pasture grazing period. The pasture grazing period is the timeframe when livestock are scheduled to be grazing in a pasture.	>40% utilization during a pasture grazing period. Reaching the soft trigger would prompt immediate discussion regarding range condition and adjustments to the grazing management to avoid exceeding the hard trigger point.	Move livestock to areas showing less utilization within the same pasture by one or more of the following (or other recommended action[s] to avoid exceeding hard trigger): *-Turn off waters (or otherwise restrict access)* *-Remove/redistribute salt* *-Herd cattle* *-Temporary fencing* Adjust numbers Use pattern mapping may be conducted to investigate distribution issues and/or utilization levels.	>50% utilization during a pasture grazing period. >50% utilization during the pasture grazing period for 3 consecutive years, or cattle moved early for 3 consecutive years. <50% utilization for 3 consecutive years.	Move cattle, shorten time within a given pasture, and/or voluntarily adjust numbers for the next grazing period. *Adjust numbers, move cattle, or shorten time within a given pasture. Increase time within a pasture or keep current management without changes, *adjust numbers.

Adjustment in stocking rates based on utilization data: see example below (Scenario 2)

[1]AU days ÷ [^]30.4 = adjusted AUMs for the next grazing period (AUMs that would be expected to not exceed utilization trigger)

[1]AU days = actual days to meet utilization level x number of AUs

[^]30.4 = average number of days per month; calculated as 365 days per year ÷ 12 months per year

Scenario 1

In pasture #1, the plan is to place 75 AUs (cows) in this pasture for 120 days while remaining at or below a 40%* utilization (util.) level.
*However, the utilization level of 40% is reached at day 97.
Calculate adjustment as follows:

Planned AUMs = 120 days x 75 AUs/30.4 = 296 AUMs
Actual AUMs = 97 days x 75 AUs/30.4 = 239 AUMs

% of planned time in pasture #1: actual days used (97) ÷ planned days (120)
= 97/120 = 0.808 or 81%

% of planned AUMs used in pasture #1: actual AUMs used (239) ÷ planned AUMs (296)
= 239/296 = 0.807 or 81%

Reduction in time of 19% = 120 days x 0.19 = 22.8 day reduction
Or Reduction in AUMs of 19% = 296 AUMs x 0.19 = 56.2 AUM reduction

Scenario 2

In pasture #2, the plan is to place 105 AUs in this pasture for 145 days while remaining at or below a 50%* utilization level.
*However, after 145 days the utilization level only reaches 41%.
Calculate adjustment as follows:

Planned utilization (util.) level of 50% = 145 days x 105 AUs ÷ 30.4 = 500.8 AUMs

Actual util. level of 41% = actual util. (41%) ÷ planned util. (50%) = 41 ÷ 50 = 0.82 or 82%

The remaining 9% portion = an increase in AUMs or time of 18%

Increase in AUMs of 18% = 500.8 AUMs x 0.18 = 90 AUM increase in stocking rate
Increase in time of 18% = 145 days x 0.18 = 26 day increase in this pasture

Table 8. Triggers and management actions based on key species utilization, long-term trend data, and ephemeral forage (continued).

Triggers and Management Actions						
Location	**Monitoring Method**	**Monitoring Frequency**	**Soft Trigger**	**Soft Trigger Management Actions**	**Hard Triggers**	**Hard Trigger Management Actions**
All Key Areas	Long Term Vegetation Trend includes frequency, dry-weight rank (relative composition), repeat photography, and ground cover estimates	Minimum of 1x/5 years	N/A	N/A	Key species frequency significantly increases, cover and composition objectives meet or make progress towards meeting objectives. Key species frequency significantly decreases, cover and composition objectives do not meet or make progress towards meeting objectives.	Adjust stocking rate, adjust period of use, or continue with current management. Adjust stocking rate, adjust period of use, or adjust use limits.
All Pastures where ephemeral growth occurs	Ephemeral forage	Seasonally, when ephemeral bloom occurs.	N/A	N/A	Apply the ephemeral rule. When in desert tortoise habitat 280 pounds per acre of ephemeral forage is needed prior to turnout.	Complete ephemeral inspection and evaluation worksheet. Authorize ephemeral grazing in accordance with applicable laws, regulations, and other guidance, including Instruction Memorandum AZ-94-018. Assess utilization on perennial and ephemeral forage during grazing and following livestock removal. >50% use on ephemeral forage allowed in focused fuels reduction areas.

It is the seasonal rainfall that is important to determining whether the precipitation is normal, below normal, or above normal and not the yearly average. Precipitation in conjunction with soil moisture and daytime-nighttime temperatures would indicate whether conditions are favorable for plant growth.

Table 9. Precipitation-related conditions expected on the allotments and the management responses for each set of conditions.

Adaptive Management Precipitation Related Scenarios		
Precipitation/Vegetation Condition	**Grazing Management Response**	**Additional Considerations**
Normal (Not Drought)	Follow grazing rotation schedule.	Continue to monitor utilization and precipitation/soil moisture.
Above Normal (Not Drought) Abundant Ephemeral Forage	Move cattle to pastures with abundant ephemeral forage until forage begins to cure. Then resume grazing rotation schedule.	Consider movement of cattle to areas with ephemeral forage or leave livestock in current pasture longer to take advantage of additional ephemeral forage. Continue to monitor utilization and precipitation/soil moisture.
Below Normal (*Abnormally Dry to Moderate Drought)	Follow grazing rotation schedule.	Review current allotment specific conditions and outlook. Determine if changes in grazing management are needed including adjusting rotation, adjusting numbers, utilizing temporary water hauls, herding etc. Continue to monitor utilization and precipitation/soil moisture.
Below Normal (*Severe to Exceptional Drought)	Open all gates and spread cattle into all pastures with the exception of pastures at or above their use limits (40% or 50%). Adjust numbers to be in balance with available forage.	Review current allotment specific conditions and outlook. Determine if additional changes in grazing management are needed including adjusting numbers and rotation, utilizing temporary water hauls, etc. Determine when livestock would be returned to the rotation and how management should proceed after the drought breaks. Continue to monitor utilization and precipitation/soil moisture. Adjust numbers to be in balance with available forage. Continue with plan including grazing schedule and monitoring. Monitor post-drought to determine plant community condition and the need for additional rest. Consider implementing management options suggested by Howery (1999).

*Terminology based on the Drought Monitor USDA/NOAA http://droughtmonitor.unl.edu/Home.aspx

Additional Cattleguards
There has been a problem with gates being left open and/or stolen on the CQFM Allotments. The following adaptive approach is meant to foster communication and develop criteria for if or when additional cattleguards are to be installed. Cattleguards could be authorized in place of existing gates if one of the following occurs:

1. If gates are left open more than five times per month, consider the addition of a cattleguard.
2. If gates are stolen at one location more than once, consider the addition of a cattleguard.
3. The permittee would notify BLM when this occurs or is occurring.

Additional Wells
The results of use pattern mapping and adaptive management could be used to indicate if additional wells are needed. New wells proposed outside of those analyzed or discussed in this EA would require site specific analysis.

Alternative 2 - Reduced Permitted Use Alternative

2.1.7 Terms and Conditions

Renew CQFM Allotments for a period of 10 years with the following grazing system schedule (Table 10) and the Terms and Conditions listed below.

Table 10. Alternative 2 grazing system schedule for years 1-3.

Pasture Name	Herd Size (AUs)	AUMs/ Pasture	AUMs/ Remain	Start Date	End Date	Grazing Days
Year 1 West Management Unit Projected Schedule						
Sugarloaf Highway	102	362	5	March 1	June 15	107
Black Tank Valley	102	448	40	June 16	Oct. 15	122
Lost Cabin Squaw Pocket	102	498	39	Oct. 16	Feb. 28	136
Twin Mills	Rest	Rest	Rest	Rest	Rest	Rest
Year 1 East Management Unit Projected Schedule						
House/Big Wash	90	317	2	March 1	June 15	107
E. Big Wash/Quail Spr.	90	294	24	June 16	Sept. 15	92
Marble Canyon/Cerbat	90	519	24	Sept.16	Feb. 28	166
Year 2 West Management Unit Projected Schedule						
Black Tank Valley	102	448	40	March 1	June 30	122
Lost Cabin Squaw Pocket	102	498	39	July 1	Nov. 15	136
Sugarloaf Highway	102	362	5	Nov. 16	Feb. 28	107
Twin Mills	Rest	Rest	Rest	Rest	Rest	Rest

Year 2 East Management Unit Projected Schedule						
Marble Canyon/Cerbat	90	519	24	March 1	Aug. 15	168
House/Big Wash	90	317	2	Aug. 16	Dec. 15	122
E. Big Wash/ Quail Spr.	90	294	24	Dec. 16	Feb. 28	75
Year 3 West Management Unit Projected Schedule						
Lost Cabin Squaw Pocket	102	498	39	March 1	July 15	137
Sugarloaf Highway	102	362	5	July 16	Oct. 30	108
Black Tank Valley	102	448	40	Nov. 1	Feb. 28	120
Twin Mills	Rest	Rest	Rest	Rest	Rest	Rest
Year 3 East Management Unit Projected Schedule						
E. Big Wash/Quail Spr.	90	294	24	Mar. 1	May 15	76
Marble Canyon/Cerbat	90	519	24	May 16	Oct. 30	168
Big Wash/House	90	317	2	Nov. 1	Feb. 28	120

The West and East Management Units (see Table 11 and Figure 7: Map 6) would be managed under a deferred rotation grazing system in which cattle would be moved three times a year. After year 3, the grazing schedule in both the West and East Units would repeat.

Flexibility: The grazing schedule would be used as a template with pasture rest and the rotation schedule being subject to change year to year based on climatic conditions, wildfire, physiological needs of the plants, as well as site specific monitoring data. The rancher would contact the BLM prior to making moves outside of the schedule, keep records of when and where livestock were actually moved, and provide the actual use information to the BLM each year. The final decisions concerning moves outside the scheduled use periods would be made by the BLM Authorized Officer.

Annual Meetings: An annual meeting between BLM and the grazing permittee would be conducted to discuss previous years monitoring, moves, etc. and the coming year's grazing schedule and climatic conditions. Emergency situations, such as loss of a water facility which would necessitate immediate removal of livestock from an area, would be handled on a case by case basis and would involve consultation with the above parties. The final decisions concerning the annual meeting recommendations and emergency situations would be made by the BLM Authorized Officer.

Table 11. Alternative 2 proposed pastures in the West and East Management units.

West Management Unit Pastures	East Management Unit Pastures
Twin Mills Lost Cabin/Squaw Pocket Black Tank/Valley Sugarloaf/Highway	Big Wash East Big Wash Quail Springs Marble Canyon House Cerbat

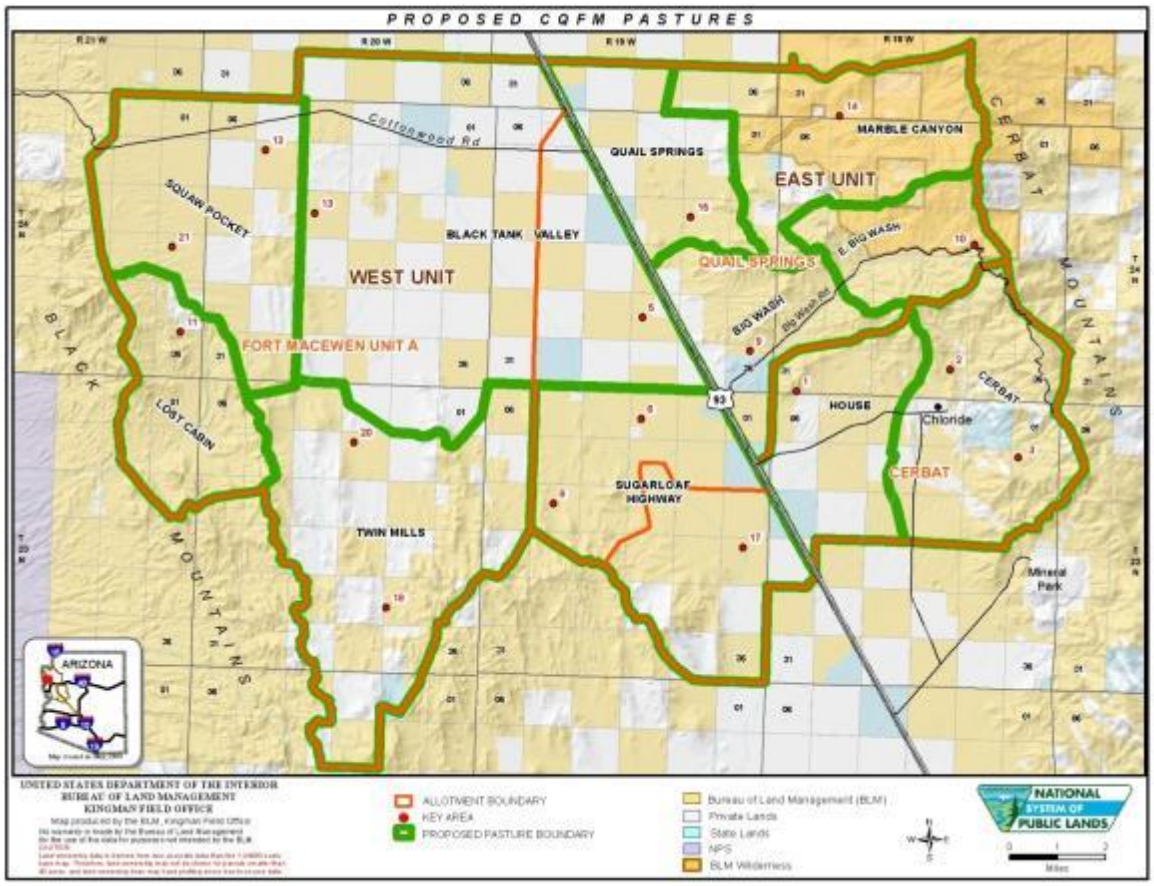

Figure 7: Map 6. Location of East and West Management units and proposed pasture boundaries within the allotments.

Additional Criteria:

- The initial stocking rate was based on actual use and a determination of attainment for the Rangeland Health Standards (USDI BLM 1997). The combined authorized stocking level for both the West and East Management Units under Alternative 2 would be 203 AUs which includes cattle and 10 horses (horse use would be allowed intermittently throughout the year for a total of two months in the Quail Springs Pasture). The stocking level would be adjusted based on monitoring data in relationship to resource management objectives.
- Any future adjustments in stocking rate would be based upon actual use, utilization, cover, frequency, and composition data. Stocking rates could remain the same or be adjusted upward or downward depending on whether Rangeland Health Standards (USDI BLM 1997) are being achieved.
- Areas within the CQFM Allotments that fall in the "Joint Use Area" would have utilization limits set in the Black Mountain Ecosystem Management Plan (USDI BLM 1996), and presented in Section 1.4, Conformance with Land Use Plan of this document. These limits would become part of the terms and conditions of the grazing permit. The key areas located in the Joint Use Area are 8, 11, 18, 20, and 21.
- Each key species at key areas outside of the Joint Use Area of the Black Mountain Ecosystem would have an average use limit of 35% over three years.

- When utilization levels reach or exceed 40% cattle would be removed from the pasture (as per Grazing Regulations).
- The permittee would have one year from date of the permit renewal to repair the Lost Cabin Squaw Pocket fences or these pastures would be closed to grazing (See 43 CFR 4110.3-2).
- No ephemeral use (no additional livestock) would be authorized for the 10-year grazing period (i.e., life of the permit). However, the base herd may be allowed to remain in a pasture for extended periods of time based upon the presence of ephemeral forage.
- The permittee would be required to have ear tags on all livestock authorized to graze.
- A change in kind of livestock from cattle to horses would be included on the term permit for the Quail Springs Allotment. The permittee would be allowed to have 10 head of horses in the Quail Springs Pasture near his headquarters for up to two months each year, only when cattle are in the pasture according to scheduled pasture rotations.
- The permittee would provide actual use information by pasture to the BLM including number of animals, kind and class of livestock, and period of use.
- All waters located on public land would be left on and functional when cattle are not in the pasture.

2.1.8 Livestock Management

West Management Unit

Livestock management under Alternative 2 provides grazing deferment in the spring and summer for all pastures (except Twin Mills) two out of three years (Table 10). To implement Alternative 2, all allotment and pasture boundary fences must be repaired to control livestock movements.

Close the Twin Mills Pasture to cattle grazing until the cover and frequency objectives relating to the DPC of Standard 3 are met. The objectives would be considered met when perennial vegetative cover at Key Area 20 reaches 15 to 20%. Current data indicates perennial vegetative cover at Key Area 20 is at 9%.

Combine the Sugarloaf and Highway 93 pastures into one pasture named Sugarloaf Highway Pasture.

Combine the Valley and Black Tank pastures into one pasture named the Black Tank Valley Pasture.

Squaw Pocket and Lost Cabin pastures would remain separate but managed as one unit (i.e., grazed at the same time).

East Management Unit

The proposed livestock management under Alternative 2 provides grazing deferment in the spring for House and Big Wash pastures two out of three years and in the summer, 2.5 out of three years (Table 10). In East Big Wash and Quail Springs pastures, grazing deferment would occur in the spring and summer two out of three years (Table 10). In Marble Canyon and Cerbat pastures, grazing deferment would occur in the spring, two out of three years and in the summer, 1.5 out of three years (Table 10). To implement Alternative 2, all allotment and pasture boundary fences must be repaired to control livestock.

2.1.9 Existing Range Improvements

The following permitted range improvements would be repaired or modified within one year of the date of implementation of Alternative 2. If not repaired or modified to control livestock then one or more of

these pastures would not be authorized for grazing use, resulting in temporary suspension of livestock AUMs. See Figure 8: Map 7 for existing range improvements.

1. Relocate the existing fence, and realign the road across Lost Cabin Wash along the west boundary of the Lost Cabin Pasture out of the wash to a nearby upland location. The gate would be replaced with a cattleguard (Figure 9: Map 8). The road in Lost Cabin Wash provides remote access to the LMNRA and, therefore, receives frequent vehicle use. Consequently, the gate at this location is often left open which allows cattle to wander onto the LMNRA.
2. The boundary fence to the west of Lost Cabin Spring would be extended approximately 0.5 miles to the south and tied into a natural boundary. The location of this fence is T24N, R21W, Sections 22, 23, and 26 (Figure 9: Map 8).
3. The fence between Squaw Pocket and Lost Cabin Pastures would be maintained or reconstructed.
4. Repair/reconstruct the West Management Unit boundary fences at Fort MacEwen Units A and B.
5. Repair the fence along the south and southeast boundary of the Sugarloaf Highway Pasture.
6. When fences are realigned, extended, or reconstructed they would be built and then maintained using BLM fencing standards (1989 BLM Fencing Manual H-1741-1). Standards would differ depending on the big game species present (bighorn sheep or mule deer).
7. Maintenance or reconstruction of fences in tortoise habitat would be conducted from existing roads or on foot or horseback where road access is not available. No off-road vehicle would be authorized.
8. To improve riparian habitat and make progress towards meeting Standard 2 at Big Wash Spring, the existing fence would be repaired or replaced. The fence around the spring would be approximately 100 feet long by 50 feet wide and built and maintained by the BLM using BLM fencing standards (1989 BLM Fencing Manual H-1741-1). This would exclude livestock from the spring source and riparian vegetation, but allow for wildlife access. The location of this spring is T24N, R18W, Section 17 (Figure 8: Map 7).

2.1.10 **Proposed Range Improvements**

Install a cattleguard along the road at Lost Cabin Wash adjacent to the fence that separates the Lost Cabin and Squaw Pocket pastures. The location of the new cattleguard is T23N, R21W, Section 11 (Figure 9: Map 8). The cattleguard would be designed to prevent entrapment of small animals (e.g., desert tortoise).

2.1.11 **Exclosure Construction**

Three exclosures would be constructed to exclude livestock grazing from those locations: near Key Area 5 in the Black Tank Pasture, near Key Area 12 in the Squaw Pocket Pasture, and near Key Area 20 in the Twin Mills Pasture. These exclosures would be approximately 10 acres in size and would be used as control areas to compare grazed and ungrazed areas in these pastures. The BLM would build and maintain the exclosure fences using BLM fencing standards (1989 BLM Fencing Manual H-1741-1).

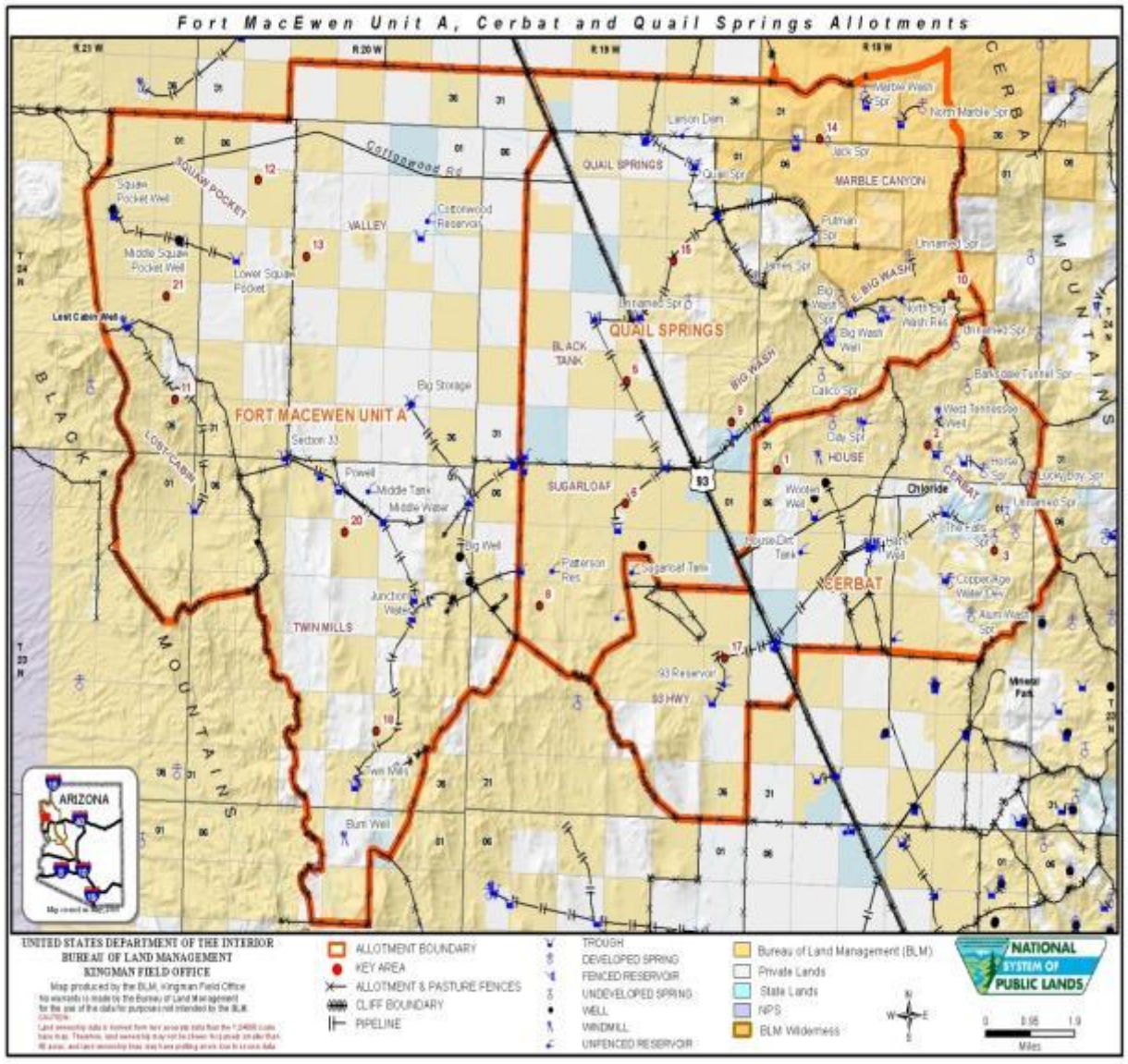

Figure 8: Map 7. Existing range improvements.

2.1.12 **Monitoring Protocol and Criteria for Stocking Rate Analysis**

BLM resource specialists would periodically monitor the allotments over the 10-year term of the grazing permit to ensure that the fundamentals or conditions of rangeland health are being met within the allotments, in accordance with 43 CFR 4180. If monitoring indicates current livestock grazing practices are causing non-attainment of resource objectives, the BLM could modify the terms and conditions of a grazing permit (i.e., number of cattle, turn out dates, removal dates, etc.) temporarily or on a more long-term basis, as deemed necessary, after consultation with the livestock permittee.

BLM would evaluate the stocking rate over the next three years using actual use data and utilization data collected by pasture every year.

BLM would monitor Swicker and Lower Falls Springs to determine the efficacy of the grazing system and would identify future management changes, if needed.

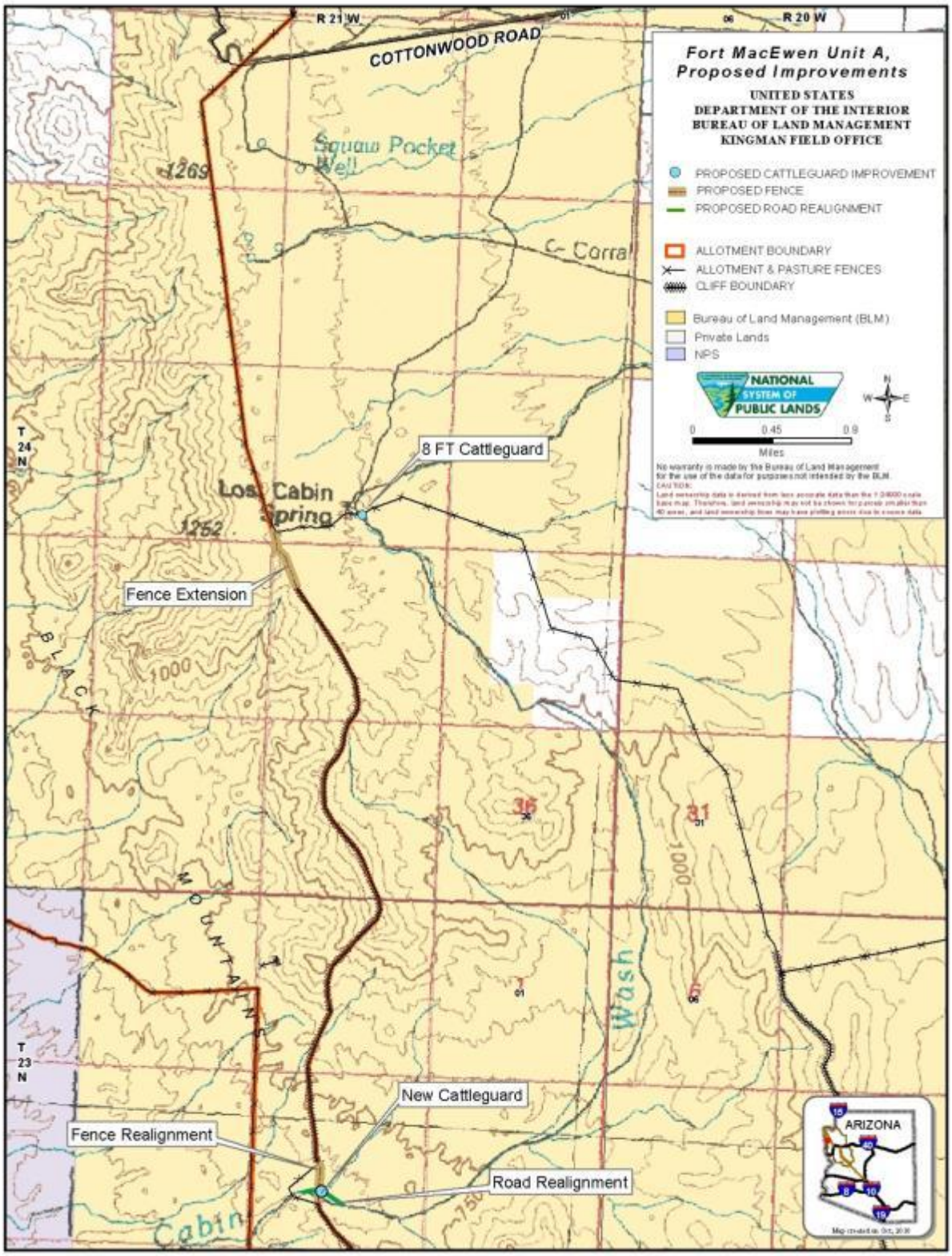

Figure 9: Map 8. Fort MacEwen Allotment proposed improvements.

2.1.13 **Stocking Rate Analysis**

Grazing Capacity or Stocking Rate Analysis: The following is the process for determining the grazing capacity or initial stocking rate for the CQFM Allotments. Grazing capacity refers to the maximum stocking rate possible year after year without causing damage to vegetation or related resources (Holechek et al. 1999).

The 13 year average for each allotment from 1998 to 2010 is presented in Table 12. The averages were used as the base stocking rate. The average for each allotment was used to allocate forage for each pasture.

Cerbat Allotment was allocated 588 AUMs or 49 AUs.

The Quail Springs Allotment was allocated 1,015 AUMs or 85 AUs.

The Fort MacEwen Allotment was allocated 834 AUMS or 69 AUs. The Twin Mills Pasture of the Fort MacEwen Allotment was allocated 411 AUMs or 34 AUs. These AUMs were removed because of the proposed closure of Twin Mills Pasture. The Valley Pasture has approximately 12,000 acres of private uncontrolled land which cannot be used in the calculation of AUMs.

The initial stocking rate for CQFM is 203 AUs.

Table 12. Thirteen year average stocking rate for CQFM.

Year	Cerbat AUMs	Quail Springs AUMs	Fort MacEwen AUMs
1998	1953	2397	1437
1999	518	1757	1777
2000	1150	632	1777
2001	679	367	626
2002	132	0	0
2003	371	522	643
2004	211	340	810
2005	335	162	1238
2006	391	297	1527
2007	391	1782	1777
2008	502	1836	1766
2009	338	991	1766
2010	670	2106	1766
Average	**588**	**1015**	**1301 - 411 (Twin Mills) = 890 AUMs**

2.1.14 **Alternative 2- Desired Plant Community Objectives**

These allotments would be managed to achieve the DPC objectives included in the Cerbat, Quail Springs, and Fort MacEwen Rangeland Health Evaluation (USDI BLM 2010). The evaluation lists and evaluates achievement of the allotment DPC objectives. These objectives were developed by an interdisciplinary

team and expressed in species composition and perennial vegetative cover (Appendix B, Table B-1 through Table B-3). See Appendix A for a list of the common and scientific names of plants.

Alternative 3 - No Action Alternative–No Change to Current Terms and Conditions

The intent of the 1980 AMP was for it to be patterned after the "Best Pasture" concept outlined in the Jornada Experimental Range Report #1 prepared by Herbel and Nelson (1969). Text from the 1980 AMP states:

> "The evolutionary development of an AMP will necessitate a continuous flow of information derived from rangeland monitoring and research with site specific overtation. This research will serve as positive support for management decisions concerned with meeting production demands placed on rangeland plant resources by an ever increasing human population".
>
> "The objective of this plan is to improve the condition and trend of the public rangeland in this allotment in line with the multiple-use objective stated in the Livestock Grazing Program document for the Cerbat Black Mountain Planning Units. Due to the evolutionary nature inherent in the development of a successful AMP, the objectives for this allotment management plan are intentionally broad in scope."

2.1.15 Grazing System

The description of the grazing system listed below was obtained during meetings between the permittee and the BLM Range Management Specialist(s). Table 13 shows the grazing permitted use and current use. Table 14 shows the pastures in the West and East Management Units.

Table 13. Alternative 3 No Action, grazing permitted use and current season of use.

Allotment	Percent Public Land	Number and Kind of Livestock	Season of Use	Active AUMs	Suspended AUMs	Total AUMs
Cerbat	93	175 Cattle	03/01–02/28	1,953	0	1,953
Quail Springs	90	242 Cattle	03/01–02/28	2,614	0	2,614
Fort MacEwen (Unit A)	92	161 Cattle	03/01–02/28	1,777	745	2,522
Totals	578 Cattle			6,344	745	7,089

Table 14. Alternative 3 No Action, pastures in the West and East Management Units.

West Management Unit	East Management Unit
Fort MacEwen Allotment (Unit A) Pastures: Valley (aka Cottonwood) Twin Mills Squaw Pocket Lost Cabin	Quail Springs Allotment Pastures: Big Wash East Big Wash Quail Springs Marble Canyon

West Management Unit	East Management Unit
Quail Springs Allotment Pastures: Black Tank Sugarloaf	Cerbat Allotment Pastures: House Cerbat
Cerbat Allotment Pasture: Highway 93	

2.1.15.1 West Management Unit

The current grazing system in the West Management Unit consists of the following components:

Each year, beginning in mid-October cattle are put into the Squaw Pocket, Lost Cabin and Twin Mills pastures. In mid-April, cattle are gathered from these pastures and moved into the shipping corrals located in the southeast corner of the Big Ranch Allotment. The cattle are then separated into cattle to ship and cattle to keep. The cattle that are kept are released back to the Valley, Black Tank, Sugarloaf, and Highway 93 pastures where they are grazed until mid-October.

Cattle are discouraged from moving back and forth between the lower and upper portions of the West Management Unit by distance between waters and internal pasture fences. When livestock are moved into an area, they are placed at the water source. When livestock are removed from a pasture, those waters on public land remain available to wildlife and burros. The distance between waters ranges from approximately one to five miles. In the hotter months, most of the cattle remain near where they were originally placed. Some internal pasture fences are in disrepair and in the cooler months, cattle may go back and forth between the lower and upper portions of the West Management Unit. Intact portions of these fences act as barriers to cattle movement and help prevent drift.

In pastures that contain a large amount of private land, large sections of pasture fence have been cut or completely removed, such as in the Valley and Black Tank pastures. Even in pastures where the fencing has not been cut, keeping gates shut is difficult due to the high volume of public traffic. This is also true for some of the gates along boundary fences.

2.1.15.2 East Management Unit

The current grazing system in the East Management Unit consists of the following components:

Each year, starting in late October, cattle are moved into the Cerbat, Marble Canyon, and East Big Wash pastures. In early May, cattle are gathered and moved into the shipping corrals located at the headquarters on the Quail Springs Allotment. The cattle are separated into cattle to ship and cattle to keep. The cattle that are kept are moved to the Big Wash, Quail Springs, and House pastures. During the cooler months, cattle may go back and forth between the lower and upper portions of the East Management Unit.

In the East Management Unit, pasture and boundary fencing are in better condition; however, keeping gates closed is still a problem. The permittee can use water to control where the livestock graze by closing off water in corrals. In the Quail Springs Allotment, the permittee is using water and fencing to control livestock. In the House Pasture (Cerbat Allotment), there is only one permanent water development and one reservoir that intermittently collects water.

In the Cerbat Pasture (Cerbat Allotment) prior to October 2013, all waters were in the form of low producing or seasonal springs. Consequently, the Cerbat Pasture was primarily used during the fall and winter grazing periods. A water development (Tennessee Well) was constructed on private land in October 2013 which now provides a permanent water source in the Cerbat Pasture. All waters are open to wildlife and wild horses year-round. The exclosure fence around Big Wash Spring would be repaired.

Alternative 4 - No Grazing

Under the No Grazing Alternative the BLM would amend the Kingman RMP (USDI BLM 1995) and initiate a process in accordance with the 43 CFR 4100 regulations to eliminate grazing. Following the successful completion for all the processes that need to be initiated, all livestock would then be removed from the allotment. Since no grazing would occur, there would be no livestock capacity determinations, no utilization or grazing intensity guidelines, no grazing management system, and no implementation or effectiveness monitoring.

Water catchments within the allotments may or may not be maintained or reclaimed. BLM would need to make a determination to either remove exclosure(s) or maintain the existing exclosure(s) that are within the allotments. To prevent unauthorized grazing use on public lands, BLM would also need to assign maintenance responsibility for existing fences to permittee's on adjoining or adjacent allotments.

This alternative does not preclude livestock grazing or livestock management on these allotments in the future if a decision is made through another comprehensive analysis to resume these actions.

3 AFFECTED ENVIRONMENT

This chapter describes the general project setting and addresses standard critical elements of the human environment (H-1790-1, Appendix 5 of the BLM NEPA Handbook 2008, as amended) and several other resource elements commonly affected by livestock grazing. A detailed discussion of the resources present at the time the Rangeland Health Standards (USDI BLM 1997) were evaluated for this EA can be found in the *Cerbat, Quail Springs, and Fort MacEwen Allotments Rangeland Health Evaluation* (USDI BLM 2010).

General Project Setting - Landscape Setting

The CQFM Allotments are located 20 miles northwest of Kingman, Arizona, and are considered within the Mojave Desert. The three allotments cover an area of land ranging from the ridgeline and west side of the Cerbat Mountain Range to the ridgeline and east side of the Black Mountain Range. The landscape includes fan terraces, drainages, and low hills in Detrital Valley.

The major land resource area is the Mojave Desert (Figure 10). Dominant aspect plants include creosote bush, white bursage, Joshua tree, and Mojave yucca.

The Sacramento Wash is the main drainage in the Cerbat Allotment. It originates in the Cerbat Mountains and flows south into Sacramento Valley and ultimately into the Colorado River. Big Wash flows westward from the Cerbat Mountains into the uppermost reaches of Detrital Wash at the head of Detrital Valley. Detrital Wash flows north through Detrital Valley and ultimately reaches the Colorado River at Lake Mead.

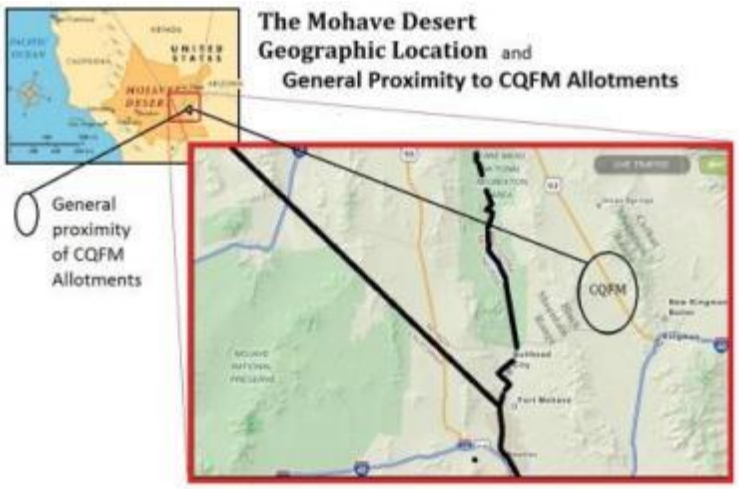

Figure 10: General of CQFM Allotments within Mojave Desert

3.1.1 Climate

The climate of the Mojave Desert is generally warm, windy, and dry with extreme highs near 120° Fahrenheit and extreme lows near 25° Fahrenheit. Precipitation ranges from three inches on the valley floor to 12 inches on high peaks in the Black Mountains and 16 inches in the Cerbat Mountains. Climate is influenced by both winter Pacific frontal storms and summer orographic convective storms. Of the annual precipitation, approximately 65% falls during the cooler months (October through April) and approximately 35% falls between May and September. This bi-modal rainfall pattern results in two distinct growing seasons which occur in the spring and summer.

From 1992 through 2008 warm season drought occurred in eleven out of seventeen years and cool season drought occurred in nine out of seventeen years (USDI BLM 2010). Warm-season drought conditions occurred several years in a row starting in 1993–1996, 2001–2003, and 2007–2008. In the 1980s, seasonal droughts also occurred but were less frequent, four out of eleven years. The duration of drought was shorter, as well, usually lasting only one year or two years in a row.

Elements/Resources of the Human Environment

The BLM is required to consider many authorities when evaluating a federal action. Those elements of the human environment that are subject to the requirements specified in statute, regulation, or executive order must be considered in all EAs (USDI BLM 2008), and have been considered by BLM resource specialists in this EA.

Table 15 lists Resources and Critical Elements considered for analysis in this document. The following alpha-descriptors used mean the following:

NP-Resource/Critical Element is "Not Present" in area and will not be impacted by the Proposed Action.

NI-Resource/Critical Element is "Present and Not Impacted" in area to the degree that analysis is required. Elements in this category will have a rationale explaining why analysis is not provided in further detail in the document.

PI- Resource/Critical Element is "Present and Impacted" in area and is provided in Section 4.3.

*- Denotes Supplemental Authorities that must be considered per BLM NEPA Handbook H1790-1.

Table 15. Elements/resources of the human environment.

Resource/Critical Element	Presence *Codes at End	Rationale for Effect Determination
Air Quality*	NI	The Federal Clean Air Act of 1970 required the Environmental Protection Agency to establish National Ambient Air Quality Standards, which specify maximum levels for six criteria pollutants: carbon monoxide, nitrogen dioxide, ozone, particulate matter (PM) (up to 10 and up to 2.5 micrometers in size), sulfur dioxide, and lead. Mohave County is classified by EPA as an "attainment area" for PM-10 authorized under the Clean Air Act Amendments of 1977 and 1990. Livestock operations release fugitive dust and carbon monoxide associated with cattle trailing, vehicle use, and range improvement projects. The current livestock operation is in conformance with the air quality standards because it lies within the Mohave County PM-10 attainment area. Therefore, all alternatives would be in conformance. The Proposed Action, Alternative 2, and the No Grazing alternative are expected to potentially reduce particulate matter even further because perennial plant cover is expected to increase over the long-term.
Areas of Critical Environmental Concern	PI	Refer to Sections 3.1.2 and 4.1.2.1
BLM Sensitive Plant Species	PI	Refer to Sections 3.1.15 and 4.1.2.13
Climate Change	NI	BLM must take action to manage public land in order to respond to the changing climate in accordance with 523 DM 1. The U.S. Geological Survey has reviewed the latest science on greenhouse gas emissions and concluded that it is currently beyond the scope of existing science to identify a specific source of greenhouse gas emissions or sequestration (storage) and designate it as the cause of specific climate impacts at a specific location (May 14, 2008 Memorandum to the U.S. Fish and Wildlife Service). BLM nevertheless recognizes that climate change may result in impacts to plants and animals. According to EPA website: http://www.epa.gov/ruminant.html/faq.html, an adult cow emits 80–110 kgs of methane per year. EPA estimates that there are 100 million cattle in the U.S. that emit about 5.5 million metric tons of methane per year, which is about 20% of U.S. methane emissions. The number of cattle currently permitted for the CQFM Allotments is 578 cows which represents 0.087% of methane production by cows on BLM land. Thus, the proposed alternatives will not substantially contribute to greenhouse gas emissions. Impacts associated with wildfire and invasive non-native species that could increase as a result of changes in climate are discussed.
Cultural Resources*	NI	Since the 1970s, BLM Kingman Field Office archaeologists conducted a minimum of Class II surveys in existing grazing allotments, focused on areas where cattle congregate, loafing areas, and cattle trails. There are numerous cultural sites scattered at low to moderate density across the Cerbat, Quail Springs, and Fort MacEwen allotments. They consist of prehistoric artifact scatters of ceramic and stone tool debitage, rock art sites, historic sites related to ranching and mining, and remnants of historic Hualapai Indian home sites. According to Arizona BLM Handbook H-8110, Guidelines for Identifying Cultural Resources (USDI BLM 1999), the following undertakings are considered generally exempt from cultural resource field inventory: 1. Allotment Management Plans (AMP), AMP amendments, allotment evaluations and similar actions associated with dispersed livestock grazing decisions except for locations within the allotments where specific land-disturbing developments are initiated by that action or where sites particularly sensitive to increased grazing levels are known or are expected to be present. 2. Range improvement maintenance (e.g., fences, pipelines, reservoirs), except at locations not previously subject to Section 106 reviews. A BLM Archaeologist conducted Class III cultural resource inventories for all of the proposed range improvements for cattleguards and exclosures. Some of these inventories were conducted in 2013. The associated report numbers are BLM-AZ-310-13-08 (conducted on March 25, 2013) and BLM-AZ-310-13-12. Both reports document that no historic properties or cultural resources were present; therefore, no effect is expected to historic properties. Subsequent to these reports, further range improvements were proposed: two 10-acre exclosures, up to eight wells, and one cattleguard. A BLM Archaeologist conducted a Class III cultural resource inventory, preceded by an existing records check, for the remaining proposed range improvements on March 27 and April 3, 2015. Except for the proposed site of well E1, the locations of all proposed range improvements were negative for cultural resources. E1's proposed location was dropped from the project design to avoid adverse impacts to potentially

Resource/Critical Element	Presence *Codes at End	Rationale for Effect Determination
		eligible cultural resources. The associated report number is BLM-AZ-310-15-18. The Proposed Action and other alternatives are not expected to have significant impact on historic properties listed on or eligible for listing on the National Register of Historic Places.
Environmental Justice*	NI	No environmental justice effects were identified or expected to happen under any of the alternatives. Continued livestock grazing under any of the alternatives is not expected to have a disproportionately high or adverse human health or any other environmental effects on minority or low income segments of the population.
Farmlands (Prime or Unique)	NP	There are no prime or unique farmlands found in the allotments.
Fish Habitat*	NP	No fish habitat is present on the allotment.
Floodplains*	NP	No actions are proposed that result in permanent fills, diversions, or placement of permanent facilities in floodplains or special flood hazard areas. Continued livestock grazing is not expected to affect the function of the floodplains.
Forests and Rangelands*	NI	No impact to forests as defined by the supplemental authority referring to the Healthy Forests Restoration Act of 2003 is expected.
Fuels/Fire Management	PI	Refer to Sections 3.1.3 and 4.1.2.2
Geology/Mineral Resources/Energy Production	NI	Continuing livestock grazing under Alternatives 1, 2, or 3 is not expected to alter geological features or mineral resources.
Invasive, Non-native Species	PI	Refer to Sections 3.1.4 and 4.1.2.3
Lands/Realty/Access	PI	Refer to Sections 3.1.6 and 4.1.2.4
Livestock Grazing	PI	Refer to Sections 3.1.5 and 4.1.2.5
Native American Religious Concerns*	NI	See explanation for Cultural Resources above.
Paleontology	NP	There are no paleontological resources identified in the alluvial deposits present within the allotments.
Recreation	PI	Refer to Sections 3.1.7 and 4.1.2.6
Socio-economic Values	PI	Refer to Sections 3.1.9 and 4.1.2.8
Soil Resources	PI	Refer to Sections 3.1.10 (Soils), 3.1.11 (Biotic Soil Crusts), and 4.1.2.9 (Soils)
Threatened, Endangered or Candidate Plant and Animal Species*	PI	Refer to Sections 3.1.15 and 4.1.2.13
Vegetation	PI	Refer to Sections 3.1.12 and 4.1.2.10
Visual Resources	NI	The allotments contain areas designated as Visual Resource Management Classes II, III, and IV. Continuing livestock grazing as proposed is not expected to affect visual resources; new range improvements as proposed with implementation of applicable Best Management Practices and/or assigned mitigation measures are not expected to change the existing character of the landscape and would meet the VRM objectives.
Wastes (Hazardous or Solid)*	NP	No known hazardous or solid waste issues occur in the allotment.
Water Quality*	PI	Refer to Sections 3.1.13 and 4.1.2.11
Wetlands-Riparian Zones*	PI	No intermittent or perennial streams occur in the allotments; however, there are wetlands/riparian zones found in association with springs. Discussion is covered within

Resource/Critical Element	Presence *Codes at End	Rationale for Effect Determination
		several sections that include Livestock Grazing Management, Riparian 3.1.8, Vegetation, and Water Quality
Wild and Scenic Rivers*	NP	There are no wild and scenic rivers found in the allotments.
Wild Horses and Burros	PI	Refer to Sections 3.1.14 and 4.1.2.12
Wilderness*	NI	Approximately 8,180 acres of the Mount Tipton Wilderness, designated by Congress in November 1990, is located in the eastern portion of the Quail Springs Allotment. This area was selected for its high degree of naturalness. Livestock grazing is an existing use within the wilderness. The Mount Tipton Wilderness Management Plan (USDI BLM 1995a) allows non-motorized and non-mechanized inspection and routine maintenance of range improvements such as fences and water developments at springs. The existing wilderness values of naturalness, outstanding opportunities for solitude, and primitive and unconfined recreation would be retained under any of the alternatives.
Wilderness Characteristics	NP	No additional wilderness characteristics have been identified in the allotments.
Wildlife (including BLM Sensitive Species and Migratory Birds*)	PI	Refer to Sections 3.1.15 and 4.1.2.13

Resources Present and Brought Forward for Analysis

The following sections contain descriptions of elements determined to be present, potentially affected by the alternatives, and carried forward for detailed analysis in this document. The description of the resources identified below provides the baseline for comparison of impacts described in Chapter 4.

3.1.2 Area of Critical Environmental Concern

Approximately 10,348 acres of the Black Mountains Ecosystem Management Area of Critical Environmental Concern (ACEC) occurs in the Fort MacEwen Allotment (Figure 11: Map 9). The ACEC was established in the Kingman RMP (USDI BLM 1995) to manage the diverse resources within its boundaries by balancing competing uses. The resources identified were: desert bighorn sheep, burro, and habitat for the BLM sensitive plant species, two-colored beard tongue (*Penstemon bicolor roseus*); outstanding scenic values; open space near major population centers; rare and outstanding cultural resources; mineral deposits; and livestock grazing. The direction for range and watershed management in the RMP is to (1) manage livestock and burro grazing to achieve objectives for bighorn sheep, burro, mule deer, and the BLM sensitive plant species, two-colored beard tongue and (2) classify allotments within nine miles of bighorn sheep habitat for grazing by livestock as cattle only (no domestic sheep or goats). Livestock grazing is an existing use in the ACEC.

3.1.3 Fuels/Fire Management

The CQFM Allotments are located in the Mojave Desert where desert scrub is the dominant plant community. Desert scrub vegetation types are not fire-adapted, and native species do not rapidly recover from the effects of wildfire. Fire is carried by exotic annual grasses which have invaded into the landscape. Exotic annual grasses such as red brome become fire hazards after wet winters. The grasses usually cure by mid-May, when the fire season typically begins.

The vegetation within the Fort MacEwen allotment in the Twin Mills and Valley Pastures was burned by wildfire (Twin Mills Fire) in July 2005. A total of 11,927 acres was burned. Another fire called the Union Fire burned in June 2006 covering 8,380 acres (Figure 12: Map 10). In the 1980s and 1990s,

several other smaller scale fires occurred in the Fort MacEwen and Quail Springs allotments. Red brome was the primary fuel which carried these fires; along with other annual grasses and forbs. No fuel reduction or fuels management projects have occurred on these allotments.

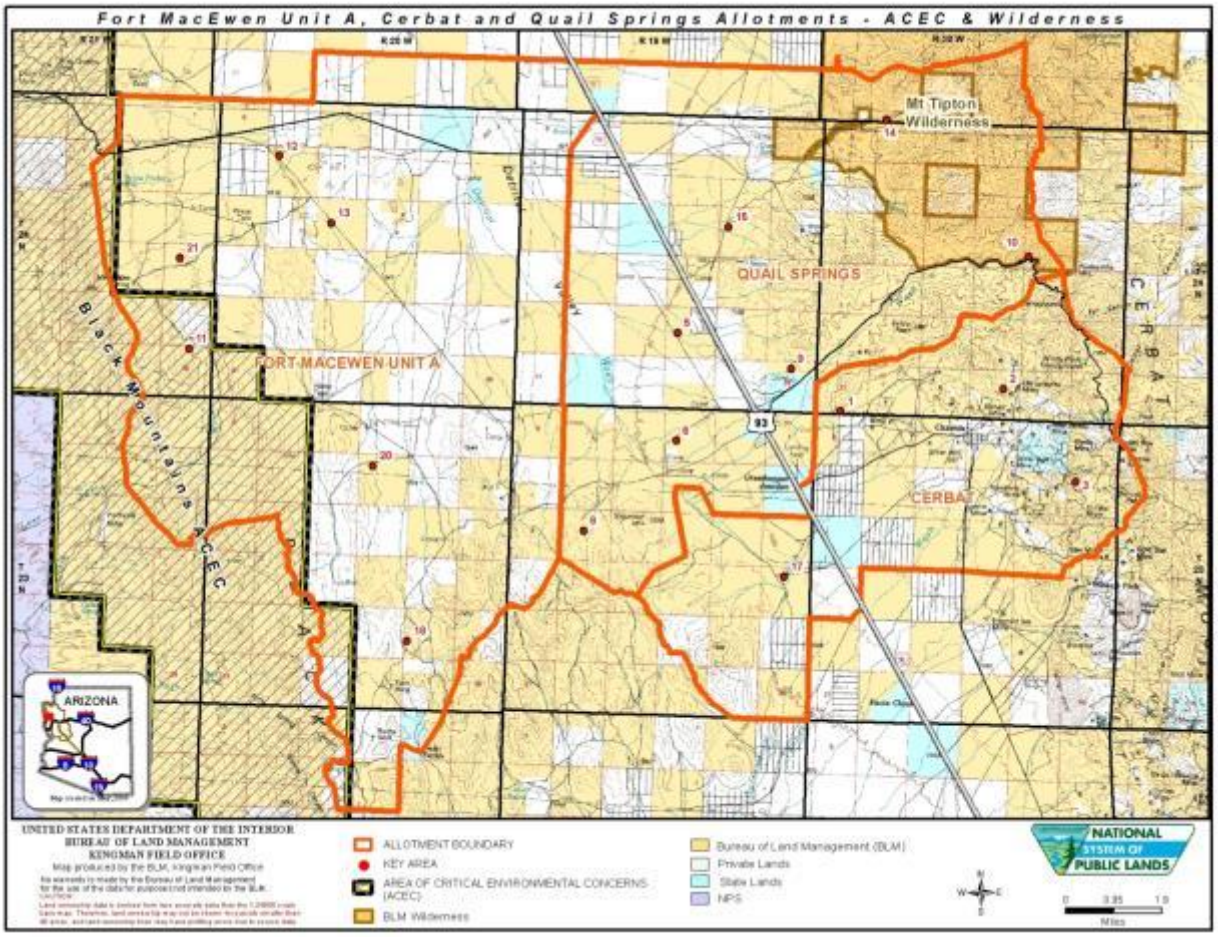

Figure 11: Map 9. Location of Black Mountain Area of Critical Environmental Concern in relation to the allotments.

3.1.4 Invasive, Non-native Species

A number of invasive, non-native species are present in the allotments, some of which have been in Arizona for more than 50 years and are common throughout the State and Mohave County. BLM employees and a recent invasive species survey documented along U.S. Highway 93 (ADOT 2009) indicate the most common invasive species are cheatgrass, red brome grass, Sahara mustard, puncture vine, Malta starthistle, and Mediterranean grass.

The presence of cheatgrass and red brome across these allotments is variable depending upon the amount and seasonal distribution of rainfall. In years with favorable precipitation, these grasses are widespread across the desert floor. In low rainfall years, these are restricted to the base of desert shrubs. Cheatgrass and red brome are not listed on the Arizona Noxious Weed List, but both are considered highly invasive non-native grass species (Arizona Wildlands Invasive Plant Working Group 2005). They are grazed by cattle when the plants are immature, prior to producing seed and curing out.

Sahara mustard and Malta starthistle are spreading northward along the highway corridor and are found primarily along the U.S. Highway 93 roadside. Puncturevine is found primarily in the residential areas dispersed throughout the allotments within the valleys. The seed is spread by vehicle tires, and it

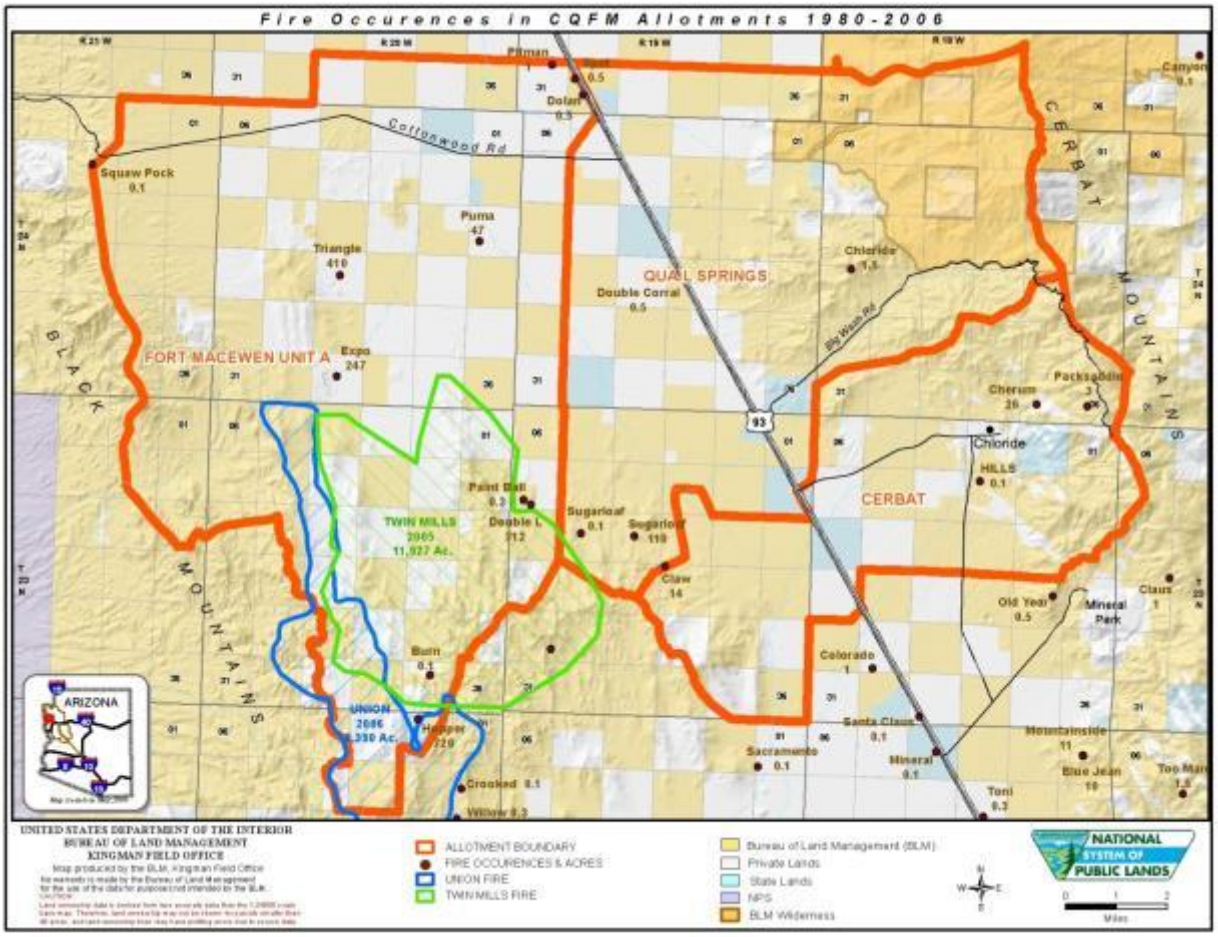

Figure 12: Map 10. Wildfire occurrence in the allotments.

germinates in disturbed areas such as parking lots and along roadsides. Mediterranean grass is widespread throughout the desert southwest.

3.1.5 **Livestock Grazing Management**

Livestock grazing has evolved and changed since it began in the 1870s and has influenced the present day condition of natural resources on the allotments. Given the past experiences with livestock impacts on resources on public lands, management of livestock grazing is an important tool for ensuring the protection of public land resources. A grazing permit is issued for livestock forage produced on public lands and is allotted on an AUM basis. Livestock are to be grazed on public lands in accordance with the terms and conditions of the BLM issued grazing permit including numbers, established season of use, etc. The livestock operator assumes grazing management responsibility with the intent to maintain or improve existing resources. The BLM retains the right to manage the public lands for multiple-uses and to make periodic inspections to ensure that inappropriate grazing does not occur.

The BLM does not control private lands within the allotments. The permit holder may own or lease private lands for grazing. If private land is used during different periods, it is the permittee's responsibility to keep livestock off the public land during non-grazing periods.

Acreage of land ownership in each allotment is shown in Table 16. Permitted Use for the Cerbat Allotment is 1,953 AUMs; 2,614 AUMs for Quail Springs Allotment; and 1,796 AUMs on the Fort MacEwen Allotment. There are also 726 AUMs on this allotment which were suspended for administrative reasons. An AUM means the amount of forage necessary for the subsistence of one cow or its equivalent for a period of one month (43 CFR 4100.1-5).

Table 16. Land ownership by allotment.

Ownership	Cerbat	Quail Springs	Fort MacEwen	Total
Federal	18,602 acres	32,538 acres	34,982 acres	86,122 acres
State	1,262 acres	2,573 acres	896 acres	4,731 acres
Private	5,979 acres	9,317 acres	25,553 acres	40,849 acres
Total	25,843 acres	44,428 acres	61,431 acres	131,702 acres

The CQFM Allotments are categorized as perennial ephemeral "improve" (I) allotments. This category was defined by BLM to identify allotments with management and resource concerns. These allotments can be managed more intensively and monitored more frequently when funding and resources are available to pursue such efforts. As a result of their categorization as improve allotments, all three have AMPs in place. The Cerbat, Quail Springs and Fort MacEwen AMP was approved September 30, 1980. The three allotments are grazed together as two units, one east of US-93 (East Unit) and one west of the highway (West Unit).

The 1980 AMP was designed to increase the productivity of the public rangeland for multiple-use using a broad scope objective, based on the Jornada Rangeland Experiment Report #1, written by Herbel and Nelson (1969). Some years the allotments were lightly stocked and in some years they were used up to their total permitted use. Documentation is limited for which pastures were rested or which ones were used according to the 1980 AMP, because actual use was reported by allotment, not by pasture.

The actual/licensed use being analyzed is shown in Table 17 but it does not reflect the light stocking rate by pastures because of the reporting protocol allowed. All AUMs shown before 2001 are based upon licensed use. Actual use reporting did not start until 2001. Actual use of the permitted AUMs on the Cerbat Allotment has varied from 7 to 100% between 1998 and 2008. Actual use in the Quail Springs Allotment has varied from 0 to 92% between 1998 and 2008. Actual use in the Fort MacEwen Allotment has varied from 0 to greater than 100%, due to additional cattle authorized to graze ephemeral forage. These variances in stocking rate are not considered abnormal, and are based on environmental conditions.

Table 17. Actual/licensed use from 1998 to 2010 for the CQFM Allotments.

Year	Cerbat AUMs	Quail Springs AUMs	Fort MacEwen AUMs
1998	1953	2397	1437
1999	518	1757	2489 (of this 712 AUMs are Eph)*
2000	1150	632	3729 (of this 1952 AUMS are Eph*)
2001	679	367	626
2002	132	0**	0**
2003	371	522	643
2004	211	340	810
2005	335	162	1238
2006	391	297	1527
2007	391	1782	3595 (of this 1818 AUMs are Eph*)
2008	502	1836	1766
2009	338	991	1766
2010	670	2106	1766

*(+Eph) Means additional cattle were turned out based upon additional ephemeral forage.
**Non-use reflects seasonally dry periods, drought years, or other factors.

3.1.6 **Lands and Realty**

Land ownership within the CQFM Allotments is a mixture of Federal, State and private land. Of private land, some is controlled by the permittee and other parcels are not under control of the permittee. Land ownership is shown in Figure 1: Map 1 and Table 16. Some private parcels are fenced to exclude cattle from grazing. In areas near private lands, fences are often cut, and posts are stolen. Gates are routinely left open by the traveling public. Actions such as these allow cattle to roam freely.

3.1.7 **Recreation**

Two developed campgrounds (Windy Point and Packsaddle) and the Cherum Peak Trail are located within the allotments. The remainder of the area in the allotments is open to dispersed recreation uses and to off-highway vehicle use on existing roads, trails and navigable washes. Where wilderness exists, OHV use is not allowed. Grazing and recreation are both existing uses that fall within the Federal Land Policy and Management Act's (1976) multiple-use mandate.

3.1.8 **Riparian**

Twenty-two riparian zones exist on public and private lands associated with springs that were evaluated for proper functioning condition to determine if Land Health Standard 2 was met (USDI BLM 2010). Springs have the potential to develop and sustain riparian vegetation. Of the 22 springs, 13 were classified as perennial, eight as ephemeral, and one spring is no longer active. All springs are classified as lentic (lakes or non-flowing sources) riparian-wetland areas. No lotic (flowing) springs exist in the allotments.

Table 18 lists nine perennial springs located on public land. Standard 2 was met at Barksdale Spring (Figure 13: Photo 1), Lucky Boy Spring (Figure 14), Falls Springs-Upper, and James Spring. Standard 2 was not met at the Falls Springs-Lower, Swicker Spring, and Big Wash Spring. BLM has no jurisdiction over the 13 springs located on private land.

Figure 13: Photo 1. Photograph of Barksdale Spring in the Cerbat Allotment, Standard 2 is met.

Standard 2, Riparian-Wetland Sites, does not apply to the six ephemeral springs that were inventoried on public land nor is this standard applicable to Lost Cabin Spring and Copper Age Spring. These springs are either dry or intermittently produce such a small amount of water that they have no potential to support riparian vegetation.

Figure 14: Photo 2. Photograph of Lucky Boy Spring in the Cerbat Allotment, Standard 2 is met.

Table 18. List of perennial springs on public land and whether Standard 2 was met or not met.

Standard 2–Riparian and Wetland Sites			
Spring Name	**Met**	**Not Met**	**N/A**
Barksdale Spring	X		
Lucky Boy Spring	X		
Upper Falls Spring	X		
Lower Falls Spring		X	
Swicker Spring		X	
Big Wash Spring		X	
James Spring	X		
Copper Age Spring*			X
Lost Cabin Spring*			X

*Copper Age Spring: This spring has no riparian development potential. It is located in a mine adit that has caved in. The water, if present, is in the mine and accessible only to small animals that can crawl into the caved in area.
*Lost Cabin Spring: This spring no longer active on the surface or in the subsurface and is not considered perennial or ephemeral.

3.1.9 **Socioeconomics**

Due to the nature of the location of impacts and the availability of data, the socioeconomic study area is different from the planning area. The study area includes Mohave County as a whole and, for some topics, the State of Arizona, rather than including the CQFM Allotments alone.

The population of Mohave County, Arizona, grew by 30% during the period from 2000 to 2013. There were more deaths than births in the County during this time; consequently, all of the population growth can be attributed to in-migration, the majority of which came from within the U.S. Like many parts of the U.S., Mohave County saw decreases in many economic indicators during the period between 2006 and 2012. In spite of the downturn, total employment, earnings, and personal income increased in the County from 2000 to 2012. Non-labor income did not decline during the economic downturn, increasing more than 58% from 2000 to 2012. This is an indication that retirement income and other investment income has become a more important part of total income in the County, steadily increasing since 1970 (adjusted for inflation). By 2012, non-labor income made up 51% of all personal income in Mohave County.

As is the case in the U.S. as a whole, the services sector has become an increasingly important employment category in Mohave County. Jobs in services related industries grew by 601% from 1970 to 2000, while non-services related jobs grew by 287% during the same time period. In the year 2000, services related jobs made up 68% of total employment in the County. Farm employment increased by 34.8% from 2001 to 2012, although total farm employment continues to provide less than 1% of all jobs in the County. From 1998 to 2012, total farm employment in Mohave County increased by approximately 60%. In contrast, total farm employment in the U.S. as a whole declined more than 15% during the same time period. This is an indication that farming and ranching continue to be important aspects of local culture and industry within the study area, in spite of making up a relatively small portion of overall economic activity in the region in dollar terms.

While farm employment increased in the County, total farm income decreased from 1990 to 2000, declining by 27%. This is in contrast with the previous three decades during which farm income had increased over time, and the farming sector is the only major industrial sector in the County that experienced a decline in personal income during that time period. In 2000, farm income made up 0.5% of

all personal income in Mohave County. From 2001 to 2012, the decline in farm income continued, decreasing by an additional 35.3%. During this period, however, several other major industrial categories also experienced decreases in total personal income, with the construction industry seeing the biggest downturn, a 64.9% reduction in income paid to workers within the County. It remains to be seen how post-recession recovery will affect the various industry sectors within the study area.

Patterns of economic change in Mohave County closely parallel those of Arizona as a whole during the time from 2000 to 2012, but average earnings per job in the County have outperformed those in the State overall. By almost every measure, the economy of Mohave County outperformed that of the State of Arizona from 1970 to 2012.

In comparison to the U.S. as a whole, at 1.5%, farm employment in Mohave County, at 0.9%, makes up approximately 1/3 less as a portion of total employment. In 2012, personal income from farming, including livestock production operations, was 0.3% of all personal income in the County. Also in 2012, cash receipts from crops were roughly double those of livestock related operations. It should be noted that a large portion of crops produced in the region is grown in support of the livestock industry, primarily in the form of alfalfa hay for cattle operations. Public lands provide an important source of forage for cattle operations within the region, as total acres of farmland dedicated to grazing comprise a small portion of total farming and ranching acres in the County.

The permittee operates a cow calf operation, which is permitted for 578 AUs but has averaged 203 AUs per year between 1998 and 2010 (Table 6). Depending on the condition and number of cattle for any given year the permittee reports a 70% calf crop.

In Arizona, it is estimated that for every dollar of livestock output sold, an additional $1.00 in economic activity is generated within the State. For each full-time job in the livestock industry, an estimated 1/3 additional full-time position is supported within the regional economy, and for each $1.00 of wages paid within the livestock industry, approximately $2 in additional labor income is generated. Based on estimated annual gross revenues of over $440,000 (assuming a stocking rate of 578 AUs), the present total value to the Arizona economy generated by potential livestock production on the CQFM Allotments over ten years is just over $7,550,000.

The permittee pays grazing fees of which 12.5% are returned to the Mohave County grazing board each year in accordance with the Taylor Grazing Act (1934). Another 50% of these fees are returned to BLM for the construction and maintenance of range improvements in accordance with the Federal Land Management and Policy Act. Depending on the price of the AUMs and the number of AUMs utilized for that year, Mohave County grazing board on average receives $30,000 each year for all ranches combined including the Arizona Strip. BLM receives approximately $70–80,000 each year for range improvements. Over the last seven years the permittee averaged $4,900 in grazing fees annually. This means $588 would go to the grazing board and $2,450 would come back to BLM for range improvements.

In the management of the grazing permit, the permittee hires approximately three year-round employees to manage livestock waters and administer the business. He may employ additional labor of one or more individuals on a seasonal basis.

The sale of calves at stockyard by the permittee benefits the financial needs of the permittee and provides capital to purchase goods and services for continuation of the grazing operation and personal needs.

3.1.10 **Soils**

Soils and ecological sites on the CQFM Allotments were mapped and correlated to the National Cooperative Soil Survey Order III soil survey standards (Soil Survey Manual, Soil Taxonomy, and National Survey Handbook). This information is published in the Soil Survey of Mohave County, Arizona, Central Part 2005 by the NRCS available at the following website: (http://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/arizona/AZ697/0/Mohave%20Central.pdf). Corresponding details on ecological site information, correlated to soil map unit information, is also found on the NRCS website (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/alphabetical/ecosite/?cid=stelprdb1049096).

A review of the Soil Survey (2005) revealed that many of the soils with slopes lower than 15% are considered sandy loams, gravelly, and have clay content ranging up to and over 20%. Some of the soils that exist on the allotments are shown in Table 19.

To determine the functional status of the three rangeland heath attributes (soil/site stability, hydrologic function, and biotic integrity) an interdisciplinary team reviews the ratings of the 17 indicators of rangeland health (Pellant et al. 2005) on a site-by-site basis and formats the interpretation into a collective rating. Based on the rating, it is then determined if more information is needed, or if the site requires additional management action(s).

The Rangeland Health Evaluation (USDI BLM 2010) found that Standard 1, Upland Health, was met at all key areas. Upland soils exhibited infiltration, permeability, and erosion rates appropriate to soil type, climate, and landform (ecological site) for the areas examined. Assessment results from all key areas indicate a "none to slight" departure from normal of the attributes measured.

Table 19: Typical Soil Series Found on the CQFM Allotments.

Soil Series Name	Map Unit ID	Soil Characteristic #1	Soil Characteristic #2
Arizo (40%) Franconia (30%) Riverwash (10%)	6	Sandy/skeletal soil with clay potential ranging between 5-35%	Flooding potential greatest in summer
Filaree gravelly sandy loam	36	20% coarse gravel; somewhat excessively drained	Very low runoff potential with no flooding hazard
Filaree (60%) Dutchflat (30%) complex	37	10-20% coarse gravel; well drained to somewhat excessively drained	Very low runoff potential with no flooding hazard
Mutang (45%) Dutang (40%) complex	90	15% coarse gravel; alkaline content; gravelly clay in 5 to 15 inch horizon; moderate shrink/swell potential	Very high to low runoff potential
Ohaco family (50%) - Bluebird (40%) Complex	102	15% to 48% coarse gravel; clays between 3 to 60 inches; very high to moderate shrink/swell potential	Very high to high runoff potential

3.1.11 **Biotic Soil Crusts**

Space existing between higher plants can include highly specialized organisms that may include cyanobacteria, green algae, lichens, mosses, microfungi, and other bacteria. Soils with these organisms are often referred to as cryptogamic soils and create what is referred to as biological soil crusts.

In general, cyanobacteria and microfungal filaments weave through the top few millimeters of soil and aid in holding loose particles together forming a biological soil crust which stabilizes and protects top soil surfaces. The biological soil crusts aid moisture retention, "fix" nitrogen, and may discourage the annual growth of annual weeds. Below the surface, the soil flora grows various rhizomes, hyphae and filaments that further bind the soil together. Biological soil crust diversity and cover are greater on finer textured rather than coarse soils (Belnap et al. 2001).

Biological soil crusts are observed throughout the allotments in small amounts. Cover data for biological soil crusts is collected at each key area when it is encountered. However, they are uncommon and rarely encountered as a cover point and likely have always been uncommon due to the coarse, rocky, and sandy nature of the soils in the allotments. Due to the expected small occurrence of the biological soil crusts and the high amount of coarse, rocky, and sandy soils in the CQFM Allotments as mapped by NRCS, biological soils crusts are not analyzed further in this EA.

3.1.12 **Vegetation (Upland)**

Management of the allotments is based on a selection of key species for each allotment. A list of plant species found in the area is located in Appendix A. In the CQFM Allotments, the more common key species are big galleta, black grama, bush muhly, sideoats grama, Mormon tea, and menodora. The key plant species are listed in Appendix B and are defined as: 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, because of their importance, must be considered in the management program (Coulloudon 1999, Smith et al. 2005). Proper management of these key species provides for the physiological requirements of most of the other desirable species on the allotments. Appendix B is composed of tables for each key area in the allotments which depict the Desired Plant Community (DPC) objectives for the Proposed Action and alternatives. These objectives are based on the ecological site descriptions of species composition and compared to species present at the key areas and historical data. DPC objectives are used as an indicator of ecosystem function and rangeland health.

Allotment monitoring data indicate that resource conditions on the allotments are not currently meeting all applicable standards for rangeland health because DPC objectives for vegetation components at key areas are not being met in some locations. The CQFM Rangeland Health Evaluation (USDI BLM 2010) developed a data summary for each of the three Arizona Standards. Standard 3 evaluates whether vegetation objectives are being met. Table 20 and Figure 15: Map 11 show that for 17 of the key areas, DPC objectives are not being met in six of them. More frequent and more extended drought from 1992 to 2008 compared to 1980 to 1991 could be contributing to decreases in big galleta and other key species as observed in the CQFM vegetation data collected for the Rangeland Health Evaluation. For a detailed discussion on why objectives are met or not met, refer to the conclusion section of the CQFM Rangeland Health Evaluation (USDI BLM 2010).

Xeroriparian or desert washes occur throughout the CQFM Allotments. These washes are linear, infrequently flooded sites that have surface water for only brief periods and often just for a few hours in a year. The perennial plant community consists of a mix of catclaw acacia, grey thorn, mesquite, wolfberry, cheeseweed, and wooly-fruited bursage.

Table 20. Rangeland health data summary*.

Allotment (Pasture)	Key Area	Ecological Site	Standard 1	Standard 3	Trend**
Cerbat	1	Sandy Loam Upland *10-13" p.z.*	Met	Met	Upward
Cerbat	2	Granitic Hills *10-13" p.z.*	Met	Met	Static to downward
Cerbat	3	Granitic Hills *10-13" p.z.*	Met	Not met, making significant progress	Static to upward
Cerbat	17	Clay Loam Upland *10-13" p.z.*	Met	Met	Downward
Quail Springs	5	Clay Loam Upland *10-13" p.z.*	Met	Not met	Downward
Quail Springs	6	Clay Loam Upland *10-13" p.z.*	Met	Met	Static
Quail Springs (Joint Use Area)	8	Basalt Hills *10-13" p.z.*	Met	Met	Static
Quail Springs	9	Sandy Loam Upland *10-13" p.z.*	Met	Met	Static
Quail Springs (East Big Wash Pasture)	10	Granitic Hills *10-13" p.z.*	Met	Not met	Downward
Quail Springs (Marble Canyon Pasture)	14	Granitic Hills *10-13" p.z.*	Met	Not met	Static to downward
Quail Springs (Quail Springs Pasture)	15	Sandy Loam Upland *10-13" p.z.*	Met	Met	Downward
Fort MacEwen Unit A (Lost Cabin Pasture, Joint Use Area)	11	Basalt Hills 6-*10" p.z.*	Met	Met	Static
Fort MacEwen Unit A (Squaw Pocket Pasture)	12	Sandy Loam Upland *10-13" p.z.*	Met	Not met	Static to downward
Fort MacEwen Unit A (Valley Pasture)	13	Sandy Loam Upland *10-13" p.z.*	Met	Met	Static
Fort MacEwen Unit A (Twin Mills Pasture, Joint Use Area)	18	Basalt Hills *10-13" p.z.*	Met	Not met	Static
Fort MacEwen Unit A (Twin Mills Pasture, Joint Use Area)	20	Limy Hills *10-13" p.z.*	Met	Not met	Static
Fort MacEwen Unit A (aka: Lost Cabin Spring, Squaw Pocket Pasture, Joint Use Area)	21	Sandy Loam Upland *10-13" p.z.*	Met	Not met, making significant progress	Upward

*Standard 2 (Riparian-Wetland Sites) assessments are not conducted at key areas as these areas are not riparian and therefore not listed in this table, but are listed in Table 18.
**Based on the trend noted in the Rangeland Health Evaluation.

3.1.13 **Water Quality (Drinking and Ground)**

There are two basins located on CQFM Allotments, Detrital and Sacramento Wash. The main drainage in the Cerbat Allotment is Sacramento Wash, which originates in the Cerbat Mountains and flows south into

Sacramento Valley and ultimately to the Colorado River. Big Wash flows westward from the Cerbat Mountains into the uppermost reaches of Detrital Wash at the head of Detrital Valley. Detrital Wash flows north through Detrital Valley and ultimately reaches Lake Mead at the Colorado River. During rainfall events large enough to cause surface flooding, surface water flows through washes. Groundwater flows in the same direction as surface water in each of the two basins.

The U.S. Geological Survey makes note that water levels have fluctuated in the Sacramento and Detrital Valleys over the period of record, 1943 to 2006 (Anning et al. 2007). They analyzed and reported periods from 1996 to 2006, 1978-79 to 2006, and 1964-65 to 2006. The report indicates that wells near or in the CQFM boundary showed small increases to groundwater level in the decade from 1996 to 2006 while apparently showing small decreases to groundwater level in two decades from 1979-80 to 2006. Overall groundwater levels remained the same or steadily increased in Detrital Valley since 1980. Conversely, groundwater has declined near urban areas of Kingman and Golden Valley.

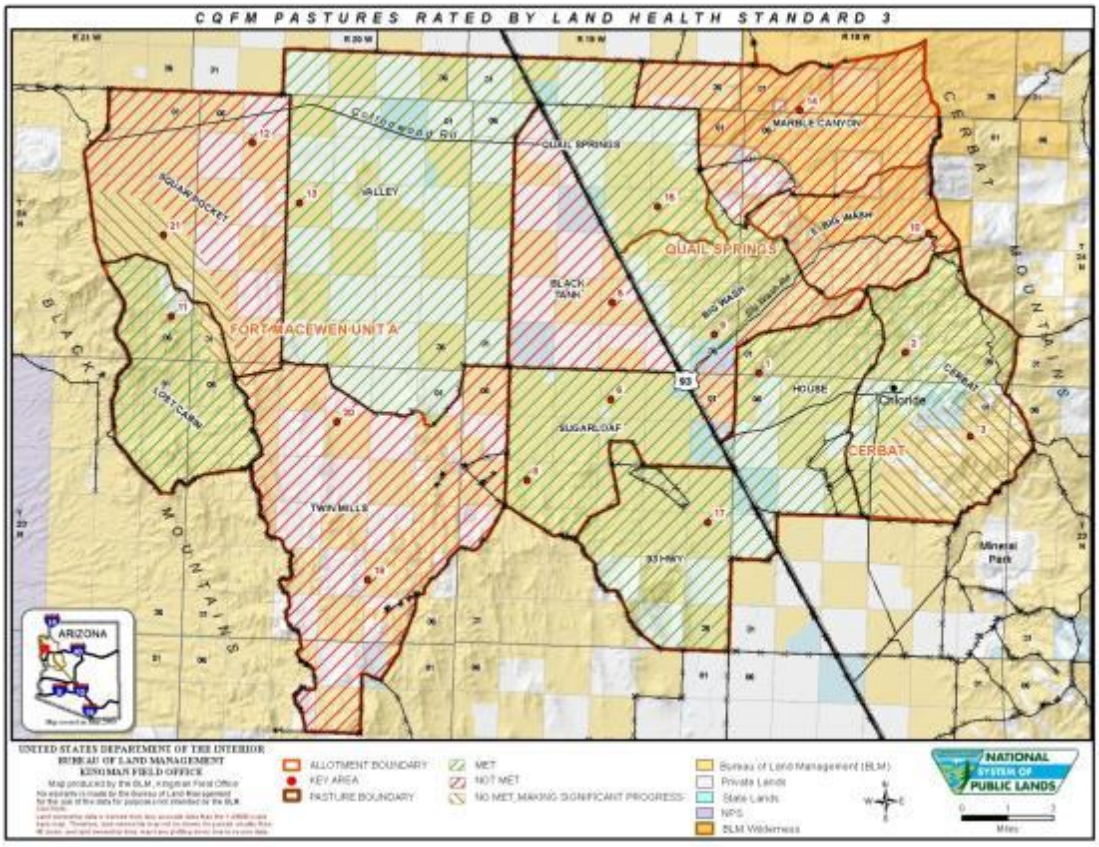

Figure 15: Map 11. Map of pastures rated by Standard 3 at key areas.

There is lentic (non-flowing) surface water within the allotments on public land at nine springs. There is no lotic (flowing) water within the allotments. The amount of water produced by each spring is variable depending upon groundwater conditions such as rock substrate and position within the aquifer. The KFO RMP (USDI BLM 1995) recognizes non-point source pollution as a factor which could affect water quality from various sources including from livestock grazing. This can be mitigated through appropriate grazing management. BLM is not required to test water quality at the surface water springs.

3.1.14 **Wild Horses and Burros**

Wild horses and burros are protected and managed by the BLM in accordance with the Wild Free Roaming Horse and Burro Act 1971, as amended. The goal of the Wild Horse and Burro Program is to manage for healthy herds and healthy rangelands.

The Black Mountain Herd Management Area (HMA) was designated in the early 1980s and is the largest in Arizona. Portions of the Fort MacEwen and Quail Springs Allotments west of US-93 lie within the HMA (Figure 16: Map 12).

Burros are medium sized ungulates (hoofed animals) that can use a variety of terrain including flat areas as well as the steep, more rugged terrain usually associated with bighorn sheep. Typically, burros are opportunistic grazers that can efficiently use coarse, lower quality forage (USDI BLM 1996 and Burden 2012). The estimated appropriate management level (AML) in the Black Mountain is 478 burros (USDI BLM 1996) based on a population metric determined by an analysis of monitoring data such as grazing use, vegetative production, trend in range condition, actual use, and other factors. Forage is allocated to burros in AUMs. One burro is 0.5 AUs, or two burros for one month equals 1 AUM. A population estimate completed in 2014 with the USGS indicates an approximate population estimate of 1,600 animals for the entire HMA.

Burros are one of the factors that contributed to some of the key areas within the allotments not meeting Rangeland Health Standards (USDI BLM 1997). Addressing the issue of burros over AML is beyond the scope of this EA. There is an EA being developed to address burro numbers; the EA is discussed in Reasonably Foreseeable Actions.

The Cerbat Herd Area (HA), located in the Cerbat Mountains, is approximately 18 miles long and 12 miles wide tapering to 4 miles at the northern end and encompasses approximately 83,000 acres. Portions of the Quail Springs and Cerbat Allotments east of US-93 lie within the HA (Figure 16: Map 12).

Wild horses can use a variety of terrain and are primarily grazers, preferring grasses and forbs to browse. Horses also have the ability to be highly selective feeders and to crop forage closely to ground surfaces (Stoddart et al. 1975). Horses compete with other ungulates for forage and are less limited on the passage rate of food fragments through the digestive tract compared to cattle. BLM does not set AML for herd areas. Information is limited on the true extent of the herd's home range and their behavioral aspects. The most recent population estimate was conducted in 2001. This survey resulted in an estimate of 70 wild horses across the entire HA. Current population levels are based on ground sightings from local residents in the area, ranchers, and BLM personnel. Current population size for wild horses within CQFM is estimated to be approximately five horses. BLM has not conducted any recent removals because of the small herd size.

3.1.15 **Wildlife including Special Status Species and Migratory Birds**

Wildlife in the CQFM Allotments considered in this EA includes federally listed and candidate species, BLM sensitive, general wildlife species, and migratory birds.

3.1.15.1 Federally Listed Species

A Biological Evaluation was completed for the CQFM Allotments (USDI BLM 2010a). The Biological Evaluation used the county list for Mohave County from the 2010 U.S. Fish and Wildlife Service (FWS) website. A review of the FWS list in 2015 revealed no changes in the species list for the CQFM Allotments. There is no suitable or critical habitat in the allotments for the Mexican spotted owl,

southwestern willow flycatcher, Yuma clapper rail, Hualapai Mexican vole, Gila topminnow, or desert pupfish. Therefore, there would be "no effect" to any of these species. The BE reported that CQFM is within the nonessential experimental range of the California condor; however, there would be no effect to this species from implementation of the Proposed Action (USDI BLM 2010a) or any of the alternatives. Impacts will not be further analyzed because there was a determination of no affect for these species,

3.1.15.2 Candidate and BLM Sensitive Species

In addition to the federally listed species, there are a number of candidate and BLM sensitive animal species that occur or may occur within the CQFM Allotments (Table 21). Information on occurrence and habitat needs for many of these species is limited because sensitive species are usually rare within at least a portion of their range.

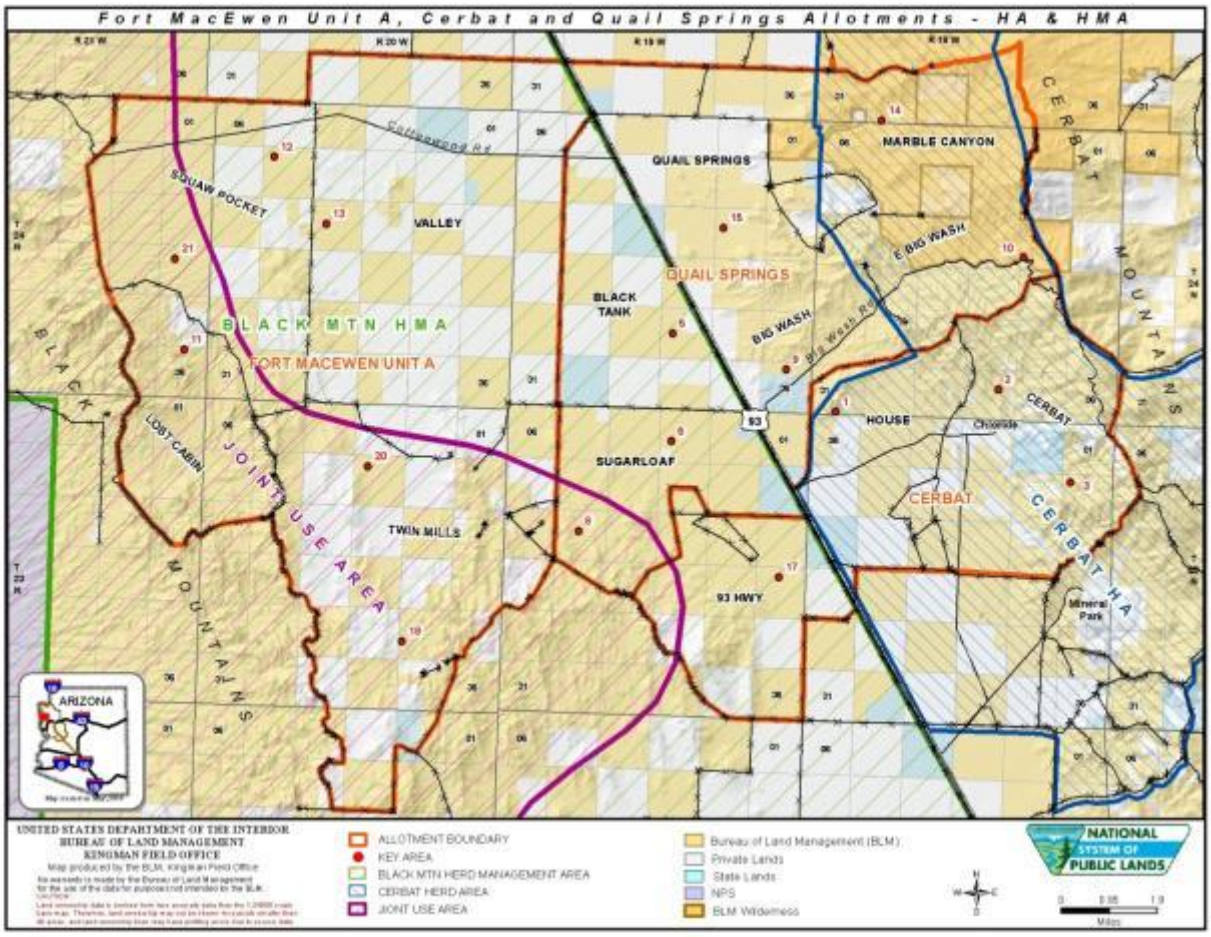

Figure 16: Map 12. Cerbat Herd Area and the Black Mountain Herd Management Area.

Table 21. Special status species that occur or have potential habitat in the allotments.

Species	Federally Listed Species	Candidate Species	BLM Sensitive	Known to occur in allotments	Potential habitat in allotments
American peregrine falcon (*Falco peregrines*)			X	X	
Golden Eagle *(Aquila chrysaetos)*			X	X	
Western burrowing owl (*Athene cunicularia hypugaea*)			X	X	
California condor (*Gymnogyps californianus*)	X				X
Le Conte's Thrasher (*Toxostoma lecontei)*			X		X
Allen's big-eared bat (*Idionycteris phyllotis*)			X	X	
Fringed myotis (Myotis thysanodes)			X	X	
Arizona myotis (*Myotis occultus*)			X		
California leaf-nosed bat (*Macrotus californicus*)			X	X	
Cave myotis (*Myotis velifer*)			X	X	
Spotted bat (*Euderma maculatum*)			X		X
Townsend's big-eared bat (*Corynorhinus townsendii*)			X	X	
Greater Mastiff Bat (*Eumops perotis californicus*)			X		X
Sonoran Desert tortoise (*Gopherus agassizii*)		X	X	X	
Two-colored beard tongue (*Penstemon bicolor)*			X	X	

Golden eagle: This species is found nesting and foraging within CQFM. It forages primarily on rabbits and other small mammals. It will nest in any of the habitats within the allotments where topography features include tall cliffs. Nesting areas are located nearby areas that contain large open areas for foraging. Within CQFM, the Cerbat Mountains and the Black Mountains provide nesting and foraging features for this species.

Le Conte's thrasher: This species is uncommon and usually very localized in distribution. It has been documented in lower Detrital Valley. Habitat for this bird is found within CQFM (Corman and Wise-Gervais 2005) Allotments in open creosote bush and scattered mesquite habitats (Monson and Phillips 1981). In Detrital Valley this bird selects richer more diverse pockets of habitat. Pockets where this species chooses to nest have clumped plants of taller greythorn, wolfberry, catclaw, and cholla.

Peregrine falcon: Historically, the peregrine falcon ranged throughout North America and much of the rest of the world. Shooting, taking of eggs and young, poisoning, and habitat destruction all contributed to the decline of peregrine falcons from much of their historic range. Peregrines in CQFM Allotments would nest on high, remote cliff ledges and forage in adjacent mountains and valleys. The peregrine falcon was delisted from the Federal endangered species list in 1999.

Western burrowing owl: Habitat for the western burrowing owl is found in all allotments within CQFM. Nesting owls have been found on the Fort MacEwen and Cerbat Allotments. This species occurs primarily in open areas with short vegetation and bare ground in desert, grassland, and shrub-steppe environments. Burrowing owls are dependent on the presence of mammals such as kangaroo rats and ground squirrels, whose burrows are used for nesting and roosting.

Bats: A number of sensitive bat species may be present on the allotments (see Table 19). Brief habitat descriptions are presented for these species.

Allen's big-eared bat: This species is known to forage and may roost in CQFM (Brown and Berry 2005). This bat roosts in abandoned mine shafts, but most often in ponderosa pine, pinyon juniper woodland, and riparian areas of sycamores, cottonwoods, and willows. This species is often found near boulder piles, cliffs, rocky outcroppings, or lava flows.

Arizona myotis: This species is generally observed at higher elevations usually in ponderosa pine and oak-pine woodland near water. It is found along permanent water or in riparian forests in some desert areas. In Arizona, this is usually in association with mixed conifer forests, including ponderosa pine-grassland, ponderosa pine-Gambel's oak, and aspen-ponderosa pine forests. The East Unit in the Cerbat Mountains may provide habitat for this species.

California leaf-nosed bat: This species is known to roost in CQFM Allotments. Its preferred habitats are caves, mines, and rock shelters, mostly in lower elevation Sonoran desert scrub. Roost sites are usually located near foraging areas. This species likes desert scrub areas, roosts by day in caves, and in abandoned mines and tunnels.

Cave myotis: This species prefers cave habitat but will choose other roosting areas if a suitable roosting cave is not available. These alternate areas can include mines, rock crevices, abandoned buildings, barns, and under bridges. They are found primarily at lower elevations (Sonoran and Transition life zones) of the southwest in areas dominated by creosote bush, paloverde, brittlebush, and cactus.

Fringed myotis: This species typically roosts above 4,000 feet elevation in tightly packed groups in rock crevices, caves, mines, large snags, under exfoliating bark, and in buildings. These sites may be day or night roosts. It may hibernate at lower elevations. It eats mostly small beetles and some moths that it forages from low desert scrub up to pine forest plant communities (AZGFD 2011). This species is known to roost in CQFM Allotments (Brown and Berry 2005).

Greater western mastiff bat: This bat is a year-round resident in Arizona where it ranges in elevations from 240–8,475 feet. It forages from the air or on the ground for insects such as moths, crickets, grasshoppers, beetles, bees, wasps, and ants. It forages over extensive areas of desert scrub at least 15 miles from the nearest likely roosting sites. It is found roosting in rugged rocky canyons with abundant crevices (AZGFD 2002). It has been documented in the southern Black Mountains; however, suitable roosting and foraging habitat is present in CQFM Allotments.

Spotted bat: This species is dependent on large isolated cliffs for roosting. It may forage in pinyon and juniper area forests in the Cerbat Allotment.

Townsend's big-eared bat: This species is associated with areas containing caves and cave-like structures for roosting habitat. Generally, they are found in the dry uplands throughout the West, including Arizona desert scrub, oak woodlands, oak-pine forests, and pinyon-juniper forests. This species is known to roost in CQFM Allotments.

Sonoran desert tortoise: The Sonoran population of the desert tortoise (*Gopherus agassizi*) is a candidate for listing under the Endangered Species Act, but the listing is precluded by higher priority actions (U.S. Fish and Wildlife Service 2010). The desert tortoises in the project area primarily inhabit rocky hillsides and gravelly desert washes below 3,530 feet. Desert tortoises in the Black Mountains are classified as Sonoran, although recent genetic research shows they are more related to the Mojave Desert tortoise (McLuckie et al. 1995). Research into morphologic and behavior characteristics suggests there may be a gradation between the Sonoran and Mojave populations in the Black Mountains ecosystem.

The BLM conducted field surveys for Sonoran desert tortoise to determine the presence or absence within the Kingman Field Office. From this survey data and using the tortoise habitat category descriptions and criteria found in the Desert Tortoise Management on the Public Land, a Range-wide Plan (USDI BLM 1988), the boundaries for the various tortoise habitat categories found in the Kingman RMP (USDI BLM 1995) were designated (RMP designated). BLM has not conducted tortoise surveys for some areas within CQFM. Within these unsurveyed areas, the predictive tortoise habitat model produced by USGS (Nussear et al. 2009) using GIS technology shows there is potential tortoise habitat (USGS potential) within the unsurveyed areas across all three allotments.

A comment was received from the 2014 CQFM EA stating that more up-to-date information for habitat distribution was available (see Figure 17) over what was stated in the 1993 Kingman RMP for the desert tortoise. Using the 2009 information provided by USGS that was recommended by the commenter, the area was recalculated using GIS and it was found that suitable habitat exists on roughly 18,900 acres in the Twin Mills, Sugarloaf and Highway 93 pastures. Figure 18: Map 13 shows about 4% of the total 479,357 acres as Category 3 (tortoise habitat) in the Black Mountains. The unsurveyed areas represent approximately 74,590 acres of potential tortoise habitat (USGS potential; Figure 19: Map 13). Although new calculations were used, it should be noted that there were no actual observations on the USGS Report 2009-1102 in the general vicinity of the CQFM Allotments and the estimations may be overstated.

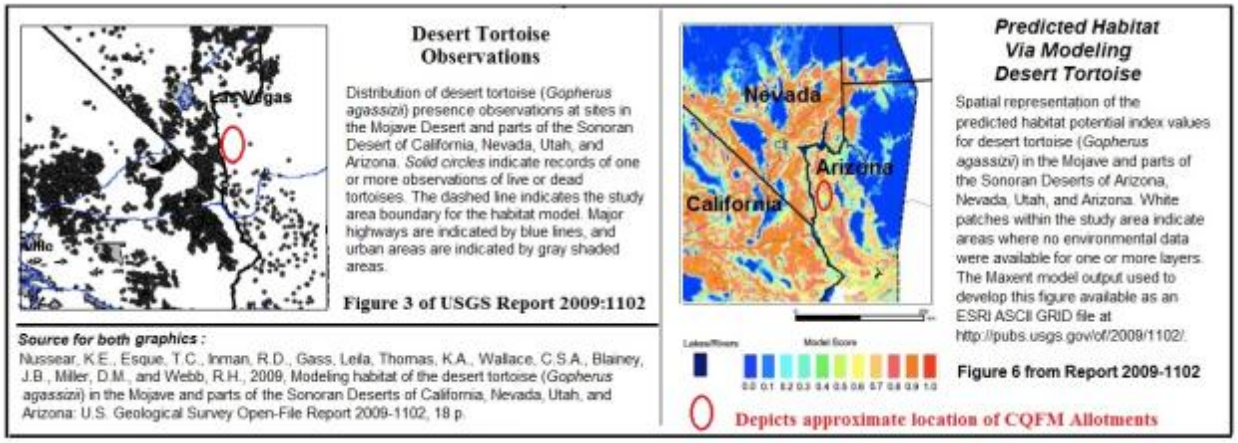

Figure 17: Desert Tortoise Observations and Predicted Habitat Using USGS Modeling.

The desert tortoise is also considered in the design criteria (turnout criteria for ephemeral use authorization is 280 pounds per acre minimum in desert tortoise habitat) for both Alternative 1 and Alternative 2.

Two-colored beardtongue: Two-colored beard tongue (*Penstemon bicolor roseus*), a BLM sensitive plant species, occurs on the Fort MacEwen Allotment. This species ranges from southern Nevada to northwestern Arizona and California. Within Arizona this species occurs in Mohave County in the Black Mountains and near Wilson Ridge. Habitat consists of gravel washes and disturbed roadsides to outwash fans and plains. This species grows in creosote bush-desert scrub and desert wash plant communities but is uncommon.

3.1.15.3 Migratory Birds

All migratory birds are protected under the 1918 Migratory Bird Treaty Act (16 USC 703), which prohibits the taking of any migratory birds, their parts, nests, or eggs. Additional protection is provided by the Neotropical Migratory Bird Conservation Act of 2000 (16 USC 80). Migratory birds occur within the KFO, many of which are known to use the habitat types present in these allotments. In April 2010, BLM and U.S. Fish and Wildlife Service entered into a Memoranda of Understanding to promote the conservation of migratory birds, as required in Executive Order 13186 (USDI BLM 2010). These species are protected by law and it is important to maintain habitat for these species so migratory patterns are not disrupted. Habitat for the following birds of conservation concern is found in CQFM: Le Conte's thrasher, Bendire's thrasher, curve-billed thrasher, hooded oriole, peregrine falcon, prairie falcon, burrowing owl, and Costa's hummingbird (U.S. Fish and Wildlife Service 2008).

3.1.15.4 General Wildlife

Habitat for multiple wildlife species occurs within these allotments. Species found include animals typical of the Mojave Desert such as Merriam's kangaroo rat, black-tailed jackrabbit, gray fox, kit fox, bobcat, coyote, speckled rattlesnake, chuckwalla, cactus wren, black-throated sparrow, golden eagle, and prairie falcon. Upland game species include Gambel's quail, mourning dove, white-winged dove, and desert cottontail. Big game species include desert bighorn sheep, mule deer, and mountain lion.

The Black Mountains support the largest, contiguous desert bighorn sheep population in the world (AZGFD 2007). The range of desert bighorn sheep and livestock overlap on the Fort MacEwen Allotment in the Black Mountains. Based on GIS data, there are an estimated 8,600 acres of bighorn sheep habitat along the western edge of the Fort MacEwen Allotment which comprises about 3% of the total bighorn sheep habitat area of 258,079 acres (Figure 19: Map 14). This species is found within the Mojave Desert scrub plant communities and prefers steep, rocky terrain for bedding, lambing, and escape from predators. They graze and browse on a wide variety of plant species of which grasses and forbs are preferred. When this food is not available, they feed on a variety of other plants, including cacti.

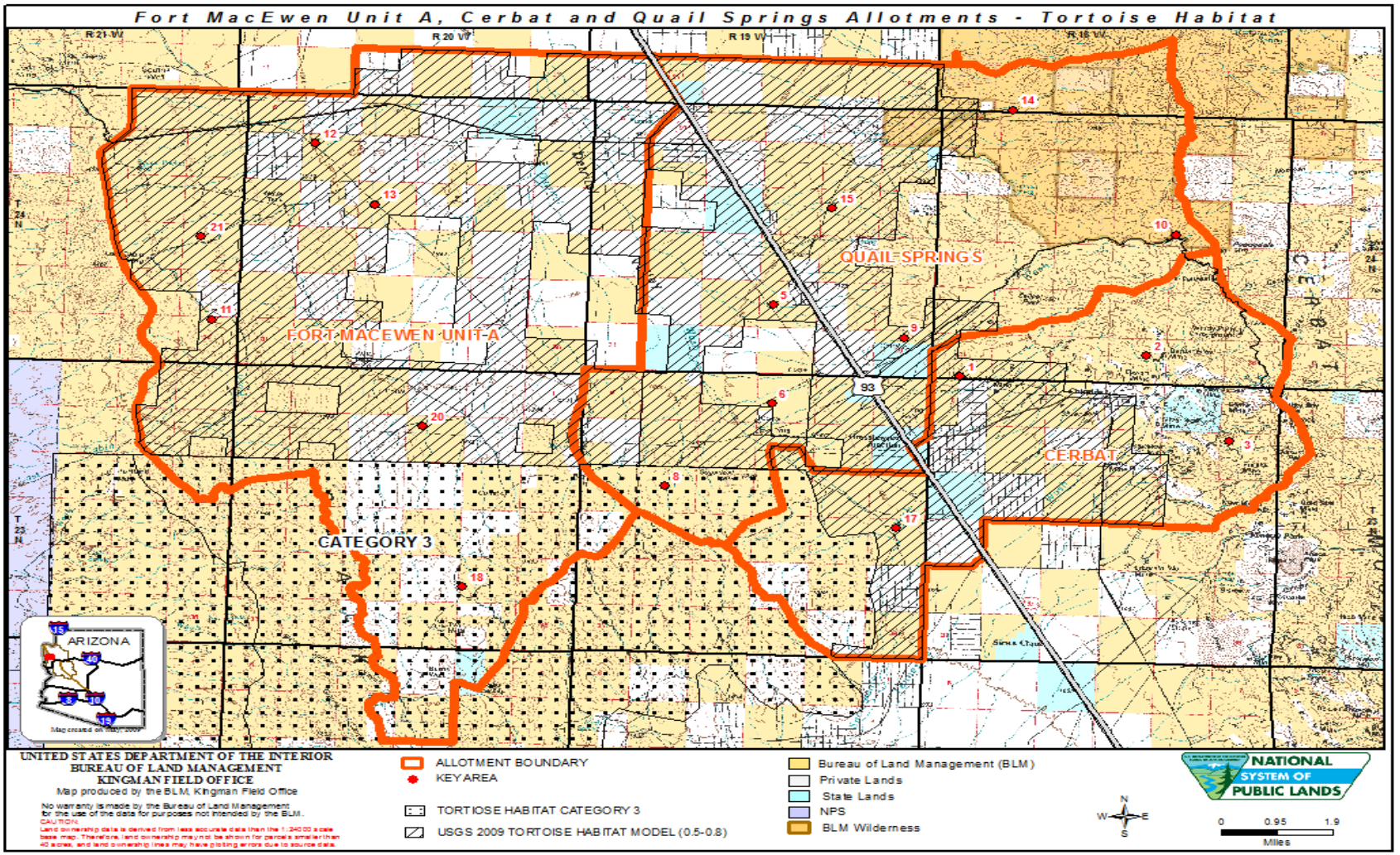

Figure 18: Map 13. Sonoran desert tortoise habitat (RMP designated and USGS potential) in the allotments.

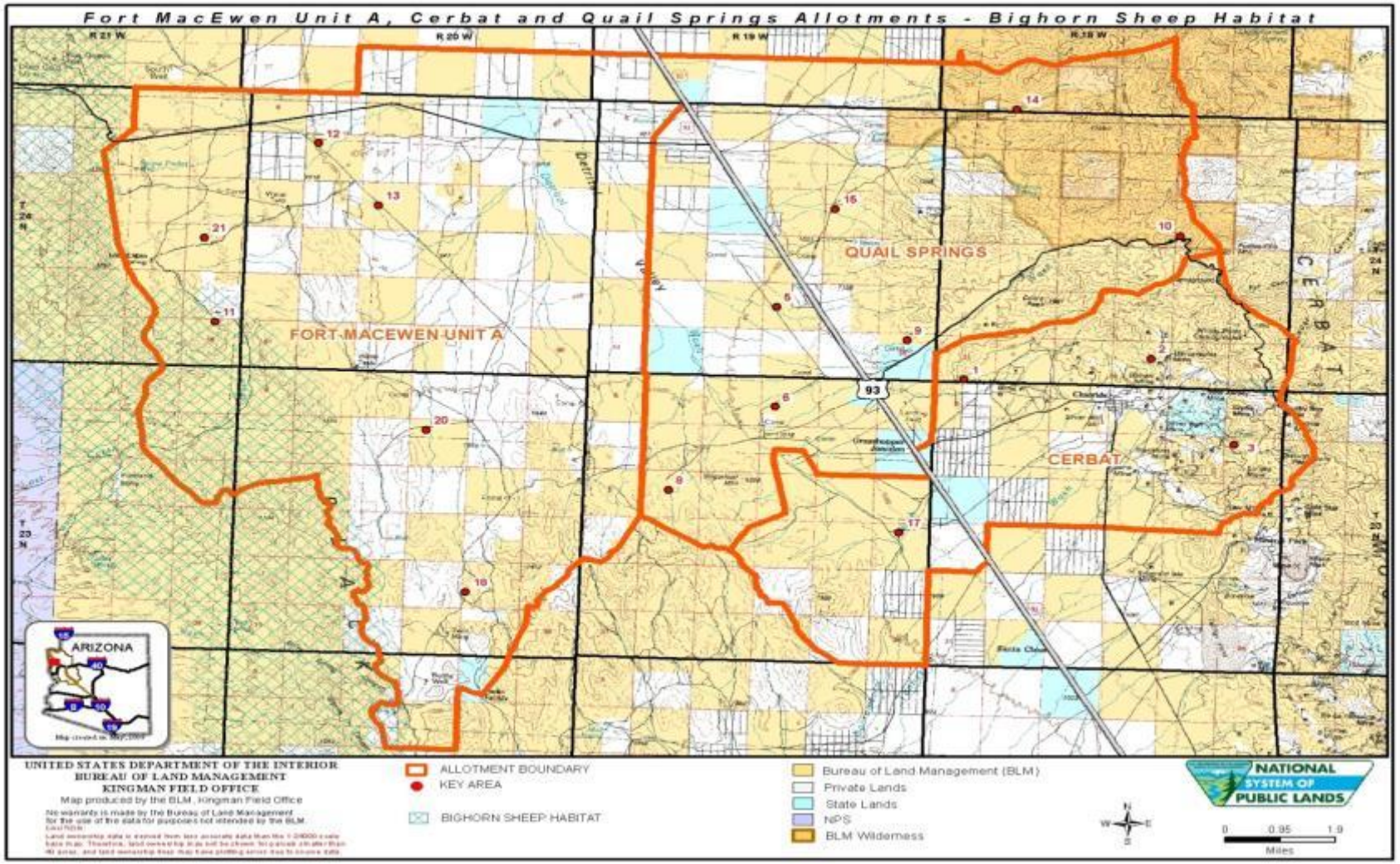

Figure 19: Map 14. Desert bighorn sheep habitat in the Fort MacEwen Unit A Allotment.

4 ENVIRONMENTAL CONSEQUENCES

Many impacts and the after-effects that can occur on the landscape are beyond the control of BLM, such as wildfire(s) and climate change. However, BLM acknowledges direction in Secretarial Order 3226 to consider activities that occur on public lands that could have long-term impacts. BLM also acknowledges the comment from the Council on Environmental Quality that *agencies should recognize the scientific limits of their ability to accurately predict climate change effects, especially of a short-term nature, and not devote effort to analyzing **wholly** speculative effects*.

The following sections are included to provide a rationale for why protocols, terms, methods, etc. are used when making determinations and findings with regards to conditions on the CQFM Allotments. Methodologies are also listed in specific sections where they are relate to an individual resource.

Methodologies

Many of the sources that BLM resource specialists follow guidance for are cited at first mention of the protocol or practice in the document (i.e., saying it is a properly functioning condition, etc.). Unless stated otherwise, the explanations provided below are applicable throughout the rest of this document.

Design Criteria, Mitigation Measures, and Residual Mitigation Measures

Design criteria are considered actions planned for in an alternative that when implemented, are intended to reduce or eliminate impacts to the environment. Analysis in this EA assumes that design criteria under any alternative(s) would be implemented. Mitigation measures are actions that are recommended as additional measures to add to an alternative for more environmental protection. After implementation of any alternative, through monitoring, it may be determined that residual mitigation measures are needed for situations that were not originally expected during planning.

Mitigation and residual mitigation measures are frequently used in scenario planning when attempting to foresee different situations that could occur (i.e., if this happens, then the response should be, etc.). Examples pertinent to the CQFM Allotments are provided in Table 8 and 9 under Alternative 1.

Defining Subjective Terms

"**Effects**" and "**impacts**" are synonymous, as suggested in the CEQ regulations (40 CFR 1508.8).

"**Likely**" is considered to have greater than a 66% probability.

"**Long-term**"

For this EA, "long-term" projects are defined as those where impacts (positive or negative) are expected to last ten years or more. One decade has been selected for reasons that include, but are not limited to:

- Observations made by BLM resource specialists with regards to their professional experience and understanding of cause and effect relationships for their respective resources.
- Native vegetation can, depending upon the species, take more than ten years to become firmly established in arid environments where water is often a growth limiting factor (Abella 2010).
- Soils exposed to both fire severity (duration) and intensity (temperature), not uncommon where drought resistant vegetation exists, can remove viable seed sources as well as result in the mortality of biological activity in the upper three inches of a soil horizon, resulting in delayed decomposition and nutrient cycling necessary for plant growth.

- Grazing permits are intended for a ten year period.
- BLM guiding documents (i.e., Resource Management Plans, Rangeland Health Standards, etc.) are normally reviewed and revised every five to fifteen years.
- Identifying direct[10] and indirect[11] effects initiated by management-induced activities for long-range planning requires many assumptions to be made with regards to understanding interactions between physical, biological, ecological, and sociological processes. Assumptions made should be in line with the Affirmative mandate put forth in NEPA (1970) that appropriate consideration is given to environmental values and amenities, to include mitigation measures, when analyzing a proposed action (see Purpose and Title 1 of NEPA).

"**Negative impacts"** are expected to reduce rangeland conditions to or below the minimum Rangeland Health Standards (USDI BLM 1997).

"Negligible" is defined as a condition whereby the overall condition will remain static (without progress or degradation) unless other variables are introduced into the environment.

"Positive impacts" are expected to move rangeland conditions beyond their existing status.

"Scenario Planning and Adaptive Management"
Adaptive management and scenario planning are tools used by BLM when preparing analysis and/or for implementation of projects to avoid making determinations that may otherwise appear speculative.

Glick et al. (2011) uses the following graph (originally cited by Peterson et al. (2003)) and explains in his report how both adaptive management and scenario planning can be used together in situations where uncertainty is high and/or outcomes are uncontrollable. Other tools that BLM uses are monitoring via ocular assessments, field surveys, site visits, photo points, regularly assessing key areas, data gathered via communication logs, and other information gather through billing, general correspondence, etc.

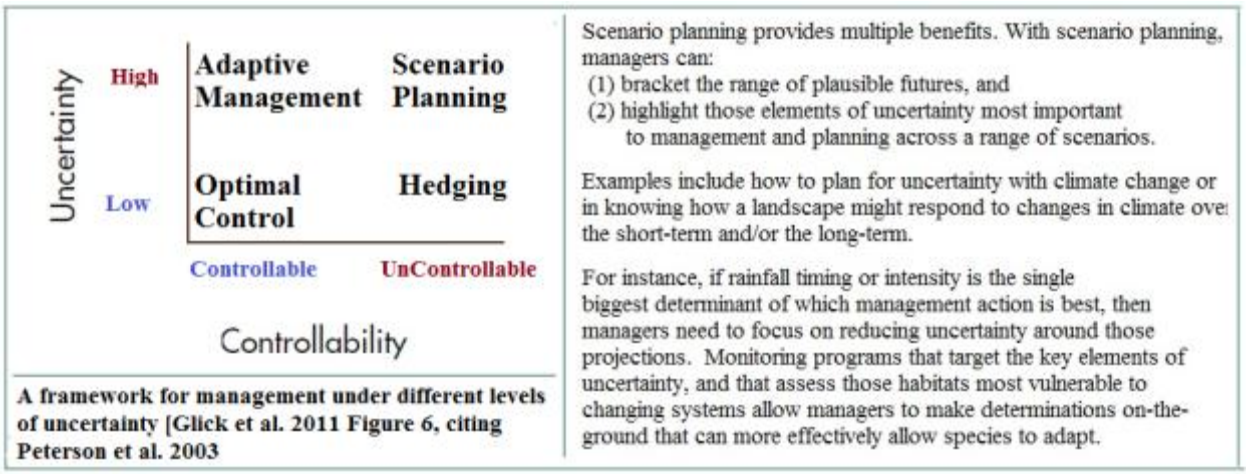

Figure 20. Scenario planning concept introduced by Glick et al. (2011) in Scanning the Conservation Horizon; recommended for situations where there is a high level of uncertainty and uncontrollability as there is with climate change and wildfire potential.

[10] Direct Impacts: Effects caused by the proposed action.
[11] Indirect Impacts: Effects (also caused by the action) that occur later in time or are farther from the project activity area, but are still within the reasonably foreseeable future (40 CFR § 1508.8).

"Short-term" – Generally considered to last from the point of implementation to within one growing season but could last to within a year or two, unless otherwise stated within a specific resource.

"**Unlikely**" is considered to have less than a 33% probability.

Resources To Be Analyzed

Table 22 provides the resources to be analyzed for their direct and indirect impacts. The analyses are written such that direct and indirect comments are provided directly beneath the applicable alternative to which the comments refer. Cumulative impacts are only listed where any are expected to occur as a result of combined multiple-use impacts and/or a reasonably foreseeable action. Design criteria and/or mitigation measures are stated within the alternative where they apply.

Table 22. Resources Analyzed.

Natural Resource	Section
Areas of Critical Environmental Concern	4.1.2.1
Fuels/Fire Management	4.1.2.2
Invasive Non-native Species	4.1.2.3
Lands and Realty	4.1.2.4
Livestock Grazing Management	4.1.2.5
Recreation	4.1.2.6
Riparian	4.1.2.7
Socioeconomics	4.1.2.8
Soils	4.1.2.9
Vegetation	4.1.2.10
Water Quality (drinking or groundwater)	4.1.2.11
Wild Horses and Burros	4.1.2.12
Wildlife, including Special Status Species and Migratory Birds	4.1.2.13

4.1.1 Impacts Common to All Alternatives

The following events are not directly associated with livestock grazing, but can result in positive or negative impacts with any of the alternatives when they occur. Impacts related to individual resources are provided in the specific resource section. Recommended design criteria and/or mitigation measures to reduce or remove the impacts are listed below the appropriate section.

4.1.1.1 Climate Change

Long-term predictions[12] associated with climate change, identified during a recent literature review for impacts that could occur within the Colorado River District include:

Temperature increase predicted of 1 to 2 degrees Fahrenheit (Karl et al. 2009) between now and 2020, leading to:

- earlier snow melt and onset of spring (Stewart et al. 2005; Mote 2005; Bernstein 2007; Feng 2007; Barnett 2008),
- longer growing season for forage production (Bernstein 2007), with potentially lower quality forage (Karl et al. 2009),
- an increase in evapotranspiration (Hamlet 2006),
- threat of an increase for diseases, insects, and non-native noxious species (Chambers et al. 2009, Glick et al. 2011) (more is provided in the following section on this topic),
- reduction in soil moisture for plants (Izaurralde et al. 2011),
- increase in drought frequency and severity (Bernstein 2007),
- likely increase to stream temperatures in non-shaded riparian areas, and
- an increase in wildfires resulting from a combination of the above factors (Ehrenfeld 2003, Norton 2003).

Precipitation could vary as much as **25% more or less** throughout the year with a total variation annually averaging between a decrease of 0.08% to zero percent than present (Timmerman et al. 1999; Meehl 2006; Karl et al. 2009, Glick et al. 2011) suggesting the:

- potential for species shifting geographically to adapt to changing conditions (Crozier 2003, 2004; Inouye et al. 2000),
- mortality of species for those unable to adapt to changing conditions (Beever et al. 2003; Galbreath et al. 2009),
- increase of storm intensity (Bernstein 2007),
- higher potential for floods and subsequent erosion on soils with high clay content (CCSP 2008; Furniss 2010), and
- higher demand for water in urban areas, resulting in an increased competition for groundwater drawdown between agricultural and urban/rural needs (Karl et al. 2009, and Deacon et al. 2007).

Design Criteria/Mitigation Considerations

Chambers and Wisdom (2009) and Parra et al. (2008) made recommendations for management that have been modified for this EA to apply to both planning and implementation responses to climate change. Each of the recommendations is included within Alternatives 1 and/or 2 to protect the environment using various forms of adaptive management and scenario planning using practices such as, but not limited to: reducing grazing numbers, grazing rest/rotation schedules, and monitoring.

[12] Climate change predictions: Interpretations are based on information provided on a regional scale with regard to historical records and modeling for future conditions in western states. Authors include: BLM 2011; Hegerl et al. 2007; Hamlet and Lettenmaier 2007; Inouye et al. 2000; Izaurralde et al. 2011; Janetos et al. 2008; Karl et al. 2009; Parra et al. 2008; Reid and Lisle 2008; Stewart et al. 2005; and Timmerman and Devoe 2006.

Management is encouraged to avoid inaction by offering support and building political and partner relationships, seeking funding, conducting research, and for authorizing implementation of additional and new venues to address resource needs with regards to impacts by climate change.

Incorporate Adaptive Management at the Landscape Project Level

- Track the various methods/results where possible to sustain resources, when the outcome of an activity is uncertain and harmful effects are possible (i.e., using scenario planning);

Prioritize projects to consider those areas having serious resource concerns

- Adjust permit numbers within a landscape to account for severe to exceptional drought
- Concentrate on riparian areas that would benefit from protection and enhancement to reduce water loss from evapotranspiration and increased temperatures.

Specialists are encouraged to: Monitor, Document, Learn and Share by

- Look for field changes for projects already implemented
    - Note differences, especially for species exhibiting resistance and resilience
    - Be aware of increases for insects (mosquitoes, beetles, etc.)
    - Maintain current reviews of peer-reviewed literature
    - Share information for successes and challenges with peers, permittee, partners.

4.1.1.2 Increase for Diseases, Insects, and Non-native Noxious Species

The Mojave Basin Rapid Ecoregional Assessment (Comer et al. 2013) supports earlier International Panel on Climate Control reports by Karl et al. (2009) saying that the major concerns for climate change in the future are for impacts that may be brought on by the increase of non-native species and wildfires. The intent of this section is to address insects and disease, specifically mosquitos and West Nile Virus that could occur as a result of climate change in the CQFM area.

With a combination of:

- a potential for larger precipitative events as stated in the previous section,
- increasing up to eight wells in the CQFM Allotments, and
- the predicted increase in temperature,

there is a possibility that insects populations could increase on the Colorado River District because of conditions such as species adaptation and shifting geographically and through climate conditions such as high winds and rain (Goldberg et al. 2010), or through the construction of man-made water sources.

Mosquito-borne West Nile Virus

A web search revealed through the USGS website that the Center for Disease Control (USGS 2015) had one case of West Nile Virus reported in Mohave County as of January 2015 and another was reported in Yavapai County; these being the two most relevant counties for the CQFM Allotments. Maricopa County had 92 reported cases and Pima and Pinal Counties both reported five cases for the same time period. More information is available at: http://diseasemaps.usgs.gov/wnv_background.html.

Mosquitos get the virus by feeding on infected birds and can then pass it on to other birds, and occasionally to other animals and people. Horses appear sensitive to the virus; however, there is no evidence that WNV causes disease in cattle. The virus is not spread from person-to-person. Mosquito season in Arizona is typically March to October, being closely tied to the monsoon rains that the area receives.

The dominant vector of WNV is the mosquito *Culex tarsalis*. This species prefers sites with submerged vegetation on which to oviposit[13], and warm standing water that promotes rapid larval development, including stagnant ephemeral[14] puddles, vegetated pond edges, and surface water held in long-standing and slow draining formations such as in road-side trenches. The larvae mature from 7 days to 4 weeks to become full-fledged mosquitos, depending on temperature and food availability. *Culex tarsalis* mosquitos are most active the first few hours after sunset.

Design Criteria/Mitigation Considerations

Collaborative efforts continue between Federal, state, and other organizations (i.e., academia, Institute of Medicine, the Centers for Disease Control and Prevention and the National Institutes of Health) to meet and examine issues of shared concern regarding research, prevention, detection, and management of emerging or reemerging infectious diseases. Methods suggested from the above agencies, for recommendations regarding past and emerging threats of disease include using pesticides where appropriate, posting public statements and using media/internet to inform the public about areas where reports have identified possible outbreaks, and stating what the public can do to both protect themselves (i.e., wearing long shirts, pants, and using mosquito-preventative repellants) and how to minimize infestations (i.e., frequently emptying containers/tires/rims that can hold stagnant waters, etc.), and contacting your local county health department if necessary to request assistance.

Local county offices in Arizona frequently placed mosquito traps in areas to determine whether fogging or other forms of pesticides are needed in urban areas. Individuals should keep informed with their local county offices for updated information regarding mosquitoes and West Nile Virus outbreaks.

4.1.1.3 Wildfire(s)

Wildfires are common in northern Arizona. Although some impacts can be positive (i.e., nutrient recycling), where water is a limiting factor and where many plant communities in the Mojave Desert are not fire adapted, the impacts are often considered negative. When left to natural recovery in arid zones like the Mojave Desert, where the CQFM Allotments are located, it can take decades for biota that may have been removed through high intensity or high severity wildfire(s) to become re-established and facilitate the processes necessary for native species re-establishment. In much of the project area at the lower elevation and precipitation zones, areas are easily converted to red brome or other annual invasive grasses following wildfire because native species are not able to out compete the invasives for soil nutrients and available plant water. Upland areas that are high in clays and/or that are poorly aggregated (cobbly or rocky) may be susceptible to wind or water erosion following wildfire, which further exacerbates the proliferation and strong hold of invasive weeds in these areas.

Wildfires at higher elevations in the Interior Chaparral plant community may be beneficial to wildlife by creating diverse habitats with varying seral stages. Wildfire suppression in these areas can be beneficial

[13] Oviposit: to deposit or lay eggs.

[14] Ephemeral: drainage area receiving only seasonal precipitation or during high rainfall events (then subject to gullying and erosion) that are able to support a variety of wildlife and plant species that often cannot not grow on other sites.

to wildlife by reducing the number of acres that are burned and may assist in limiting habitat loss and fragmentation that can occur from large scale fires. Rehabilitation efforts, where they are implemented and possible, can improve wildlife habitat by mitigating the invasive impact of red brome and other invasive species.

Following a wildfire, Fire Emergency Stabilization and Rehabilitation efforts help prevent the conversion of native range species to non-native species. Emergency Stabilization and Rehabilitation efforts vary in degrees of success but when successful, they can help control the spread of invasive, annual species.

Design Criteria/Mitigation Considerations

Proactive measures in the Kingman Field Office to minimize impacts by wildfire include annual enlistment of fire staff and fire suppression equipment. The BLM fire staff monitors daily weather conditions and coordinates with other agencies to suppress wildfires that occur within and around the surrounding areas. Seasonally, BLM also enlists the support of Engine[15] and Type II Hand[16] Crews, as well as Helitack[17] and Hotshot[18] Crews (when necessary) to suppress wildfires ignited from a variety of different sources, including humans or climatic events (i.e., lightning).

BLM also assigns roles/responsibilities to qualified emergency assessment team members ("Resource Advisors" with specific training/knowledge in resources impacted by fire such as soils, range, wildlife, and botanists). Once a fire is considered both contained and controlled by an Incident Commander, the advisors are among the first to examine and determine fire severity to provide reclamation recommendations.

4.1.2 Resource Analysis

Direct and indirect impacts are those associated with the Proposed Action: livestock grazing on the CQFM Allotments under each alternative. The Affected Environment Status in Chapter 3 explained how many of the past conditions led to the current situation. Chapter 4 offers more of the current situation and introduces expectations for how future actions associated with the Proposed Action could impact the CQFM Allotments when combined with Reasonably Foreseeable Actions and Cumulative Effects. Guidance issued by the Council on Environmental Quality on June 24, 2005, points out that review of

[15] Engine Crews are used for initial and extended attack fire suppression, support of prescribed fires, patrolling, and project work. These crews range in size from three to ten firefighters and work with specialized firefighting equipment and perform many strenuous activities such as –mobile attack with engines, hose lay, construction of fire line with hand tools, burnout operations, and mopping up hotspots.

[16] Hand Crews normally consist of 18-20 crewmembers. Hand Crews can be used for a variety of operations on a wildland fires. Hand Crews are assigned duties on wildland and prescribed fire primarily that consist of constructing fire lines with hand tools and chainsaws, burning out areas using drip torches and other firing devices, and mop-up and rehabilitation of burned areas. Hand crews may or may not have assigned permanent supervision.

[17] Helitack crews are wildland fires suppression crews specializing in helicopter operations. Helitack Firefighters are delivered to fires via helicopter and suppress wildfires with hand tools and chainsaws. Helicopters can be equipped with a bucket or fixed tank to drop water or retardant during firefighting operations. They deliver helitack crews for initial attack, and transport personnel and cargo in support of fires.

[18] Hotshot Crews are a 20 person organized crew of which is used primarily for wildfire suppression, fuels reduction, and other fire management duties. They perform the same duties as Hand Crews, however are very specialized and are generally placed in the most rugged terrain on the most active and difficult areas on wildfires. Hotshot crews are utilized throughout the country and may spend extended periods away from their home units. The crews place a great deal of emphasis on physical fitness.

past actions is required only to the extent that the review informs agency decision-making regarding the alternatives. The guidance states, "agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions." This is because a description of the current situation of the environment inherently includes effects of past actions.

Cumulative Impact Sources

Cumulative impacts are those that occur from the incremental impact of the proposed action that are added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can also result from individually minor but collectively significant actions taking place over a period of time (40 CFR § 1508.7). In addition to grazing, cumulative impacts that can occur within any of the allotments include:

- BLM activities (burro gather(s); monitoring; vegetative and wildlife habitat improvement projects; invasive, non-native species control efforts; fire management activities to reduce the threat and impact of wildfire (e.g., fuels reduction projects), etc.);
- Recreational activities: wildlife viewing, hunting, camping, etc.;
- Public forms of multiple-use (gaining access to/from private or public lands) across the allotments;
- Maintenance forms of multiple-use (utility companies maintaining power lines on right-of-ways, lands/realty surveys, etc.);
- Mineral exploration, extraction, and/or development;
- State/county services (weed eradication; invasive, non-native species control efforts; highway maintenance, etc.)

Cumulative effects were analyzed in the Kingman RMP/Final EIS (USDI BLM 1995) to which this analysis is tiered. All resource values addressed in Chapter 3 have been evaluated for cumulative effects. If there is no net effect to a particular resource from an action, then there is no potential for cumulative effects. For cumulative effects analysis, the geographic scope of the proposed grazing permit renewals encompasses the 131,700 acres that comprise the CQFM Allotments. It is reasonable to expect that most of the actions discussed above would persist at their current rate and remain steady throughout the time frame considered in this analysis with relatively little change in intensity.

Reasonably Foreseeable Actions

In addition to each of the above effects continuing to occur, new developments could also occur. With regard to any new developments from the above sources or those mentioned below, should they require federal funding from BLM and ground disturbing activities, NEPA analysis would be required. As such, impacts for them would be analyzed at a later time and are not included in this analysis. Events likely to occur within the next ten years include:

The Arizona Department of Administration Employment and Population Statistics Division, using a medium growth modeling exercise, estimated in their December 7, 2012 report that Mohave County will increase in population 13% over 212,805 by 2020 (to 240,998) and by 24% in 2025 (to 264,143). The projected increases are expected to equate to more users on public lands for many different forms of multiple-use. There is also the potential for an increase in sources of conflict with regards to crossing private and public lands through gates used to control livestock grazing.

Projects that are developed with regard to population growth (i.e., lands/realty right-of-way requests; transportation corridor applications, etc.) would be analyzed when more information is available.

Other new actions that could occur include:

Nuisance Wild Horse/Burro Removals
BLM is authorized to remove wild horses and/or burros as soon as practicable, after receipt of written requests from private land owner(s) requesting the removal of strayed or excess wild horse/burros from private property (43 CFR 4720.2, …2-1, …2-2).

Burro Gather in the Black Mountain Herd Management Area
BLM is currently in the initial stages of preparing an EA that will address burro management within the Black Mountain Herd Management Area. Initial public scoping has been completed. The interdisciplinary team has not yet been identified. It is expected that burro population control efforts could occur in portions of the CQFM Allotments over the next 10 years. Should the burros be gathered and reduced to within AML, it is expected that conditions on the landscape should improve under all alternatives at a more rapid pace than not.

Colorado District Office Allotment Range Improvements
A Project Team is being formed to analyze and authorize new range improvements within the Colorado River District Office. This is for projects other than those included in this EA where NEPA analysis verifies that proposed actions will satisfy the five mandates of NEPA, and where an accompanying Finding of No Significant Impacts finds that the EA's prepared are sufficient to implement the new projects. The range improvement requests are for permittee's throughout the Colorado River District. It is expected that NEPA will be required on range improvements for new projects such as installing new fences and/or water developments.

Solar Applications
The Kingman Field Office has received phone calls about the feasibility of approving applications for various types of installations to further cell phone coverage within the Colorado River District. At the time of preparation for this EA, no applications have been received.

Mohave Wind Farm Environmental Impact Statement
In August 2009 the Kingman Field Office received an application for a 500 MW wind energy development right-of-way in the White Hills area. An environmental impact statement (EIS) was prepared and a Record of Decision was signed in June 2013 to approve the project, known as the Mohave Wind Farm, consisting of 243 turbine sites, approximately 105 miles of roads, six miles of transmission line, a five acre area for conducting operation and maintenance that will have a building, water well, and associated facilities, a ten acre switchyard, two electrical substations which will occupy up to five acres each, collector lines from each turbine, and other ancillary facilities. The entire project will occupy 35,339.63 acres located in Ts. 28 N., Rs. 19, 20, and 21 W., and T. 29 N., R. 20 W., G&SRM.

The right-of-way was offered to the proponent (Orion Renewable Energy Group, LLC) on June 16, 2014 and as of June 29, 2015 it has not been accepted.

4.1.2.1 Area of Critical Environmental Concern (ACEC)

General impacts from Alternatives 1, 2, and 3

Portions of the Lost Cabin, Squaw Pocket, and Twin Mills pastures (approximately 10,348 acres) are located in the Black Mountain Ecosystem ACEC. Over the evaluation period, it was found that objectives for the BMEMP are being met, as well as Standards 1 and 3 at Key Area 11. This means the site is producing desirable forage, cover, and soil protection in the amounts that are typically found in these types of ecological sites. This suggests that habitat values such as forage quality and quantity are adequate to sustain bighorn sheep, mule deer, livestock, and burros. What this means for ACEC values, is that a "healthy" rangeland is more likely to provide the necessary food and cover to sustain species there. It is expected that these values would be sustained or improved under the Proposed Action and any of the alternatives. Water for all species would continue to be available in the ACEC.

Fencing proposed may eliminate cattle drift onto Lake Mead National Recreation Area (LMNRA) and is expected to confine cattle to the Lost Cabin/Squaw Pocket pasture, portions of which are in the ACEC. This could increase grazing pressure within this pasture when cattle are present. The proposed water development (W4) in Lost Cabin Wash could focus livestock use in bighorn sheep habitat.

Bighorn sheep and mule deer are known to avoid livestock (Bissonette and Steinkamp 1996, McIntosh and Krausman 1982, Wallace and Krausman 1987). For mule deer this may be related to forage resources, lack of cover, or behavioral avoidance. Competition for space could be partially mitigated by species habitat use preferences. It is expected that livestock could primarily use the lower, less rugged areas of the pastures in the ACEC while mule deer and bighorn sheep might use the more rugged areas.

Two-colored beard tongue is found in the ACEC. Two-colored beard tongue may be grazed or trampled by ungulates including livestock under these alternatives.

Alternative 1 Proposed Action Adaptive Management Alternative

During the four year rotation schedule, this portion of the ACEC would receive spring livestock grazing deferment two out of four years and 2.5 out of four years during the summer. Livestock grazing is one of the values identified for the ACEC. Adaptive management would be used as a tool to analyze range condition when the pastures are stocked and changes could be made if utilization limits and other monitoring indicators show that a change in management is needed to protect ACEC values. Under this alternative, it is expected that Key Area 11 would continue to meet Standards 1 and 3.

Alternative 2 Reduced Permitted Use Alternative

Impacts to the ACEC from Alternative 2 would be similar to Alternative 1- Proposed Action. The proposed grazing management system in Alternative 2 would seasonally concentrate livestock in the ACEC increasing the density of ungulates (cattle, bighorn sheep, and mule deer) during these times. Longer spring deferment periods and lower permitted use would reduce grazing pressure on vegetation and also reduce the duration of time cattle are in each pasture compared to Alternative 1. It is expected that Key Area 11 would continue to meet Standards 1 and 3.

Alternative 3 No Action Alternative

It is expected that Key Area 11 would continue to meet Standards 1 and 3. Habitat for bighorn sheep, mule deer, burros, cattle, and two-colored beard tongue would continue to be sustained because there

would be no change in livestock grazing management, and current management has resulted in meeting the standards for rangeland health in the ACEC.

Alternative 4 No Grazing Alternative

The ACEC value of livestock grazing identified in the Kingman RMP (USDI BLM 1995) would be removed but all other values would remain. Habitat for bighorn sheep, mule deer, and burros would be enhanced as these species would be the only ungulates using the ACEC and potential competition with livestock for forage and space would be eliminated. Under this alternative targeted grazing would not occur to reduce fuel loading and continuity of non-native annual grasses, consequently reducing fire behavior.

4.1.2.2 Fire/Fuels Management

Alternative 1 Proposed Action Adaptive Management Alternative

The grazing of cattle has been considered a tool to reduce annual grasses in pastures where targeted grazing can be focused and concentrated. If cattle grazing is not focused and concentrated, reducing the risk of fire through grazing would not be effective (McAdoo et al. 2007). Under the scenario when cattle grazing is not focused and concentrated this Alternative could have minimal to no impact on fire frequency and size as large fires in CQFM Allotments have burned under current grazing management up to three years following El Nino winters. After three years or so following wet winters, red brome breaks down, fuel continuity is interrupted, and fire hazard is reduced whether there are cattle present or not.

Temporary fencing would be allowed which would confine cattle to small areas in order to target red brome removal during wet winters when it is palatable. Adaptive management would provide the necessary tools and flexibility to seasonally reduce fire potential through reducing red brome by focused grazing. Focused livestock grazing to reduce fuel loads may be difficult to implement in the Twin Mills Pasture because the roads into this pasture are primitive and as is, do not lend themselves to water hauling.

Maintaining the DPC objectives, as prescribed in the Proposed Action, may help to reduce the spread of annual exotic grasses which are the primary fuel source for wildfires. Non-native annual grasses increase with the removal of native perennial herbaceous grasses and forbs which can occur as a result of overgrazing and fire (Zouhar 2003). Management that encourages growth of perennial grass competitors would aid in suppression of red brome (USDA Forest Service 2014). Post-fire recovery in the Mojave Desert often takes decades to occur (Abella 2010).

Alternative 2 Reduced Permitted Use Alternative

Proposed range improvements, deferment, rest, and rotation could have an effect on fire or fuels management. Temporarily closing Twin Mills Pasture until objectives are met is expected to have a negligible effect on fire or fuels management because post-fire recovery in the Mojave Desert takes decades to occur (Abella 2010). If DPC objectives are met within the ten year grazing period, cattle could graze on annual grasses during abundant ephemeral growth years, but grazing would not reduce the risk of fire following a wet winter unless it was concentrated and focused grazing (McAdoo 2007). It is assumed that native perennial vegetation cover, which is currently not meeting DPC objectives at some key areas, could begin to increase without grazing pressure.

Alternative 3 No Action Alternative

The effects on fire/fuels management by the No Action Alternative would be similar to the Proposed Action. Key plant species are expected to decrease in pastures that are not meeting objectives. This could increase the buildup of fine fuels because there would be more open space for the non-native annuals to invade. This Alternative could have minimal to no impact on fire frequency and size as large fires in CQFM Allotments have burned under current grazing management up to three years following El Nino winters. After three years or so following wet winters, red brome breaks down, fuel continuity is interrupted, and fire hazard is reduced whether there are cattle present or not.

Alternative 4 No Grazing Alternative

An assumption could be made that no grazing would potentially increase the intensity of fires in the area. However, large fires in CQFM Allotments have burned under current grazing management up to three years following El Nino winters. Consequently, the No Grazing Alternative could have minimal to no impact on fire frequency and size. After three years or so following wet winters, red brome breaks down, fuel continuity is interrupted, and fire hazard is reduced whether there are cattle present or not. The impacts then may be similar to the Proposed Action because key species are expected to increase and there could be less open space for exotics.

4.1.2.3 Invasive Non-Native Species

General impacts of invasive non-native species

All of the undesirable invasive non-native species described in Chapter 3 can be spread by animals such as livestock, burros, mule deer, bighorn sheep, and birds as seeds are transported via hair, hooves, and/or spread in feces. Cheatgrass, red brome, and Mediterranean grass are present and vary in amounts depending on the amount and timing of annual rainfall. Malta starthistle has the potential to invade springs on CQFM Allotments. It has been found at springs further north and along the US-93 right-of-way because of the increase in moisture availability. Sahara mustard is found along the roadsides within the allotments and may spread to sandy soils in wet winters on the rangelands. In southwestern Arizona, during wet winters Sahara mustard is spreading by wind onto rangelands in areas where cattle have not been present for 20–30 years. In CQFM Allotments puncturevine appears to be restricted to areas highly disturbed by humans. It has not yet been found around the livestock facilities on these allotments. It is apparent that the spread of these species cannot be totally prevented, but if the DPC is kept intact it should be more difficult for invasive species to take hold and dominate this area.

Alternative 1 Proposed Action Adaptive Management Alternative

Adaptive management would provide the necessary tools and flexibility to seasonally reduce red brome by focused and concentrated grazing. Maintaining the DPC, as prescribed in the Proposed Action, is expected to reduce the spread of undesirable plant species. Composition and cover of desired forage species is expected to be maintained or improved under the Proposed Action and could potentially reduce open space between perennial plants where invasive annual grasses and forbs can grow. Cheatgrass increases with the removal of native perennial herbaceous grasses and forbs, which can occur as a result of fire and overgrazing (Zouhar 2003). This happens in part because cheatgrass can out compete remaining native plants in accessing soil water and nutrients. It has been found that proper range practices can help prevent the spread of invasive non-native plant species (Sheley 1995). The installation of new water developments could increase the presence and spread of invasive species through increased disturbance from concentrated livestock and other ungulate use near or around the water developments.

Under the new grazing management system, invasive species that have a tendency to pioneer into areas disturbed by grazing should receive more competition from key species that are receiving less grazing pressure due to enhanced pasture management. These key plant species may be more vigorous and productive throughout their lifecycles because of increased growing season rest from grazing. The BLM would continue to monitor the allotments for the presence of invasive weeds.

Alternative 2 Reduced Permitted Use Alternative

Impacts would be similar to those described under Alternative 1 Proposed Action. However, the presence and spread of invasive species are expected to be less as compared to the Proposed Action because no new water developments are proposed. Alternative 2 does not provide the flexibility that would promote more responsive actions to be taken if treatment of invasive non-native species is needed.

Under the new grazing management system, invasive species that have a tendency to pioneer into areas disturbed by grazing would receive more competition from key species that are receiving less grazing pressure due to enhanced pasture management. These key plant species may be more vigorous and productive throughout their lifecycles because of increased growing season rest from grazing. The BLM would continue to monitor the allotments for the presence of invasive weeds.

Alternative 3 No Action Alternative

In key areas where Standard 3 is not being met, it is expected that invasive non-native species would increase in abundance or remain the same. The reduced occurrence of key plant species (USDI BLM 2010) in some key areas on CQFM Allotments may have allowed for an increase of invasive non-native species. When native species decline, it opens up space for invasive non-native annual grasses and forbs to invade and become established (USDA Forest Service 2014).

Alternative 4 No Grazing Alternative

Removal of livestock would not eliminate the presence of invasive non-native species on the allotments because some species (red brome) are already established and widespread throughout the area. Young and Evans (1978) found that removal of grazing by domestic livestock does not automatically lead to the disappearance of cheatgrass (Young and Evans 1978). Burros, bighorn sheep, mule deer, birds, and other wildlife would continue to be vectors for the spread of invasive plants. The removal of grazing is expected to result in an increase over time for the frequency, cover, recruitment, and composition of key perennial plant species which would allow for a more rapid attainment of DPC objectives. Maintaining the DPC objectives is expected to reduce the spread of undesirable plant species.

Cumulative Effects

Communicating with Mohave County in their weed eradication efforts could help to identify areas when non-native invasives are noticed. BLM also has guidance in the Vegetation Treatments on Bureau of Land Management Lands in 17 Western States (2007) available for various mitigations and applications that can be used to address invasive species that emerge on the CQFM Allotments from various forms of multiple-use. Overall the effects of monitoring, treatment, and when applicable wildfire rehabilitation would be beneficial to upland soils and vegetation in the long-term. This would indirectly contribute to attainment of the Arizona Standards for Rangeland Health.

4.1.2.4 Lands and Realty

Alternative 1 Proposed Action Adaptive Management Alternative

The proposed range improvements (exchanging gates with cattleguards) and maintenance of existing pasture fences would reduce impacts to landowners that are living on 40 acre or smaller parcels within the allotments by reducing the amount of fencing that landowners would encounter along roads. Many of the existing fences cross private lands and some block access points (across washes). This alternative should reduce the amount of pasture fences that need to be maintained, make crossing fences by the public easier with the installation of cattleguards, and may help alleviate the issue of landowners cutting fences and leaving gates open.

Alternative 2 Reduced Permitted Use Alternative

Impacts are similar to the Proposed Action because range improvements that would affect access or be encountered by land owners are similar. The potential for adding cattleguards under an adaptive management strategy is not addressed in this alternative, therefore, the permittee could potentially be affected by gates being left open or stolen.

Alternative 3 No Action Alternative

The 1980 AMP is difficult to implement under the current condition because of conflicts between private landowners and the permittee. The fences which separate the pastures are difficult to maintain. Private land dispersed throughout the pastures that is not under control of the permittee has been developed into 40-acre residential areas. Small communities and/or private developments are often unfenced, and fences near or surrounding these areas are often cut by landowners.

Alternative 4 No Grazing Alternative

If the land use plan is amended to make the CQFM Allotments unavailable for grazing, the permittee could potentially remove range improvements and/or be compensated by the BLM for those range improvements. The removal of range improvements may eliminate landowner conflicts associated with the restriction of access by the fences. With no livestock present, the landowners would not have to fence their properties to keep cattle out.

Cumulative Effects

Population growth in the area that results in new housing developments, building new roads on private property that need to cross public land for access to and/or from one's property, etc., may result in additional conflicts between the permittee and private land owners. It is expected under this scenario that more fencing and/or cattleguards might be required. It can only be stated that vegetation and soil disturbance will likely be localized and short-term in nature along the areas where fencing and cattleguards are placed.

No known lands/realty projects have been identified within the CQFM Allotments area over the next 10 years.

4.1.2.5 Livestock Grazing Management

Alternative 1 Proposed Action Adaptive Management Alternative

Progress could be made toward meeting the Rangeland Health Standards (USDI BLM 1997) with improved grazing management, increased rest from grazing, and the additional terms and conditions and range improvements proposed.

Short-term Impacts (1 to 2 years)

In the first year, the cost of reducing the stocking rate (gather costs) should be offset by the sale of cattle. Assuming the permittee is running full numbers in year one, the reduction in livestock would be 123 head. A one bull to 15 cow ratio equates to eight bulls, and assuming a 75% calf crop, equates to 86 cow/calf pairs and 29 open cows. At the current prices the permittee could get $1,600 per pair, $1,000 each for open cows, and $2000 for each bull; the gross from the sale of these animals is estimated to be $182,600. In the second year, the loss of calves for sale, due to the reduced stocking rate, could be as much as $900 per calf (Personal communication Overson 2014). This was estimated from the reduced stocking rate of 115 cows at a 75% calf crop which could cost the permittee approximately $80,000.

The proposed change to authorize 15 horses on the grazing permit for the Quail Springs Allotment should reduce the cost of feeding horses by as much as $60 per day. In a year, this could save the permittee more than $21,900 and over two years approximately $43,800. This means a reduced operating cost of approximately $146,000 over the first two years.

Long-term Impacts (2 to 10 years)

Over the course of ten years, the reduction in horse feeding costs could save the permittee more than $219,000. This would allow the permittee to develop a more useful and valuable herd of range horses. Horses accustomed to grazing on rangelands are better able to navigate and are more stable on rough terrain. If held at the reduced rate over the same ten years, the yearly loss in revenue is $80,000 from the reduced calf crop, for a total of $800,000. Under the Adaptive Management Plan, there could be years in which the permittee is authorized to run more than the 455AUs, off-setting some of these costs.

Under adaptive management, the permittee should be able to have a sustainable livestock operation with similar or better economic returns beginning with a lower initial stocking rate of 455 AUs, lower utilization limits in the Joint Use Area, and pasture rest through grazing deferment versus the No Action Alternative. Adaptive management is expected to improve range conditions over time, and this in turn should improve condition class and overall health of the herd. Over the next ten years, through adaptive management, the stocking rate may be adjusted up or down based on monitoring results.

Fuel and labor costs are expected to be reduced or offset by managing a smaller area at any one time. The permittee may be better able to keep track of his cattle because they would not be spread over all of the pastures at the same time. The permittee may also be able to run fewer bulls because the bulls would have less area to search for cows. As a result, it is anticipated there could be an increase in calf crop from 75% to as high as 85% over the next ten years. Calving could become more synchronized under this alternative, which means the calving period would be reduced from year-round to a few months out of the year. Thus, when the permittee gathers calves in the fall most calves could be ready for branding and culling at once. When the calves go to market they could be of more uniform size and weight. Larger calves are expected to bring more pounds across the scale and a better price upon selling.

The proposed water developments could increase water quantity and availability for livestock. This could potentially reduce the need to haul water, resulting in savings for man hours, machine maintenance and fuel costs. The proposed fence realignments and extension and cattleguards are expected to provide for improved livestock control on the allotments. Installation of the cattleguards is expected to reduce the likelihood of gates being left open and fences being cut by the public.

The grazing permittee is expected to incur costs associated with the maintenance of existing and new range improvements. The permittee could apply for the funding needed with BLM, NRCS, or AZGFD. Additionally, the permittee is expected to incur costs associated with the drilling and equipping of up to eight new wells. For all eight wells, the cost could total $440,000 ($55,000 per well). Approximately 50 acres of grazing land (i.e., forage for livestock grazing) would be removed from livestock grazing as a result of the construction of five 10 acre exclosures built and maintained by BLM.

Meeting or trending towards DPC objectives would improve forage quality and production, and ultimately result in higher quality forage for cattle. Healthy productive cows is expected to yield a higher calf crop and higher economic returns.

Cumulative Effects

The Proposed Action is expected to improve upland vegetation communities throughout the allotments and result in beneficial effects for all resources present within the allotments. Short-term and long-term impacts are both expected to make progress toward meeting Rangeland Health Standards (USDI BLM 1997) resulting in an incremental positive cumulative effect for the area. Benefits in addition to improving the watershed and rangeland values over the long-term are expected to include increasing wildlife in the area, and possibly wildlife viewing and other recreational activities.

The change in stocking rate, utilization limits, rotation and deferment, and addition of one new well on State trust land could be cumulatively beneficial to vegetation communities in the allotments and is expected to aid in the maintenance and attainment of the Rangeland Health Standards (USDI BLM 1997).

Alternative 2 Reduced Permitted Use Alternative

Short-term Impacts (1 to 2 years)

In year one, the cost of reducing the stocking rate to the permittee should be offset by the sale of cattle. Assuming the permittee is running full numbers in year one, the reduction in livestock is expected to be 375 head. A one bull to 15 cow ratio equates to 25 bulls, and assuming a 75% calf crop, equates to 263 pairs and 87 open cows. At the current prices, the permittee should get $1,600 per pair, $1,000 each for open cow, and $2000 for each bull; the gross from the selling of these animals should be approximately $540,000. In the second year, the cost from each calf lost could be as much as $900 per calf (Personal communication Overson 2014). This was estimated from the reduced stocking rate of 350 cows using a 75% calf crop, which is estimated to cost the permittee $236,000. The proposed change to authorize 10 horses on the grazing permit for the Quail Springs allotment should reduce the cost of feeding horses by as much as $40 per day. Over a year, this could save the permittee more than $14,600 and over $29,000 in two years. This means a gross income of $333,000 over the first two years.

Long-term Impacts (2 to 10 years)

During drought the grazing schedule would continue to be followed. Because the stocking rate is lower than Alternatives 1 or 3, it is possible that cattle numbers would not need to be reduced during drought.

The likelihood of a herd reduction would be much lower than for the Proposed Action and No Action Alternatives. Once the drought breaks it is likely there would be an ungrazed pasture for livestock to be put into.

Over the course of 10 years, the yearly loss in revenue of $236,000 from reduced calf crop could be as high as $2,360,000. The permittee is expected to incur more costs because the deferred grazing rotation system requires one additional move per year. This alternative requires the permittee to move livestock three times throughout the year compared to the Proposed Action and No Action alternatives where cattle are handled and moved twice per year. This additional herd move, employing four cowboys, horses, trucks/trailers, etc. could cost the permittee about $1,000 per day. Therefore, if the move takes one month to complete, it could cost as much as $30,000. In addition, every move puts stress on the herd. A loss of about 4% or $40 per cow over the course of a month would be expected (Personal communication Overson 2014). This stress to the herd from the additional move could cost the permittee as much as $18,200. The proposed change in kind of livestock to authorize 10 horses on the grazing permit for the Quail Springs allotment should reduce the cost of feeding the horses by as much as $40 per day. Over a period of 10 years, this could save the permittee more than $146,000.

Over time as the plant community meets DPC objectives and becomes more productive, the permittee should be able to have a sustainable livestock operation with similar or better economic returns with lower stocking rates, lower utilization limits, and pasture rest through grazing deferment. Fuel and labor costs could potentially be reduced or offset by managing a much smaller area at any one time. The permittee should also be better able to keep track of his cattle because they would not be spread over all the pastures at the same time. The permittee may be able to run fewer bulls because the bulls would have less area to search for cows. As a result, it is anticipated there could be an increase in calf crop from 75% to as high as 85% over the next ten years. Calving could become more synchronized under this alternative, which means the calving period would be reduced from year-round to a few months out of the year. Thus, when the permittee gathers calves in the fall most calves could be ready for branding and culling at once. When the calves go to market they are to be expected of more uniform size and weight. Larger calves should bring more pounds across the scale and better price upon selling.

Once a forage bank is developed under the deferred rotation system, cattle should be able to maintain weight and breed back each spring; therefore, potentially increasing the calf crop percentage and calf weaning weights. Holechek et al. (1999) found that calf crops and weaning weights were greater on conservatively stocked pastures. The rotation system is expected to result in improved plant vigor and productivity which could provide a greater quantity and quality of forage for livestock and potentially result in heavier calves. Heavier calf weights could result in more economic gain for the permittee. Residual vegetation and increased plant vigor and productivity may reduce the need for destocking during drought years. When vegetation is conservatively used, a ranch is at less risk of financial losses from drought or low cattle prices (Holechek et al. 1999). Thomas et al. (2007) found that grazing at light use (25 to 30%) avoids herd liquidation in short-term drought.

The lower utilization limits and seasons of use would provide a sustainable forage base for livestock grazing. An average forage utilization of 40% has been shown to benefit plant production and resilience (Valentine 1970, Van Poollen et al. 1979). The reduction in utilization should increase plant vigor and seed production of various grasses, forbs, and shrubs in all pastures which would increase available forage and animal productivity. It is expected that the diversity of palatable plants would be maintained or improved under this alternative. According to Meen (2000) available crude protein in plants decreases

as plants are re-grazed; therefore, lower utilization levels and seasonal rotation should provide livestock and wildlife with more available crude protein.

The proposed fence realignment, extension, and cattleguards would allow for improved livestock control on the allotments. Installation of the cattleguards would reduce the likelihood of gates being left open and fences being cut by the public. Closing the Twin Mills Pasture to cattle grazing until the DPC objectives are met could affect the permittee's livestock grazing operation by temporarily reducing the amount of acreage available for grazing. The removal of the AUMs from the areas that cannot be used is expected to temporarily reduce the cow herd. Removal of the Twin Mills Pasture would simplify livestock grazing management because there would be less acreage to manage.

The grazing permittee would incur costs associated with the maintenance of existing and new range improvements. The permittee could apply for the funding needed with BLM, NRCS, or AZGFD. The permittee would need to repair the Lost Cabin Squaw Pocket fences within one year of the date of the permit renewal or these pastures would be closed to grazing. If these pastures are closed, there could be a reduction in acreage available for livestock grazing and a subsequent suspension of permitted use for the AUMs within the pastures. Approximately 30 acres of grazing land and, therefore, forage for livestock grazing would be removed as a result of the construction of the three 10 acre exclosures that would be built and maintained by BLM.

Ultimately, implementation of this alternative could allow range conditions for the three allotments, currently in the "Improve" Category, to begin an upward trend for Standard 3 over the life of the 10-year permit. This would result in higher quality forage for cattle. Healthy productive cows could result in a higher calf crop and higher economic returns for the permittee.

Alternative 3 No Action Alternative

This alternative would maintain the current level of livestock grazing authorized for the permittee. Permit renewal under this alternative would likely result in a continuation of Standard 3 not being met at some of the key areas. The operation may become unsustainable as frequency of key species continues to decline. This is also likely to result in a continued decline of key species. The No Action Alternative could result in lower calf weights, uneven calf sizes, lower breed back percentages, and an inability to manage pastures because fences are unmaintained. The permittee's risk associated with drought would go up as the need to destock more often would increase. Destocking during a drought means cattle may be sold at lower prices because the market would be flooded with cattle from other ranches that are also destocking. Once the permittee would be able to restock, purchase prices of a mother cow would be much higher as others would also be trying to do the same thing.

There would be no change in kind of livestock in the Quail Springs allotment. The permittee would not be able to graze domestic horses on public land and would have higher horse feeding costs. The horses used by the permittee would not be as adapted to travelling through rough terrain. Not constructing the proposed fence realignment and extension and not installing the cattleguards is expected to make the control of livestock difficult. Cattle would be able to drift onto the LMNRA without these improvements. It is possible that the public would continue to leave gates open where the cattleguards are proposed and continue to cut fences to gain easier access.

New infrastructure costs to the permittee would be less under this alternative because no new water developments are proposed. The five 10 acre exclosures would not be constructed under this alternative; therefore, 50 acres of grazing land and forage for livestock grazing would not be removed from grazing.

Alternative 4 No Grazing Alternative

If the No Grazing Alternative is chosen, the renewal of the 10-year permit for the CQFM Allotments would not be authorized. The Kingman RMP could be amended to permanently remove the allotments from grazing. The permittee would discontinue his cow/calf business, and the allotments would not be available to transfer permitted use to another permittee. There would be no income to the community from the cattle operation.

Cumulative Effects

Alternatives 1, 2, and 4 are expected to improve upland vegetation communities throughout the allotments and result in beneficial effects for all resources present within the allotments. Short-term and long-term impacts are both expected to make progress toward meeting Rangeland Health Standards (USDI BLM 1997), resulting in an incremental positive cumulative effect for the area. Benefits in addition to improving the watershed and rangeland values over the long-term are expected to include increasing wildlife in the area, and possibly wildlife viewing and other recreational activities.

4.1.2.6 Recreation

Alternative 1 Proposed Action Adaptive Management Alternative

Under the Proposed Action, there would be fewer fences on the allotments because some pastures could be combined into units. Therefore, recreational users would encounter fewer fences that may restrict access. Cattle may be present in each pasture only part of the year; thus, allowing those who prefer to recreate in areas without cattle to do so. There could still be opportunity to view cattle at other times of the year as cattle are rotated through the pastures. Standard 2 could be met at Big Wash Spring because it would be excluded from livestock grazing. Seasonal deferment of cattle may also allow Swicker and Lower Falls Springs enough time to recover from livestock grazing during the rest periods. Hunting and nature viewing opportunities could improve at these three springs as full recovery of vegetation (i.e., riparian habitat) could occur under this alternative.

Alternative 2 Reduced Permitted Use Alternative

Impacts to recreation would be similar to Alternative 1; however, riparian and upland vegetation are expected to recover more rapidly. These improvements could enhance the visual quality of the landscapes for the recreating public. Hunting and wildlife viewing opportunities could also improve at Big Wash, Swicker, and Lower Falls Springs as full recovery of vegetation (i.e., riparian habitat) is expected under this alternative.

Alternative 3 No Action Alternative

Recreational users are expected to continue to encounter fences that may restrict access. Cattle could be present in all areas for visitors to view which could be positive or negative. The recreational experience could decline because Rangeland Health Standards (USDI BLM 1997) were not met at some key areas and conditions without management changes are not expected to improve.

Alternative 4 No Grazing Alternative

Recreational access is expected to improve as proposed range improvements and existing range improvements would not be built or maintained, resulting in fewer fences where recreational users access public land within the allotments. Visitors would not see cattle which could be positive or negative. Hunters would still be able to access springs for hunting.

Livestock waters could be removed, and therefore, big game and big game hunting may be reduced or eliminated around those locations. Rangeland health, such as perennial plant cover, is expected to improve which could enhance the opportunity for nature viewing. Standard 2 may be met at Big Wash, Swicker, and Lower Falls Springs, as livestock grazing could cease and full recovery of vegetation (i.e., riparian habitat) is expected to occur under this alternative.

Cumulative Effects

Increased off-highway vehicle over the long-term (five to ten years) from projected population growth may impact soil and vegetative communities negatively through ground disturbance, displacement, and/or compaction. The impacts may have subsequent detrimental effects to natural plant communities which may lead to soil erosion, particularly if off-trail use occurs.

4.1.2.7 Riparian

General impacts of livestock grazing on riparian vegetation

Riparian hot-season use

Livestock spend more time in riparian habitats in the late summer when temperatures are the highest (Parsons et al. 2003). Because upland grasses are often dry and temperatures are warmer during the summer months, livestock make disproportionate use of riparian areas, and riparian herbaceous vegetation is preferred (Powell et al. 2000, Bailey and Brown 2011). Impacts to riparian vegetation during the hot season would be disproportionate to the uplands. In semi-arid rangelands, where forage growth is limited primarily by precipitation, ensuring that riparian area grazing does not occur during the critical late summer period may be more beneficial than rotational systems that defer livestock use throughout the grazing season (Bailey and Brown 2011). A fall system of grazing would be beneficial for improvement of riparian areas when stream bank temperatures are cool enough to discourage animals from congregating in riparian areas (Bellows 2003).

Trees, shrubs, and herbaceous vegetation form multi-layered complex habitats in riparian areas that provide a wide range of niches for aquatic and terrestrial wildlife species. The loss of any component of a riparian area can reduce cover and forage for some wildlife species. Riparian habitats are ephemeral in nature, and portions are removed by flood events. However, as long as vegetation has the opportunity to establish, grow, and reproduce on a regular basis, it can sustain these complex riparian habitats.

Livestock grazing in riparian habitat can reduce vegetation and modify stream banks causing erosion (Kauffman et al. 1984). Vegetation loss from grazing and erosion decreases shading of riparian areas which results in higher water temperatures. Vegetation loss also reduces forage and cover for wildlife in riparian habitats. Grazing riparian habitats every year for extended periods during the hot season typically results in over utilization of herbaceous and woody vegetation, which reduces the vigor and reproductive capability of existing plants and inhibits the establishment of seedlings.

Alternative 1 Proposed Action Adaptive Management Alternative

Under this alternative, riparian habitat would receive periodic deferment from grazing during the summer. This would provide rest periods from livestock grazing in the riparian zones during those years. Maintenance of Proper Functioning Condition (Prichard et al. 2003) of the springs that are currently at this condition [Proper Functioning Condition] is expected to continue. However, when livestock are in pastures with riparian habitats, the livestock could be more concentrated than under the Alternative 3, which could increase utilization and trampling of riparian vegetation. In the East Unit, wild horses could also trample and graze at spring sites; however, there are only an estimated five horses. No burros occur in the East Unit, and there are no perennial springs with the potential for riparian vegetation to develop on public land in the West Unit. Preference limits would remain the same as in Alternative 3, but the stocking rate would be lowered by approximately 123 animals. Regular deferment during the growing season and the resulting increase in vigor and reproductive capability may outweigh the increase in utilization and trampling that could occur by concentrating cattle in pastures. Swicker Spring and Lower Falls Spring is expected to make progress towards Proper Functioning Condition.

Riparian habitat is expected to improve at Big Wash Spring once the existing fence around the spring is repaired. The 100 foot by 50 foot fence would exclude livestock from the spring source and allow riparian vegetation to expand and reach its full potential of growth.

It is expected that by meeting or maintaining DPC objectives, and lowering the stocking rate along with scheduled rest periods the xeroriparian areas would be sustained.

Alternative 2 Reduced Permitted Use Alternative

Riparian habitat is expected to improve under this alternative after the existing fence around Big Wash Spring is repaired. The 100 foot by 50 foot fence would exclude livestock from this spring source and allow riparian vegetation to expand and reach its full potential of growth. In southeastern Arizona, density of herbaceous vegetation increased four to six fold following the removal of cattle (Krueper et al. 2003). This alternative is expected (with appropriate precipitation) to enable progress to move towards meeting Standard 2 at Big Wash Spring. It is expected that Standard 2 would be met within three years at Big Wash Spring.

Reducing the number of cows and implementing a grazing rotation system is expected to accelerate recovery of the Swicker and Lower Falls Springs riparian habitat. Springs that are currently meeting Standard 2 are expected to continue to meet the standard. Rotational grazing can be useful in improving riparian areas if grazing is kept at light or moderate levels (Krausman et al. 2011). Soil disturbance and associated sediment could decrease because cows would not have the opportunity to linger in these areas for long periods of time. Wild horses could also trample and graze at spring sites; however, there are only an estimated five horses. No burros occur in the East Unit, and no perennial springs with potential for riparian vegetation to develop occur on public land in the West Unit. Riparian conditions could improve because trampling and associated fine sediment loss could decrease while riparian vegetation density increases over time. Over the long-term (five plus years), riparian vegetation is expected to re-establish, filling in areas of bare ground, stabilizing banks, and increasing shade.

It is assumed that by meeting or sustaining DPC objectives, lowering use limits on key species, and lowering the stocking rate along with scheduled rest periods the xeroriparian areas would be sustained or improved.

Alternative 3 No Action Alternative

Bank disturbance, fine sediment loss, compaction, and bare ground associated with livestock grazing are expected to continue. Wild horses could also trample and graze at spring sites; however, there are only an estimated five horses. No burros occur in the East Unit, and no perennial springs with potential for riparian vegetation to develop occur on public land in the West Unit. Wildlife would continue to use the springs year-round. Therefore, Standard 2 under this alternative is not expected to be met.

The vigor and reproductive capability of key species found in desert washes or xeroriparian areas are expected to be negatively impacted by the same combination of sources as they are currently: grazing ungulates, drought, other wildlife, and impacts by wildfire.

Alternative 4 No Grazing Alternative

Removing all cattle from the allotments may lead to improvement in the condition of springs and associated riparian areas on the allotments. However, the estimated five wild horses could still have access to all unfenced springs. No burros occur in the East Unit, and no perennial springs with potential for riparian vegetation to develop occur on public land in the West Unit. Riparian habitat conditions in the allotments may improve as riparian vegetation density increases, as trampling and associated fine sediment loss by livestock decreases. Compaction of riparian areas from livestock grazing could be reduced, improving ground water storage and recharge. Over the long-term (five plus years), riparian vegetation would re-establish, filling in areas of bare ground, stabilizing banks, and increasing shade. It is anticipated that all riparian areas that are currently at Proper Functioning Condition would remain so, and that those riparian areas currently not at Proper Functioning Condition could achieve this status in the short-to-long term (two to five years) under this alternative.

4.1.2.8 Socioeconomics

The ranch-level economic impacts of changes in permitted AUs under the range of alternatives, shown below, are based on the following assumptions (and may be conservative for some items):

- Permitted AUs for seasonal grazing on the CQFM Allotments serve as the limiting factor that determines total annual herd size.
- For AUM calculation purposes, mother cows are assumed to weigh 1,000 pounds, although actual range animals are understood to weigh less.
- Calves are sold at a weight of 500 pounds.
- Under existing conditions, the calf crop success rate is 70%.
- Under all public land alternatives, the calf crop success rate increases to an average of 80%; Under private land grazing alternatives, the calf crop success rate is assumed to be 92%.
- If an alternate feeding location is not available, excess mother cows (above the allowed stocking rate) will be sold at a weight of 800 pounds and a market price of $0.64 per pound.
- Infrastructure improvements have a useful life of 10 years, and the interest rate paid on loans taken out to fund infrastructure improvements is 6%.
- 15% of calves are retained as replacement heifers.
- Calves will be sold at an average market price of $2.35 per pound.
- Present values are calculated using a discount rate of 3%.

Estimated non-fee operating costs on federal allotments and private pasture are taken from the national formula used to calculate Congressionally-approved grazing fees. Estimated fees for grazing on private

lands are derived from National Agricultural Statistics data and Land Grant University statistics, where those are available.

Although some alternatives include grazing on private land as an option, it is recognized that there is very limited or even no private grazing land available within the study area, depending on climate conditions. Other options, however, do exist, including shipping animals to distant areas or even to other states where feeding facilities exist. The potential for a low probability that any of these options for feeding livestock in an alternate location is feasible is also recognized.

Alternative 1 Proposed Action Adaptive Management Alternative

Under the adaptive management alternative, net revenue to the livestock industry is expected to fluctuate between an estimated $133,000 and $228,000 per year, depending on the stocking rate, market conditions, availability of an alternate feeding location, and the calf crop percentage realized each year. The impact on ranch-level income under this alternative is expected to range from a loss of approximately $21,600 per year to a possible increase of $74,000 per year.

Grazing fees could increase or decrease depending on determinations made under the Adaptive Management Plan. The contribution of fees to the county grazing board and to the BLM would vary depending upon how many cows the permittee grazes.

The ability to hire temporary employees could increase or be reduced based on changes in management due to determinations made under the Adaptive Management Plan. In the management of the grazing permit, the permittee hires approximately four year round employees to manage livestock waters and administer the business. Additional labor may be employed which typically consists of one or more individuals on a seasonal basis.

The CQFM Allotments at 578 AUs are expected to add approximately $885,000 per year to the local economy. With a lesser stocking rate of 455 cows initially, the impact to the local economy is 123 fewer cattle or 21% less. Under adaptive management, this contribution could change each year.

Alternative 2 Reduced Permitted Use Alternative

Under the reduced permitted use alternative, net revenue to the livestock industry is expected to fluctuate between an estimated $24,000 and $313,000 per year, depending on the stocking rate, market conditions, availability of an alternate feeding location, and the calf crop percentage realized each year. The impact on ranch-level income under this alternative is expected to range from a loss of approximately $130,200 per year to a possible increase of $158,000 per year.

Grazing fees would decrease under this alternative, and the contribution of fees to the county grazing board and to the BLM would subsequently decrease. The ability to hire temporary employees would also be reduced based on a lower stocking rate.

Under the reduced permitted use alternative, economic benefits within the Arizona economy would be expected to either increase or decrease, depending on the industry response to reduced AUs. Possible impacts could range from a loss of $609,000 per year to an increase of $991,000 per year.

Alternative 3 No Action Alternative

Impacts to socioeconomics would be similar as for the Proposed Action. However, there would be a larger number of AUMs permitted. The income to Mohave County could be proportionally higher than

for Alternative 1 because the initial stocking rate would be 578 AUs. With no change in livestock management, the impact to the community would remain similar to the current impacts.

Alternative 4 No Grazing Alternative

Under the No Grazing Alternative, net revenue to the livestock industry is expected to fluctuate between $31,000 and $474,000 per year, depending on the availability of an alternate feeding location and the market prices realized either upon selling the herd or selling calves raised in any alternate location. Because of reductions in operating costs and the revenue stream that could be realized through selling non-grazed livestock, ranch income associated with the allotments is not expected to go to zero. Impacts to ranch-level net revenue is estimated to range from a loss of $123,000 to an increase of $319,000.

Should livestock grazing no longer occur on the CQFM allotment, the Mohave County revenues from grazing fees are expected to be eliminated. The permittee would have to purchase or rent pasture to support his livestock in an alternate location or sell the livestock associated with the CQFM Allotments.

Cumulative Effects

Cumulative local and regional socioeconomic impacts of the selected alternative are expected to be determined by the production and operation decisions made by the rancher as well as being affected by market conditions and regional and national economic variables.

4.1.2.9 Soils

Under all alternatives, it is reported that soils in the CQFM Allotment are receiving higher than normal amounts of nitrate via atmospheric deposition (Comer et al. 2013). The higher rates of nitrate could be one factor that is contributing to the spread of some non-native invasive species such as red brome and cheatgrass (see Figure 21).

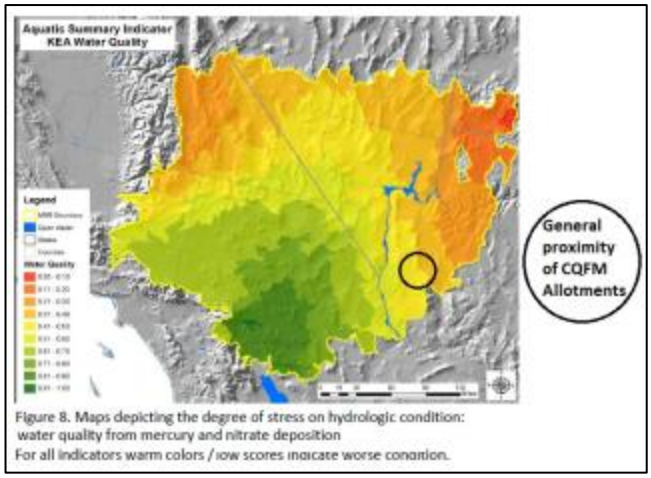

Figure 21:Atmospheric deposition of nitrate over the Mojave Basin as cited by Comer et al. (2013).

Alternative 1 Proposed Action Adaptive Management Alternative

The Rangeland Health Evaluation (USDI BLM 2010) findings show that Standard 1 for soils at key areas is being met on all of the allotments. Under this alternative, livestock grazing on the CQFM Allotments may continue to have a localized long-term negative impact on soils associated with loafing (congregation areas) such as watering sites and corrals through soil compaction caused by the concentration and/or trailing of livestock. Soil compaction results in accelerated erosion by allowing rapid run-off of water due to the lack of filtration. It also impedes seed germination. Seasonal rotation of pasture use and control of animal movement with installation and maintenance of fencing could allow some areas of compacted soils to improve (de-compact) slightly during periods of non-use. The vast majority of soils in the allotments are expected to continue to meet the soils standard.

In general, large portions of the area are covered with cobbles, gravel, and sand. Although uncommon in the area, biological soil crusts are able to find refugia in rocky soil (Belnap et al. 2001). Grazing animals can apply compressional and shear forces to the soil. Moisture and burial are two important factors relating to the degree of impact to biological soil crusts. With course textured sandy soils, crusts are better able to withstand disturbances in moist soils than in dry soils.

Alternative 2 Reduced Permitted Use Alternative

In the short-term soil disturbances throughout the allotments such as compaction and trailing are expected to be reduced compared to the Proposed Action Alternative, resulting in increased soil productivity over the long-term (e.g., potential for more plant cover, less shear force applied to the soil, more rapid recovery from soil compaction, etc.). It is expected that Standard 1 would be met under this alternative. In the long-term it is likely that improved soil productivity could in turn facilitate vegetation recovery.

Alternative 3 No Action Alternative

Impacts of the No Action Alternative would be greater than Alternatives 1 or 2 because livestock would be allowed to graze in higher numbers. Some of the key areas that are not meeting Standard 3 (upland vegetation) are indicators that soil productivity could be at risk. Over the long-term the continued loss of plant cover could result in Standard 1 not being met, especially in an exceptional to severe drought or an extended drought.

Alternative 4 No Grazing Alternative

Soils in the CQFM Allotments would not have livestock grazing or impacts associated with livestock grazing. It is likely that in the short-term (up to two years) there would be no change from Alternative 3, until the cattle are actually removed from the allotments. In the long-term (five to ten years) however, through the natural processes of heating and cooling over the spring, summer, winter, and fall months, soil productivity is expected to improve (e.g., potential for more plant cover, less shear force applied to the soil, more rapid recovery from soil compaction, etc.). It is likely however, that without restoration management actions, cattle congregation and trailing scars may remain on the landscape for decades.

4.1.2.10 Vegetation (Upland)

Livestock grazing has the potential to affect many aspects of the plant community including abundance, vigor, and reproductive capabilities of palatable forage plants. These impacts vary with timing, intensity, selectivity, and frequency of use by livestock (Holechek et al. 2001). Range plants are entirely dependent on green leaf tissue for their survival. When leaves are removed from plants by grazing their food-producing capacity is reduced (Holechek et al. 2001).

Stocking rate and utilization

Research has demonstrated that properly managed livestock grazing is designed to have minimal impacts to rangeland resources. Holechek et al. (2001a) reviewed 25 long-term stocking rate studies and found that stocking rates, rather than the grazing system, is the primary factor governing vegetation, animal, and financial outcomes. Conservative stocking rates help to maintain lower utilization levels. Conservative stocking rates in the form of reserve forage or grass banks are well established strategies for contending with economic and drought risk (Thurow and Taylor 1999). The extra herbage left from under grazing in wet years will help plants recover from drought and may build feed reserves (Holechek et al. 1999). Studies suggest (Stoddart et al. (1975), Hutchings and Stewart (1953), and Heady (1975)) that rangeland stocking rates be lower than average forage production to account for variable forage production during

drought, and to prevent or reduce harm to vegetation. Hutchings and Stewart (1953) and Heady (1975) suggest that rangelands be routinely stocked at 75% of grazing capacity to account for drought.

Holechek et al. (2001a) suggest that utilization levels between 25% and 40% in the desert southwest would be sufficient to maintain forage production but recommend 25–35% use limits in the Mojave Desert. Additionally, these authors recommend a 30–40% use limit for pinyon-juniper woodlands. Ranges in good condition with flat topography and good water distribution can withstand the higher end of this range while ranges in poor condition or grazed during the active growing season or with rugged topography or poor water distribution should receive the lower use limit (Holechek et al. 2001a). A single year of heavy use, even with favorable precipitation, has been shown to reduce forage production in subsequent years (Holechek et al. 2001a).

Utilization is the proportion or degree of current year's forage production that is consumed or destroyed by animals (including insects). Utilization may refer either to a single plant species, a group of species, or the vegetation as a whole (Interagency Technical Reference 1999). According to a recent extensive literature review by Smith et al. (2005),

> "utilization at the end of the grazing season has long been a tool to consider whether an increase or decrease of stocking would be desirable in the next grazing season. Long-term utilization data, considered along with other monitoring data, should be used to adjust management practices to achieve land use plan objectives or Rangeland Health Standards (Interagency Technical Reference 1999)".

BLM measures utilization on key forage species, and utilization estimates would be considered relative utilization or seasonal utilization rather than total utilization because utilization on key forage species would primarily be measured prior to the end of the growing season. Consequently, measured utilization levels are expected to be within the conservative use guidelines recommended in the literature (e.g., Holechek et.al. 1999).

Smith et al. (2005) further state that,

> "utilization guidelines are intended to indicate a level of use or desired stocking rate to be achieved over a period of years. For example, nearly all of the studies used by Holechek and Galt (2000) to develop utilization guidelines for desert ecosystems encompass 10-year grazing trials. Holechek's 'utilization guidelines for different range types' are based on conclusions from numerous research studies conducted in different conditions. They are not site-specific and are only valid as a starting point in the absence of site-specific data, such as trend data compared to long-term utilization and actual use records. Managers must further refine and validate utilization guidelines so they are tailored to each particular situation."

Holechek et al. (1999), state in a review of stocking rate studies, "desert forage plants can sustain about 40% use of annual herbage production. Use in the drought years approached 55–60% while use in the wet years was near 20–25%." Holechek and Galt (2000) suggested that use levels of >50% should be avoided on public rangelands dominated by native vegetation when various zones and key areas within a range unit are averaged within any year, with some tolerance for heavy grazing on up to 30% of the pasture. Holechek and Galt (2000) cautioned that, "…attainment of specific use levels is nearly impossible on a year-to-year basis due to variation in climate. Instead, we believe they should be a target across 5 to 10-year time periods". Holechek et al. (1998) suggested that "…management changes may be

needed if utilization guidelines are exceeded on over 30% of the pasture or allotment for 2 consecutive years or in any 2 years out of 5".

Active-growing-season use and fall-winter use

Grazing upland habitats during the active growing season can have multiple impacts on the vegetation. Many grass species are most sensitive to grazing from the late bloom to early heading stage (Howery 1999).

Cattle are primarily grazers and focus primarily on grasses; however, when grasses go dormant and their protein content is reduced cattle will supplement dry grass by increasing their consumption of shrubs that still have high protein content in new stems. Because shrubs maintain high protein levels in the winter, cattle graze on them more heavily during this time. Periodic winter deferment allows shrubs to maintain more new leader growth and better maintain their vigor and reproductive capability.

Deferment and Rest

Deferment, as used in this document, involves the delay of grazing in a pasture during one or more seasons, usually the growing seasons of spring and summer. In general, summer deferment is during the months of July through September; spring deferment is February through April. Warm season and cool season growth are the two types of growth strategies that plants exhibit on CQFM Allotments. Seasonal deferment (cool [spring] and/or warm [summer]) allows upland vegetation to complete its annual growth and reproduction cycle with minimal disturbance from livestock. Some species (big galleta) are opportunistic and will grow in spring or summer if environmental conditions are conducive to growth.

Deferment allows forage plants to gain vigor and reproduce (Holechek et al. 2001b). With deferment, perennial grasses and forbs are able to replenish and develop their root system and energy storage, set seed, develop rhizomes, stolons, and stolon sets. Deferment can be used to reduce grazing pressure on either cool or warm season plant species depending on what time of year it is implemented. Seedlings are able to become established and develop an adequate root system to survive dry periods. Deferment allows perennial grasses and forbs to regain vigor that is lost from grazing during the active growing season in previous years. Plants with high vigor can break dormancy earlier, get taller, and produce more seed than plants with low vigor.

Rest involves not grazing a pasture or allotment for an entire year and provides more time for plants to recover from past grazing influences compared to deferment (Holechek et al. 2001b). Like deferment, rest allows upland vegetation to complete its annual growth and reproduction cycle without disturbance from livestock, but rest also ensures that adequate cover remains through the fall and winter. Additionally, rest ensures two consecutive growing seasons (spring and summer) from grazing allowing plants to take advantage of both growth periods.

Drought management

Based on a review of the weekly Drought Monitor maps from January 2000 to June 2014, the CQFM Allotments have experienced:

- normal or above normal conditions ~ 23% of the time
- abnormally dry or worse ~ 77% of the time and
- moderate or worse drought ~ 52% of the time.

Normal or above normal conditions are typically achieved as a result of winter moisture but occasionally as a result of summer monsoon moisture, and only once in 14.5 years has there been normal or above normal conditions associated with consecutive winter and summer moisture (http://droughtmonitor.unl.edu/MapsAndData/MapArchive.aspx).

As stated above, drought conditions are common in the CQFM Allotments and must be taken into account when preparing a grazing schedule. Livestock operators must plan for drought as a normal part of the range-livestock business (Howery 1999). The primary goal in drought management should be to protect range plants before and during drought so that they can recover quickly after a drought (Howery 1999). To do this the University of Arizona Cooperative extension recommends stocking below the average long-term carrying capacity in normal years and to reduce stocking levels during a drought to balance with the forage supply (Howery 1999). Plants that are healthy with good vigor produce more forage during a drought and recover more quickly after a drought than plants with low vigor (Howery 1999).

Alternative 1 Proposed Action Adaptive Management Alternative

The current permitted use is 578 AUs. The average number of livestock ran from 1981 to 2008 was 330 AUs (excluding ephemeral use). The initial stocking rate under the Proposed Action would be 455 AUs which is 123 AUs more than the 26-year average. Over the next ten years, through adaptive management, the stocking rate may be adjusted up or down based on monitoring results and resource conditions.

The proposed stocking rate and rotational grazing plan could result in more spring and summer growing season deferment than has occurred under the No Action Alternative. Alternative 1's overall plan is intended to improve vigor, frequency, cover and composition of key forage species. However, the proposed use limits and stocking rate may slow the response as compared to Alternative 2 which has a lower stocking rate and utilization limits. Under adaptive management, if monitoring indicates changes are needed, the stocking rate, season of use, or utilization limits could be adjusted to allow for plant communities to be sustained or improve.

The Proposed Action is expected to meet conservative use guidelines of 25 to 40% total use as suggested by Holechek et al. (2001a). The proposed triggers of 40% and 50% are relative use measures and regrowth of key species are expected to occur following livestock removal before the end of the growing season from pastures in most years.

Adaptive management responses should reduce grazing pressure on vegetation during severe to exceptional drought conditions by 1) initially lowering cattle numbers and dispersing the cattle across the allotments resulting in lighter utilization on drought stressed plants or 2) completely removing cattle off the allotments (as regulations allow, or if use limits are reached or exceeded).

In the East Unit, severe to exceptional drought conditions have occurred once during the 20-year period (1992–2011) or 5% of the time. In the West Unit, severe to exceptional drought conditions have ranged from three to four times (based on established BLM rain gauges and soil moisture probes) during the 20-year period (1992–2011) or 15 to 20% of the time. Spreading cattle out during drought conditions would interrupt scheduled rest periods for key species, however this situation is expected to occur infrequently based on rainfall and soil moisture data from 1992 through 2011.

The scheduled rest periods are expected to maintain the vigor and productivity of key species and other vegetation. The grazing system would mitigate grazing impacts on vegetation by adjusting the timing of use (allowing growing season rest as recommended by Canfield 1939, and Holechek et al. 2001b) and

reducing use limits on key species (conservative limits as recommended by Holechek et al. 1999, Holechek et al. 2003, Navarro et al. 2002, Paulsen and Ares 1962, and Valentine 1970). The recovery of areas not currently meeting objectives may be slower under Alternative 1 compared to Alternative 2 as use limits and the stocking rate is higher under this alternative and growing season rest would be less.

It is expected that the DPC and BMEMP vegetation objectives can be sustained or met under Alternative 1. Moving the livestock two times per year as proposed would provide scheduled deferment during the spring and summer growing seasons for grasses, shrubs, and forbs, thus, improving key species vigor and cover and aid in seedling establishment. This is expected to support healthy rangeland ecological conditions and sustainable livestock grazing use.

Scheduled grazing of the Twin Mills pasture in the winter would allow for spring and summer growing season rest in all years. Growing season rest may speed up post-fire vegetation recovery by providing perennial vegetation a full opportunity to reach maturity, set seed, and reproduce. Increases are expected for key species frequency, cover, and composition. DPC objectives for this pasture are more likely to be achieved under Alternative 1 as compared to the No Action Alternative.

Grazing the Twin Mills pasture in the spring or summer could only occur during years of abundant ephemeral growth. Livestock would focus on annuals during this time and use on key species is expected to be very light.

Five exclosures would provide control areas to compare grazed and ungrazed areas. This would provide an opportunity to evaluate the potential causal factors if Rangeland Health Standards (USDI BLM 1997) are not met.

New water developments and/or improvements are expected to improve livestock distribution and may reduce overall grazing pressure on vegetation. The reduction in grazing pressure on vegetation throughout the allotments assumes that the stocking rate would be in balance with forage production. Areas around livestock waters are typically loafing areas for cattle. Cattle are expected to be able to access previously unused or lightly used areas after the initial development of a watering facility. In the short-term (following construction and up to one season of use) heavy use is expected in these areas in a 0.5 to 1.0 mile radius surrounding each watering point. With time (6 months and beyond), as livestock become familiar and are settled in an area, it is expected that loafing areas would be reduced to 0.25 mile surrounding the newly developed watering points.

Periodic deferment in all pastures during both the spring and summer growing seasons may allow key forage plants the opportunity to grow, set seed, and replenish root reserves (growing seasons rest as recommended by Canfield 1939, and Holechek et al. 2001b) as compared to the No Action Alternative.

A field review of fire effects in the Twin Mills pasture was conducted in June 2014. The valley bottoms (0 to 15% slopes) had burned at very high temperatures and only about 5% of the original plant community remains. The few forage species found in the valley bottoms have not recovered. This is due in part from heavy grazing pressure and trailing to and from water developments by cattle and burros. The grazing schedule proposed in Alternative 1 should shorten the recovery period of all the plant communities in this pasture by allowing growing season deferment every year. Recovery of Twin Mills Pasture is expected to occur more quickly than under the No Action Alternative. Recovery is expected to be slower than Alternative 2 which provides complete year-round rest, or Alternative 4 which provides total rest.

Grazing vegetation during the winter is expected to inhibit cattle from loafing around waters due to colder temperature in the valley bottoms.

The initial stocking rate of 455 AUs may result in exceeding use limits during severe to exceptional drought years. Spreading livestock in all pastures during severe to exceptional drought could cause use limits to be exceeded in some pastures and may prevent growing season rest. Spreading out cattle without reducing the stocking rate could result in excessive utilization and reduced vigor of key plant species.

However, adaptive management with monitoring (as confirmation), provides mechanisms to respond to these situations by reducing the stocking rate and utilization limits, and/or completely removing livestock from the allotment if needed.

Alternative 2 Reduced Permitted Use Alternative

Impacts to vegetation from Alternative 2 are similar to those described for Alternative 1. It is expected that progress towards meeting DPC objectives could occur at a more rapid rate compared to Alternative 1 because of lower stocking rates and utilization limits. Although the vegetative objectives were not achieved at some key areas with the average licensed use (1998–2010) of 237 AUs, the deferred grazing system versus Alternative 3 should provide for the physiological needs of the key species.

Under ephemeral grazing authorizations, additional livestock would not be permitted for the 10 year grazing period (i.e., life of the permit). Ephemeral authorization would only apply to the base herd; e.g., 1) Cattle may remain in pastures for a longer period of time in areas where ephemeral forage is abundant, or 2) additional cattle from the base herd could be brought to an area where ephemeral forage is abundant. This alternative may reduce grazing pressure on key forage species compared to the No Action and Proposed Action alternatives, and Rangeland Health Standards (USDI BLM 1997) may be met quicker.

Closing the Twin Mills pasture to livestock grazing could allow for complete rest which would speed up the plant community post-fire recovery process (Howery 1999), and allow key species an opportunity to reach maturity, set seed, and reproduce. It is expected that the frequency, cover, and composition of key species would increase at Key Area 18 and 20 (Figures 22 and 23). DPC objectives for this pasture are more likely to be achieved under this alternative compared to the No Action Alternative and be quicker to achieve than under the Proposed Action Alternative.

Figure 22: Photo 3. Photograph of Key Area 18 in the Joint Use Area of the Twin Mills Pasture, Standard 3 is not met.

Figure 23: Photo 4. Photograph of Key Area 20 in the Joint Use Area of the Twin Mills Pasture, Standard 3 is not met.

The effect of drought may be similar to Alternative 1; however, the more conservative stocking rate and lower utilization limits would likely help to further mitigate drought effects as compared to Alternative 1.

The construction of the three exclosures would provide control areas to compare grazed and ungrazed areas within the pastures where they are located. This would provide an opportunity to evaluate the potential causal factors if not meeting the standards for rangeland health.

Alternative 3 No Action Alternative

Monitoring data from the 2010 Rangeland Evaluation (Table 20) shows that for the 21 key areas surveyed:

- 38% Did not meet Standard 3 (eight of 21; however two were progressing upward)
- 33% had a "static" overall trend (seven of 21)
- 19% had a "Static with a downward trend" (four of 21)
- 14% had a "Downward trend" (three of 21).

Trend of key species (33%) is down at some of the key areas and static at others (33%), showing no forward progress (two of the key areas where there was a static trend, Standard 3 was not met). Plant vigor is low, productivity is low, and reproduction appears to be negatively affected, as in some years few seed heads, stolons, tillers, and seedlings of palatable plants are found. Trend is expected to continue downward to static under current management practices. The DPC objectives at some of the key areas is not expected to be met without a change in management practices.

Continuing with the current stocking rate of 578 AUs is expected to result in utilization above the recommended use limits of 25–40%. Overutilization could cause excessive leaf, seed head, and stolon removal of key species. Excessive removal of leaves, seed heads, and stolons affects the ability of plants to produce carbohydrates, and/or reproduce. Under such conditions plants are unable to sustain themselves during normal rainfall years and especially during and following drought years.

Keeping the Twin Mills Pasture open to livestock grazing without adjusting livestock use levels is expected to impede the plant community post-fire recovery process. No additional exclosures are expected to be constructed under this Alternative, and an opportunity to compare grazed and ungrazed areas within the pastures would not exist. Consequently, it may be more difficult to evaluate the potential causal factors for not meeting the Standards for Rangeland Health.

Alternative 4 No Grazing Alternative

Under the No Grazing Alternative, livestock grazing on these allotments would cease. Key species are expected to have more of an opportunity to complete all phenological growth stages. There would be less trampling of vegetation by cattle. Standing biomass levels may increase. Impacts over time to the ecological function of these plant communities are expected to be confined to disturbances from wildlife, wild horse and burros, wildfire, and drought. The speed of recovery in areas not meeting DPC objectives would depend on amount and location of seed sources, current distribution and abundance of key species, and seasonal distribution and quantity of annual rainfall. It is more likely DPC objectives would be reached at a faster rate compared to the other alternatives because less vegetation would be consumed by grazing livestock. Plant frequency, composition, and cover of key species is expected to increase. Vegetation recovery following drought should occur at a faster rate compared to Alternatives 1, 2, and 3

as complete rest from livestock grazing is the most effective way to achieve range recovery following drought (Howery 1999).

Under Alternative 4, no exclosures are expected to be constructed. BLM would not have the opportunity to compare vegetation conditions inside and outside of the exclosures. Without this data, it would be more difficult to evaluate the potential causal factors if not meeting the standards for rangeland health.

4.1.2.11 Water Quality (Drinking and Ground)

Alternative 1 Proposed Action Adaptive Management Alternative

The installation of up to eight new wells in the CQFM Allotments and use of water for livestock watering is expected to have a negligible effect to groundwater resources in Detrital Valley and Sacramento Valley. Evaluations were conducted on eight new wells and one existing well (T23N, R18W, Section 15); however, the existing well would be developed in place of two of the proposed new wells (E2 and E4). Factors contributing to the expectation of impacts are: distances between proposed wells; drawing water from different groundwater depth or aquifer zones; intermittent and low pumping rates and use of water; and distribution and periodic use of water.

The wells would be relatively widely distributed within the CQFM allotment boundaries and have relatively few neighboring wells. The locations for the proposed new wells and the existing well appear to be placed between 0.3 miles to over 1 mile distance from the closest neighboring existing wells.

Proximity analysis showed that other existing wells near proposed wells (W1, W2, W3, W4) varied in well depths and depths to groundwater. Four existing wells occurred between one and two miles from well W1. Three wells appeared to be located shallower than the depth range for W1 with depths from 950 to 1,100 feet higher than W1 and with two located in the shallow alluvial aquifer. The fourth well appeared to have the potential to draw water from the underlying deeper aquifer at depths within the range of W1. Three existing wells occur between 0.8 and 1.1 miles from the well W2. The three wells appeared to have the potential to draw water from the aquifer about 100 to 500 feet shallower than W2. Two existing wells were found between 1.3 to 1.9 miles from W3 and appeared to have the potential to draw water about 100 to 600 feet deeper than W3, in the underlying deeper aquifer. Two existing wells were found about 1.5 miles from W4 and one well appeared to have the potential to draw water about 500 to 700 feet shallower than W4 while one well appears to have the potential to draw water from the same depth range as W4.

Five existing wells are located about 0.3 miles from well E1. Two wells occurred about 70 to 460 feet shallower than E1 and three wells within the similar depth range as E1. Two wells were found between 0.8 and 1 mile from E2. One well occurred about 300 to 400 feet shallower than E2 and one well was potentially within the depth range as E2. Two wells were found about 1 mile from E3. The two wells ranged from 445 to 841 feet deeper than E3. Two wells were found about one mile from E4. These two wells ranged from 150 to 500 deeper than E4. Four existing wells were found about 0.4 miles from the location of the existing well site (T23N, R18W, Section 15). Three of these existing wells were located about 40 to 200 feet shallower than the well depth of the existing well site, and the fourth drew water about 240 feet deeper.

Water from the proposed wells would be pumped by an appropriately selected energy source (e.g., windmill, solar, or gasoline powered electric pump). Water from each well would be piped to a 10,000 gallon storage tank then to a 500 gallon trough. Each well location would store approximately 10,500

gallons of water (0.03 acre-feet) during a single fill cycle. Livestock (cattle and horse) water use in the CQFM Allotments was estimated conservatively to be 20 gallons per day (includes animal use and evaporation from troughs) or potentially about 11,480 gallons per day or roughly 13 acre-feet annually. Shut-off valves should be attached to storage tanks and/or troughs to avoid overflow. Water should be pumped from each well either continuously (at low volume if by windmill power given the existence of sufficient wind speed), or periodically (at expected higher volumes with electric pumps). Photo Voltaic units are assumed to operate in a 12-hour solar cycle and generators should operate during periods of time necessary to fill the storage tanks and troughs.

Effects to Groundwater Resources

Wells W1, W2, W3, and W4 occur no closer than 3.5 miles from one another. Wells E1, E2, E3, E4, and the existing well are spaced, on average, about 3.6 miles from each other. The wells in the West Unit and the wells in the East Unit are separated by about 15 miles. The proposed wells are not the only watering sources for livestock. Other sources located in the CQFM Allotments are available for watering use. Proposed pasture use and timing patterns are expected to control livestock access to water sources and eliminate the potential for livestock to have exclusive use of any one watering source.

All but a few proposed wells have neighboring wells that could potentially draw water from a similar depth horizon. When water is potentially drawn from the same aquifer there appears to be enough head differential between the proposed well and its neighbors that the potential to affect or compound the cones of depression appears negligible. The Theis Equation was used to determine the effects of pumping the proposed wells at the upper limit of pumping rate continuously for 24 hours over 365 days. In reality, the maximum pumping rate for each well would be determined by the quantity of water needed to satisfy storage (trough and tank) and the type of pumps used. Solar pumps are expected to operate only when sufficient light intensity produces energy or about 14 hours per day in mid-summer and less at other times of the year. Windmills are expected to pump water only when sufficient wind velocity is encountered and gasoline powered pumps only pump until storage capacity is met. In any case, the actual cone of depression created by the use of the proposed wells is expected to be far less than the model predicted drawdown values. When pumps are inactive, for whatever reason, the aquifer(s) are expected to enter a recharge phase. It is expected that the true cone of depression resulting from pumping actions would range from the immeasurable to a few tenths of a foot depending on whether the aquifer is found in consolidated or unconsolidated materials.

Timing of pump operation and relatively low pumping rates is not expected to have more than a negligible impact on existing groundwater resources. Pumping impacts would be localized and short-term with persistence only expected to last hours for windmill and solar pump operation and perhaps days for generator operations. The relatively low pumping rates expected would allow for rapid recovery when pumping ceases. Water use at each new well location is not expected to be continuously available to livestock and horses but would become available in context of proposed pasture use stipulations. However, water may be continuously available to wildlife.

Any cones of depression created by pumping from the proposed wells are not expected to practically influence groundwater levels at any existing well or within the Detrital and Sacramento Valleys. The discontinuous or intermittent pumping from the wells may create miniscule, localized cones of depression immediately adjacent to each well which are expected to reduce when pumps are no longer operating. Distribution of watering sources and livestock and timing of pasture use is expected to preclude the exclusive use of one well location by all animals and as such allow rest periods where any water level

drawdown at each well is dissipated.

Effects to Surface Water Resources

No perennial or intermittent streams occur in the CQFM Allotments. Ephemeral stream systems dominate the landscape and flow directly in response to precipitation events and are only persistent for a short time after rainfall ceases. Pumping of groundwater from the proposed wells would not affect the ephemeral stream network in the CQFM Allotments in Detrital and Sacramento Valleys.

Several spring sources are distributed throughout the CQFM Allotments. The springs are associated with the shallow alluvial aquifer and not the underlying deeper aquifer. Given the depth at which water would be pumped, it is expected that pumping at the rate and use described would not affect the springs.

Alternative 2 Reduced Permitted Use Alternative

Because of reduced livestock numbers, water use by livestock would be reduced and impacts to water quality and quantity, under this alternative, would be similar to the Proposed Action.

Alternative 3 No Action Alternative

Groundwater levels have fluctuated in the Sacramento and Detrital Valleys over the period of record (1943 to 2006—Anning et al. 2007). Overall groundwater levels remained the same or steadily increased in Detrital Valley. In Sacramento Valley, groundwater increased slightly between 1996–2006 but slightly decreased from 1979–2006. Livestock grazing has been ongoing in the allotments, and therefore, depletion of groundwater as a result of livestock grazing in the Sacramento and Detrital Valleys is unlikely to occur.

Under the No Action Alternative, existing range improvements are expected to be maintained and are not expected to cause a reduction to water quality or quantity of groundwater.

Alternative 4 No Grazing Alternative

No change in water quantity is expected from the No Grazing Alternative. Water quality at springs may be improved with the removal of livestock. Cattle would not be grazing on the allotment; however, wild horses and burros and wildlife are still expected to graze and use water on the allotments.

Cumulative Effects

A water development (Tennessee Well) was constructed for livestock on private land (T24N, R18W, Section 35 SWSW) in the Cerbat Pasture in October 2013. This water development provides a more permanent water source and improves livestock distribution in this pasture. The addition of this well has also increased the amount of acreage (about a 0.5 to 1.0 mile radius) that would be affected by cattle grazing and loafing near the water development. Use is typically heavy in areas surrounding waters. Under proper stocking, distribution, and deferment, it is expected that the loafing area would be reduced to 0.25 mile or less.

One new well (W4; see Figure 5: Map 4) is proposed to be developed for livestock on State Trust land (T24N, R20W, Section 2) in the Black Tank Valley pasture. This water development would improve livestock distribution in this pasture as well as increase the amount of acreage that would be affected by cattle grazing and loafing near the water development. Continuation of these activities in the future would result in a continuation of effects similar to those that have resulted from past activities.

4.1.2.12 Wild Horses and Burros

General

Under Alternatives 1, 2, and 4 it is expected that forage availability (both type and amount) for wild horses and burros would increase within the allotments in the Black Mountain HMA and Cerbat HA. Implementing the proposed grazing systems on these allotments to achieve DPC objectives may result in less competition for food and water between livestock and wild horses or burros around most key areas. A grazing system that provides spring and summer growing season rest is expected to improve ecological condition on the allotments (see Section 4.3.2.10 Vegetation (Upland) resulting in an increase of forage.

Burros, currently over AML in the Black Mountain Range, are protected under the Wild Horse and Burro Free Roaming Act of 1973. Addressing burros is discussed within the Reasonably Foreseeable Actions Section of this document through an upcoming burro gather and through nuisance burro removals. Otherwise, it is considered beyond the scope of analysis for this livestock management and permit renewal EA. The BMEMP allocated 30% of forage to burros in the Joint Use Area. If forage increases, there may be less competition between ungulates for water and forage.

No studies have been conducted on burro movements between allotments utilizing natural boundaries in the Black Mountains. Currently, approximately 50% of the pastures are delineated with natural boundaries which burros appear to move across. Where burros are unable to traverse the natural boundaries they may be confined to certain areas or an allotment by fencing. However, confining them to a smaller area may compromise herd viability and inbreeding could occur.

Alternative 1 Proposed Action Adaptive Management Alternative

Adaptive management provides for flexibility in the grazing system and stocking rate. This is an important consideration because wild horse and burro populations present in portions of the allotments could fluctuate. Adaptive management would be a useful tool to change livestock grazing in response to changing wild horse and burro herd numbers. BLM estimates that burro herds grow at an average rate of 20% annually. The adaptive management approach provides flexible options in livestock management to accommodate for changes in environmental conditions such as fluctuations in these populations.

By renewing the 10 year grazing permit, potential competition for forage between cattle, wild horses, and burros could occur. However, the management practices proposed under this alternative are designed to manage livestock grazing to provide for a diversity of wildlife and plant species, to maintain ecological functioning systems, and to maintain and/or improve ecological conditions.

Under this action, if cattle rotations are controlled by water, burros may fall subject to the same movements as cattle. This could force more burros into areas that are only occasionally used (Black Tank/Valley Pasture) for longer periods of time as well as limit their movement across the HMA. Developing new waters could affect burro distribution and reduce grazing pressure on vegetation around the existing water sources.

Under 43 CFR 4710.5(b), "All public lands inhabited by wild horses or burros shall be closed to grazing under permit or lease by domestic horses and burros". Fifteen horses would be permitted in the Quail Springs and Big Wash Pastures. These pastures are not part of the Cerbat HA (Figure 24: Map 15). As long as the fences are in good working condition, the mixing of domestic horses with wild horses would be unlikely. Keeping the fences in working order should not be a problem because they are located on

public lands or private lands controlled by the permittee. If domestic horses get into the HA the Authorized Officer may establish conditions for the removal of the domestic horses from public lands adjacent to or within the HA to prevent undue harassment of the wild horses (43 CFR 4710.6). The permittee may also be subject to unauthorized use if domestic horses are found in the HA.

Compared to the No Action Alternative, impacts to wild horses and burros are expected to decrease under a grazing system that rests pastures and reduces livestock AUMs in the HMA.

Proposed fencing on the west side of US Highway 93 may limit or alter movement patterns and reduce drift of burros from LMNRA to BLM lands and between allotments.

Alternative 2 Reduced Permitted Use Alternative

Under Alternative 2, impacts would be similar to Alternative 1. Ten horses would be permitted for up to two months in the Quail Springs Pasture of the Quail Springs Allotment, which is not part of the Cerbat HA (Figure 24: Map 15). As long as the fences are in working condition, the mixing of domestic horses with wild horses would be unlikely.

BLM estimates burro herds grow at an average rate of 20% annually. This alternative provides fewer options for adjustments in livestock management to accommodate fluctuations in wild horse and burro populations. The potential for forage competition between wild horses, burros, and livestock is expected to be less because of the lower stocking rate of livestock in this alternative.

Alternative 3 No Action Alternative

Current downward trends at some key areas could continue if Rangeland Health Standards (USDI BLM 1997) are not met or continue to decline, potentially increasing competition for forage between cattle, burros, wild horses, and wildlife. Declining forage conditions and amounts could cause burros and wild horses to graze on less desirable species. In combination with livestock grazing, this could lead to desired forage species (e.g., big galleta, black grama, bush muhly, Mormon tea, globemallow etc.) declining or disappearing on the landscape. Consequently, ungulates would need to switch to less palatable species such as flat-top buckwheat, etc.

Alternative 4 No Grazing Alternative

In the long-term, the removal of grazing livestock from the allotments would reduce any competition for forage, space, and water in riparian and upland wild horse and burro habitats. In the short-term, the shutting off of water under the No Grazing Alternative would seasonally exclude wild horses and burros from those pastures unless natural perennial waters (springs) existed. In the long-term, BLM or some other entity could assume responsibility to maintain some of the waters allowing use of these areas by wild horses and burros.

Cumulative Effects

Wild horse and burro population levels would continue to fluctuate within the allotments. Potential future population control efforts, adoptions, and holding facility capacities as well as natural factors like drought, wildfire, and reproductive rates could influence the degree of fluctuation in the population levels. Wild horse and burro populations could continue to affect vegetation cover, frequency, and composition and the available forage for livestock and wildlife and vice versa. Burro populations that exceed sustainable forage production levels in combination with natural occurrences like drought and wildfire would reduce forage quality and availability in an area.

The EA currently under development in the KFO to address burros over AML in the Black Mountain HMA is scheduled to be completed within the upcoming decade. As of the preparation for this EA, one request for comments has been sent out, with many comments received. The next phase of the process is to select an interdisciplinary team (IDT) to review the comments and to begin development of alternatives, based on issues and concerns stated in the comment letters and from within the IDT.

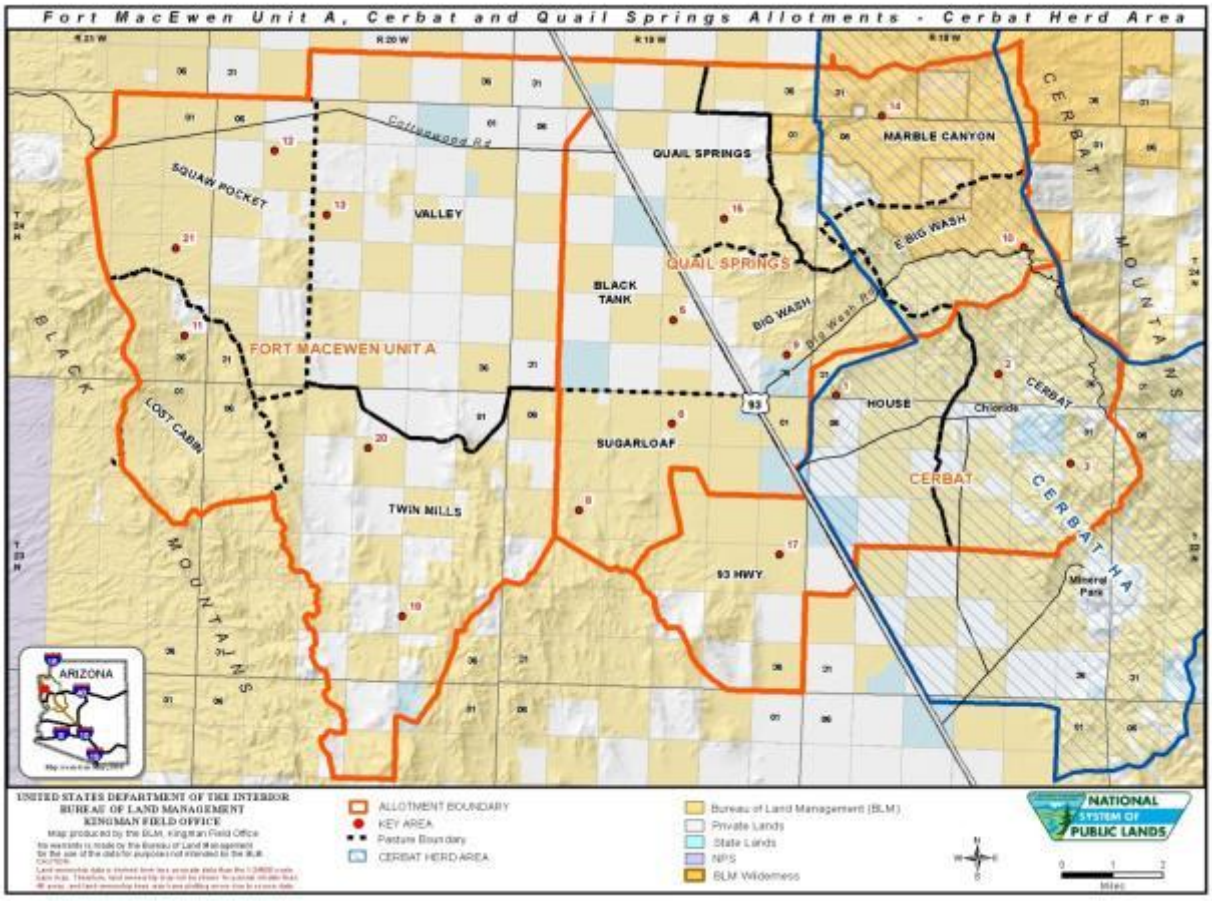

Figure 24: Map 15. Cerbat Herd Area boundary and the Quail Springs Allotment.

4.1.2.13 Wildlife including Special Status Species and Migratory Birds

Analysis Method

Each alternative will be compared to the current environmental conditions and grazing practices and the effects from each alternative will be described. Effects analysis will focus on upland and riparian wildlife habitats, special status species, Sonoran desert tortoise, migratory birds, and bighorn sheep. The analysis will disclose the impacts to habitats and how they affect wildlife's ability to survive and reproduce.

To make efficient use of the data available for this group of allotments and have a clean analysis without large amounts of repetition, it is necessary to make several assumptions about how the data can correlate to multiple habitat types and many special status species. As with all assumptions, there are times when they will not fit perfectly, but in general, the assumptions are expected to cover the species and habitats in

this group of allotments. If additional site-specific information is available for individual special status species, it will be used to analyze impacts to that species at that location.

The following assumptions were used to facilitate the analysis of special status species, migratory birds, and general wildlife habitats:

Assumption 1: Upland habitats that are meeting Standard 1 and 3 are either providing adequate habitat or have the ecological processes in place that will allow for the development of adequate habitat for upland special status species, migratory birds, and general wildlife.

Rationale: Upland habitats vary greatly depending on the soil type, climate, and landform. Often, different habitats may be found close to each other. Data collected for analysis of Standard 3 are often the only quantitative site-specific data that is available to assess upland wildlife habitat. Analysis of Standard 3 uses data from key areas, utilization measurements, and assessments based on the 17 Indicators of Rangeland Health (Pellant et al. 2005). This data is compared to the appropriate ecological site description from NRCS to determine if the DPC is present. In habitat management, one cannot expect more from a certain habitat type than what it is capable of based on its soil type, climate, and landform. Every location cannot provide habitat for every species, and it is not feasible to attempt to assess every single niche on the landscape. If a site has the appropriate soil, hydrological, and biological components and each process (i.e., nutrient cycling, hydrologic cycling, and energy flow) is functioning properly, then the site is said to be providing what habitat it is capable of, or it can progress toward its site potential, and therefore, habitat potential. Properly functioning ecosystems can provide the diversity of habitats that are necessary for most species that are dependent on that ecosystem.

Assumption 2: Riparian habitats that are meeting Standard 2 are either providing adequate habitat for riparian dependent special status species, wildlife species, and plant species, or they have the appropriate processes in place to make progress towards developing suitable habitat.

Rationale: BLM assesses riparian habitat using the Proper Functioning Condition (Prichard et al. 2003) method. Additional species-specific habitat parameters are not measured in most areas. Riparian habitats vary greatly depending on their width, gradient, amount of water, and whether they are streams or springs. The habitat they are capable of providing also varies greatly, but when they are in Proper Functioning Condition, they are providing either the habitat they are capable of, or the processes to develop to their capability are in place and functioning. Some riparian habitats that are in Proper Functioning Condition may be currently providing suitable habitat for a wide variety of riparian dependent wildlife species while other riparian areas are in Proper Functioning Condition but are not yet fully developed. A riparian area that is maintained in Proper Functioning Condition should be able to make progress toward providing wildlife and plant habitat in balance with its capability.

Basis for the expected outcomes from changes in grazing management

Habitat for wildlife species and special status species must provide for food, cover, survival, and reproduction of each species. Not every plant community will provide all of the components necessary for every species. However, if plant communities are able to maintain their vigor and diversity, and ecological processes are functioning properly, then plant communities could provide what habitat they are capable of and could progress toward their capability. Impacts to general wildlife species from livestock consists primarily of alterations to the vegetative community. If a vigorous native plant community is maintained within its natural range of variation, then habitat could be provided for the natural variety of

species on the CQFM Allotments. These species would be able to exploit their respective niches and populations could be expected to sustain themselves. Therefore, impacts to general wildlife and special status species are considered with the analysis of impacts to vegetation.

New water developments

Developing new waters is expected to improve livestock distribution, reduce grazing pressure on vegetation (i.e., wildlife habitat), and provide wildlife new sources of water. Cattle may also be able to reach new areas that are currently ungrazed and potentially increase forage competition with wildlife in these areas. Areas that were previously unused could have foraging cattle and lightly used habitat areas could become heavily used, depending how close to the new waters these areas are located. Additional waters could provide cattle with new loafing areas potentially affecting the quality of the surrounding habitats by lowering the frequency of key forage plants as a result of frequent and high use within 0.5 to 1.0 mile radius of each water source. Under proper stocking and distribution, it is expected that the loafing areas could be reduced to 0.25 mile around any new or existing watering points.

Sonoran Desert Tortoise

Desert tortoises can be affected by cattle grazing in several ways including crushing, collapsing of burrows, alteration of available cover through grazing, and competition for forage.

Crushing of tortoise: Tortoise can be crushed by cattle; however, no data exists on the frequency at which cattle trample desert tortoise. Cattle pose a low degree of risk to above ground adult desert tortoise and possibly sub-adults, simply because cattle would likely try to avoid stepping on what essentially would appear to them to be a rock (Boarman 2002). Because they are small, hatchlings are more likely to be stepped on than adult tortoises.

Collapsing of burrows: Avery and Neibergs (1997) found that more burrows of desert tortoise were partially or completely destroyed in areas that were grazed by cattle than in a fenced area. Tortoise burrows in the rocky habitats of the Twin Mills, Sugarloaf, and Highway Pastures, would be in drainage cut banks or under boulders, and therefore, unlikely to be collapsed. Burrows found in the flats are more likely to be collapsed by livestock.

Cover: The desert tortoise needs vegetation to provide cover from thermal extremes, for shelter site construction, and for concealment from predators (Cordery et al. 1993). Livestock grazing can reduce this cover and could require tortoises to travel further to find adequate cover, exposing them to predators and extreme temperatures.

Forage Competition: Desert tortoise consume a wide variety of plants. Preferred forage plants for tortoise include perennial and annual grasses, forbs, vines, mallows, and shrubby buckwheat (Van Devender et al. 2002, Arizona Interagency Desert Tortoise Team 1996). Three-awn, bush muhly, big galleta, globemallow, and shrubby buckwheat, which are key forage species for livestock in the Fort MacEwen Allotment, are also important forage species for desert tortoise (Van Devender et al. 2002). A decline in abundance or elimination of key forage species would reduce the amount and quality of forage available to desert tortoises.

Grazing management with periodic deferment is expected to provide plant communities the opportunity to maintain high vigor and reproductive capability which is necessary to achieve or maintain the DPC objectives (e.g., cover and composition of key forage species and trend). This is expected to benefit desert tortoises by sustaining or increasing cover and available forage.

Construction and maintenance of range improvements and cattle gathering activities may bring workers into contact with desert tortoises. During these activities desert tortoise could be unintentionally harmed or killed.

Bighorn Sheep

Cattle grazing in bighorn sheep habitat can affect bighorn sheep in a variety of ways including competition for forage and space, avoidance of interactions with cattle, and disease. In 2007, the AZGFD finalized their bighorn sheep management plan for the Black Mountains (AZGFD 2007). The objectives of this plan regarding cattle involve improving range conditions, reducing competition between bighorn sheep and cattle for water and forage, and minimizing conflicts between cattle and bighorn sheep (AZGFD 2007).

Competition for forage: Bighorn sheep will readily use areas with slopes between 0 and 80% while cattle typically use slopes between 0 and 30% (Ganskopp and Vavra 1987). In areas with slopes between 0 and 30% in bighorn sheep habitat there is the potential for competition between livestock and bighorn sheep. Competition for forage between cattle and bighorn sheep has been cited as a concern for bighorn sheep populations (Wishart 1978 and Trefethen 1975). In the lower Grand Canyon, diets of bighorn sheep, cattle, and burros overlapped substantially (Hansen and Martin 1973). Seegmiller and Ohmart (1981) found a considerable overlap in the diets (competition for forage) of bighorn sheep and burros in the Black Mountains of Arizona.

Forage availability for bighorn sheep on the CQFM Allotments has likely been reduced by a combination of grazing by burros and cattle, drought, and wildfire. Additionally, competition between bighorn sheep, cattle, and burros for natural water may occur within the allotments. Bighorn sheep make use of some of the man-made livestock waters within the allotments. Livestock management actions that increases the vigor, abundance, and cover of key forage species could increase forage availability for bighorn sheep and reduce competition between bighorn sheep and cattle, burros, and other wildlife.

Avoidance of cattle: Studies have shown that bighorn sheep spend more time on alert when cattle are nearby, yet they do not appear to actively avoid areas with cattle unless they are directly approached by them (Brown et al. 2010). Newly transplanted bighorn sheep in southern Idaho reduced and shifted their home range in response to livestock entering the pasture and shifted and expanded their range back when livestock left the pasture (Bissonette and Steinkamp 1996). The home ranges of bighorn sheep in the Black Mountains may have been reduced or shifted by the presence of cattle and burros in the area.

Disease: Disease transmission between domestic sheep and bighorn sheep has been confirmed. Transmission between cattle and bighorn sheep is speculative. Disease has affected the bighorn sheep populations in the Black Mountains north of Highway 68, but this outbreak was not attributed to disease transmission from cattle.

Special Status Species, Migratory Birds, and General Wildlife

Livestock grazing can impact bird species by altering forage abundance through grazing and altering the abundance and quality of nest substrates through grazing or trampling. Cattle could occasionally trample ground nests or knock nests out of small shrubs as they pass, causing nest failure. These events are expected to be rare unless cattle are stocked at high densities. Pastures that are grazed in the spring are going to offer less cover for ground nesting birds, which could make finding a suitable nest site more difficult or could expose nests to predators and reduce nest success. Pastures that are deferred during the

spring and summer when bird species are nesting could provide sufficient cover for ground nesting birds and have increased food resources (seeds and insects). A plant community that meets the DPC objectives should provide the necessary resources to meet the food and nesting requirements for birds.

When a pasture is meeting Standard 3, it is expected to have and sustain a desirable native plant community that should provide habitat for the expected variety and abundance of native wildlife species appropriate for that site.

Alternative 1 Proposed Action Adaptive Management Alternative

Sonoran Desert Tortoise

Under this alternative, the risk of desert tortoise being crushed or their burrows being collapsed could increase when livestock are concentrated in a single pasture compared to the current situation where cattle are spread out over a wider area or compared to Alternative 2 where fewer cattle would be present in a pasture.

This alternative is expected to provide for periodic growing season rest which could allow the plant community to trend towards or maintain the DPC objectives. Habitat for desert tortoise could be enhanced as plants that provide thermal cover and concealment from predators become more common. During severe to exceptional drought periods livestock could be spread into all pastures. Tortoise habitat may be slower to recover following drought as a result of no growing season rest during these times.

Because desert tortoise and livestock have similar diets and consume the same key species, forage competition could still be present. Initially there would be approximately 123 fewer head of cattle compared to the current situation (578 AUs to 455 AUs).

Under Alternative 1, cattle are not expected to be present in every pasture for every year in all seasons. This should reduce potential forage competition between the desert tortoise and livestock in those years when livestock are not present compared to the No Action Alternative. Spring and summer are the seasons when desert tortoise are most active. In the West Unit, cattle would be out of the pastures 1.5 to 2 years out of 4 years during the spring or summer growing seasons, and in the Twin Mills Pasture 4 of 4 years during the spring and summer. In the East Unit, cattle would be out of the pastures 4.5 to 5.5 years out of 9 years during the spring or summer growing seasons. Forage competition would be reduced during those years with spring and or summer deferment. When pastures are scheduled for grazing in the spring and summer, livestock would be present and concentrated during the desert tortoise active season and competition for forage during these times may occur. This forage competition could be mitigated by the lower use limits on key species in the Joint Use Area. Outside the Joint Use Area the use limits remain the same as the current situation. The proposed grazing rotation system, lower stocking rate, and adaptive management actions are expected to help mitigate potential competition for forage between livestock and desert tortoises.

Ephemeral grazing could be authorized during years of abundant ephemeral forage production. When authorized, cattle grazing could occur in any pasture including Twin Mills outside of the scheduled rotation. Forage competition could occur during these times but is expected to be mitigated by the sheer amount of forage available to desert tortoise and ungulates, because 280 pounds per acre of ephemeral forage needs to be present in desert tortoise habitat before allowing the turnout of livestock.

New water developments are expected to reduce overall grazing pressure in a pasture, but they could move cattle into areas not previously grazed or only lightly grazed by cattle. This could reduce the amount and availability of forage for desert tortoise. An increase in the acreage of loafing around new water developments could decrease the amount of forage and cover available for desert tortoise in these areas compared with the current situation. During these activities desert tortoise could be unintentionally harmed or killed.

Impacts to tortoise from the placement of cattleguards is expected to be negligible as cattleguards would be designed to prevent the entrapment of desert tortoise.

Bighorn Sheep

Initially there would be approximately 123 fewer head of cattle compared to the current situation (578 AUs to 455 AUs). The proposed grazing rotation system and lower stocking rate could help to mitigate potential competition for forage and water between livestock and bighorn sheep during periods when livestock are not in the Twin Mills, Squaw Pocket, or Lost Cabin pastures. However, when livestock are in these pastures they are expected to be more concentrated than they are under the current situation and competition for forage and space could increase during these periods. During these times, bighorn sheep may remain more vigilant and restrict their movements and habitat use to the steeper slopes. Potential competition for forage and space between bighorn sheep and cattle is likely to be greater than under Alternative 2 because vegetation utilization levels and stocking rates could be higher.

The proposed grazing rotation system, lower stocking rate, and adaptive management actions are expected to mitigate potential competition for forage between livestock and bighorn sheep. Impacts to bighorn sheep are expected to be less when compared to Alternative 3 because meeting or sustaining DPC objectives is expected to improve the quality of habitat for bighorn sheep, providing them with food and cover to meet habitat needs. During severe to exceptional drought periods livestock could be spread into all pastures. Bighorn sheep habitat may be slower to recover following drought as a result of no growing season rest during these times.

Contact between bighorn sheep and cattle is expected to increase at new water developments located in bighorn sheep habitat. New water developments could reduce overall grazing pressure in a pasture. Cattle could be moved into areas previously or lightly grazed, thereby increasing contact between cattle and bighorn sheep. Potential competition for forage is expected to increase in these areas. Developing new waters (well W2, Map 4) or extending the Lost Cabin pipeline in bighorn sheep habitat is expected to increase contact and could cause conflict between cattle and bighorn sheep and may also increase forage competition. Livestock are expected to loaf at the new water development and more intensively graze vegetation within a 0.5 to 1 mile radius around the water. Bighorn sheep may avoid these areas when livestock are present thereby reducing their foraging opportunities.

Special Status Species, Migratory Birds, and General Wildlife

Implementing the proposed deferred grazing system on these allotments to achieve or maintain the DPC objectives is expected to improve the ecological condition of the allotments (see Sections 4.3.2.10 Vegetation (Upland) and 4.3.2.7 Riparian discussions) as well as provide for the habitat needs (i.e., forage, cover, nesting sites, and shelter) of wildlife including special status species and migratory birds. The recovery of areas not currently meeting objectives may be slower under Alternative 1 compared to Alternative 2 as use limits and stocking rate are higher under this alternative and growing season rest would be less. This alternative is designed to maintain or make progress toward meeting Standard 3, and

it is anticipated that wildlife, sensitive species, and migratory bird habitats would improve or be sustained for most species.

Periodic rest from livestock grazing during the spring and summer growing seasons and winter use of the Twin Mills Pasture is expected to improve the frequency, cover, and productivity of key species (e.g., bush muhly and big galleta), consequently improving habitat for those species of wildlife that use these plants for cover and foraging. During severe to exceptional drought periods livestock could be spread into all pastures. Wildlife habitat may be slower to recover following drought as a result of no growing season rest during these times.

Maintaining or improving key species productivity, cover, and meeting the DPC objectives may improve habitat for insects; thus, indirectly maintaining or improve foraging conditions for bats, Le Conte's thrashers, Birds of Conservation Concern, and other migratory birds. This alternative would not affect the roosting sites (caves, cliffs, mines, rocky areas) of bats.

During the migratory bird breeding season, grazing could result in the destruction of nests of ground nesting bird species; however, cattle may not be present every year in every pasture. During periods of deferment contact between livestock and nesting birds is expected to be reduced. However, an increase in contact could occur in those years when grazing is scheduled during the breeding season. Ground nests could potentially be trampled during those times. The risk of nest trampling by cattle may increase compared to the existing situation because cattle could be more concentrated. This alternative is designed to provide sufficient seed production for seed eating species and adequate forage for insects, which are important prey species to bats and many birds, reptiles, and small mammals.

Keeping waters operating on public land yearlong, even when livestock are not in the pasture, would provide wildlife with year-round water. Those species that are more water dependent, such as mule deer, bighorn sheep, and Gambel's quail, could continue to use an area after livestock have moved. However, if gates are closed to prevent livestock use of waters, some of the watering facilities would become unavailable to larger animals (mule deer and bighorn sheep). Some of the current watering facilities are not designed with wildlife friendly fencing standards.

Construction and maintenance of the proposed range improvements could cause a temporary disturbance to wildlife. This disturbance is not expected to occur for more than a week in any one area. These activities would cease at night allowing wildlife access to water. Fences can form barriers to wildlife movement, but this would be mitigated by constructing new fences and fence reconstruction as proposed in a wildlife friendly manner. The fence design allows big game to cross the fences without injury. The design also helps to reduce the vulnerability of big game to predation as escape is easier with this design. Other smaller wildlife would be able to easily cross under the fence lines.

Alternative 1 increases the amount of acreage that could be impacted by cattle loafing near new waters and could reduce the habitat productivity of these areas for migratory birds and general wildlife.

Western Burrowing Owl

Literature discusses a direct relationship with grasslands, livestock grazing, and burrowing owls (Corman and Wise-Gervais 2005). The relationship however also notes an association with prairie dog towns and the close cropped vegetation that occurs in such areas. CQFM does not have prairie dog habitat; however, the lower stocking rate and utilization limits would allow key species to reach a taller growth form, possibly reducing the habitat feature of short vegetation that burrowing owls prefer. In the more

arid West Unit portion of the allotments, naturally wider plant spacing would mitigate the taller growth form of the vegetation.

Golden Eagle and Peregrine Falcon

Livestock grazing is not expected to affect the nesting locations of these two species because their nests are found on inaccessible cliff faces. These species forage over large areas, and livestock grazing is unlikely to affect the amount of available prey (rabbits and birds).

Two-colored Beardtongue

Two-colored beard tongue plants may be grazed and trampled when livestock are present. It is anticipated that periodic growing season rest would help to mitigate these effects by allowing this species to grow unhindered during these times. During severe to exceptional drought periods livestock would be spread into all pastures.

Alternative 2 Reduced Permitted Use Alternative

Sonoran Desert Tortoise

With scheduled growing season deferment and the closure of the Twin Mills Pasture, it is expected that desert tortoise food plants, thermal cover, shelter site cover, and plant cover for concealment from predators would increase at a faster rate compared to the current situation and to Alternative 1. Livestock numbers would range from 252 to 341 fewer AUs compared to Alternative 1 Proposed Action (455 AUs - 203 AUs = 252 AUs) and Alternative 3 No Action (578AUs - 237AUs = 341). Fewer cattle could reduce forage competition between livestock and desert tortoise compared to the current situation and Alternative 1 because of the lower stocking rate and reduced utilization levels.

Annual grasses and forbs provide forage for desert tortoise, even after the vegetation dries out in the summer (Van Devender 2002). Ephemeral permits for grazing on annual plants are not be authorized during the next 10 years while the perennial plant communities regain their ecological health (i.e., to meet the Rangeland Health Standards (USDI BLM 1997)). During this time, any forage competition between desert tortoise and livestock for ephemeral vegetation would likely be eliminated.

At times livestock may be grazing in desert tortoise habitat during the desert tortoise active seasons; however, with the adjusted seasons of use, cattle grazing during the spring and summer growing seasons are expected to be limited to one year out of three. During the grazing of these pastures competition for forage could occur between desert tortoise and livestock; however, utilization limits on key species is expected to be in line with what is generally recommended in the scientific literature (25–40% use of current year's growth) (Holechek et al. 2001a). Therefore, forage is expected to be available for desert tortoises once livestock are moved to a different pasture. By meeting the DPC objectives for each of the key areas and Standard 3 in the pastures where Sonoran desert tortoise habitat is found the dietary needs of the desert tortoise could be met.

In the long-term, once DPC objectives are met in the Twin Mills Pasture, cattle grazing is expected to resume under a deferred grazing strategy that consists of conservative use limits and a low stocking rate. The conservative use limits and low stocking rate should reduce the potential for forage competition between cattle and desert tortoise.

The risk of tortoise being crushed or their burrows being collapsed is expected to increase when livestock are concentrated in a single pasture compared to the current situation where livestock are spread out over a larger area. However, fewer cattle means fewer potential encounters between cattle and desert tortoise. In the rocky habitats of the Twin Mills, Sugarloaf, and Highway pastures the majority of burrows would be in drainage cutbanks or under boulders and therefore, unlikely to be crushed.

The maintenance or reconstruction of fences in desert tortoise habitat is expected to be conducted from existing roads, on foot, or on horseback where road access is not available. Maintenance or reconstruction in this manner should reduce the danger of desert tortoise being run over by vehicles. During livestock management activities, desert tortoise could be unintentionally harmed or killed. Impacts to desert tortoise from the placement of cattleguards is expected to be negligible as cattleguards would be designed to prevent the entrapment of tortoise.

Bighorn Sheep

Impacts to bighorn sheep are similar to Alternative 1 but smaller in nature because 341 less AUs (578 - 237 AUs) would be grazing under this Alternative thus allowing for a reduction in potential forage competition. Avoidance of cattle by bighorn sheep is expected to be reduced by the lower grazing numbers.

Potential competition with livestock would also be mitigated by implementing the rotation system, lowering the stocking rate, lowering use limits set on the key species, maintaining or achieving the Rangeland Health Standards (USDI BLM 1997) at the key areas, and closing the Twin Mills Pasture. This would reduce competition for forage and space as compared to Alternatives 1 and 3. Achieving Rangeland Health Standards (USDI BLM 1997) is expected to result in the vegetation communities reaching and sustaining the DPC objectives. Forage quality and quantity is expected to increase for bighorn sheep compared to the current situation and to the Proposed Action.

The proposed fence realignment and fence extension is not expected to impede crossing by bighorn sheep as these fences would be built using fence specifications designed to allow bighorn sheep to cross. Bighorn sheep are expected to move from the area while range improvements are being maintained or constructed.

Special Status Species, Migratory Birds, and General Wildlife

Implementing the proposed deferred grazing system to achieve or sustain the DPC objectives is expected to improve the ecological condition of the allotments (see Sections 4.3.2.10 Vegetation (Upland) and 4.3.2.7 Riparian) which is expected to provide for habitat needs (i.e., forage, cover, nesting sites, and shelter) of wildlife including bats, special status species, and migratory birds. Compared to Alternatives 1 and 3, the more frequent spring and summer growing season rest, the closing of the Twin Mills Pasture, and lower stocking rates and utilization limits is expected to more quickly improve the rangelands. Increasing the frequency, cover, and productivity of key species such as bush muhly and big galleta, would subsequently improve habitat for those species of wildlife that use these plants for cover and foraging.

Western Burrowing Owl

Impacts to the western burrowing owl are similar to Alternative 1, except under Alternative 2 recovery of vegetation is expected to occur at a more rapid rate, and the short vegetation that owls prefer would be less abundant than under Alternative 1. Compared to Alternative 3, this alternative may increase the

quality of habitat on the allotments. The western burrowing owl prefers more open conditions like those that currently exist under Alternative 3.

Golden Eagle and Peregrine Falcon

Livestock grazing is not expected to affect the nesting locations of these two species because their nests are found on inaccessible cliff faces. These species forage over large areas, and livestock grazing is unlikely to affect the amount of available prey (rabbits and birds).

Two-colored Beardtongue

Similar impacts as Alternative 1, however, the lower stocking rate, lower use limits, and increased periods of growing season rest would decrease the potential for livestock to graze or trample this species.

Alternative 3 No Action Alternative

Sonoran Desert Tortoise

Continuing with the higher stocking rates and use limits, compared to Alternatives 1 and 2, could allow livestock to consume a greater amount of forage potentially reducing the amount of forage and vegetation ground cover available to desert tortoise. Impacts to desert tortoise are expected to be greatest around cattle concentration areas, such as cattle troughs, salt and mineral blocks etc., where vegetation receives the heaviest use.

Bighorn Sheep

Key forage species at key areas not meeting Standard 3 could continue to decline in frequency. Consequently, the quality forage available to bighorn sheep as well as perennial vegetation cover may be reduced. The higher stocking rate and utilization limits may potentially increase forage competition between livestock and bighorn sheep. Impacts to bighorn sheep could be greatest around cattle concentration areas, such as troughs, salt/mineral blocks etc., where vegetation receives heavy use.

Special Status Species, Migratory Birds, and General Wildlife

Under this alternative, Standard 3 is expected to decline further at some of the key areas. This could affect special status species (e.g., bats and Le Conte's thrasher), Birds of Conservation Concern and other migratory birds, and general wildlife by changing plant community composition, cover, frequency, and function (see Section 4.3.2.10, Vegetation). The key forage species at key areas not meeting Standard 3 could continue to decline in frequency. Consequently, the quality forage available to native herbivores (e.g., mule deer) as well perennial vegetation cover may be reduced. This could impact those species dependent on ground cover for protection, food, thermal cover, and breeding sites (e.g., ground nesting birds, burrowing rodents, etc.).

The risk of nest trampling by cattle could decrease under Alternative 3 because cattle would not be as concentrated as under Alternatives 1. The grazing permittee could continue to keep water on in all pastures which could provide wildlife with year-round water and allow those species that are more water dependent, such as mule deer, to continue to utilize an area.

Western Burrowing Owl

Habitat quality for the western burrowing owl is expected to remain the same under the No Action Alternative. This species is associated with flat, open, sparsely vegetated areas. Areas with these characteristics are not uncommon in some areas of the CQFM Allotments.

Golden Eagle and Peregrine Falcon

Livestock grazing is not expected to affect the nesting locations of these two species because their nests are found on inaccessible cliff faces. These species forage over large areas, and livestock grazing is unlikely to affect the amount of available prey (rabbits and birds).

Two-colored Beardtongue

Higher stocking rates and use limits under the No Action Alternative could result in the potential for greater use of this plant by livestock.

Alternative 4 No Grazing Alternative

Total removal of cattle from all of the allotments would maintain or facilitate progress towards meeting Rangeland Health Standards (USDI BLM 1997). Wildlife habitat would improve or be sustained for most species as described above under Alternatives 1 and 2, but at a quicker rate. Recovery of vegetation is expected within two decades as compared to two or more decades under Alternatives 1 and 2. Upland areas could provide adequate habitat or have the ecological processes in place that would allow for the development of adequate habitat for desert tortoise, bighorn sheep, special status species, migratory birds, and general wildlife within two decades as compared to Alternatives 1 and 2. Competition for forage would not occur between livestock and wildlife, and the risk of livestock stepping on desert tortoise or collapsing burrows would be eliminated.

Waters on public and private lands maintained by the permittee potentially could be turned off, and more water dependent species, such as mule deer and Gambel's quail, could be more restricted in their use of CQFM Allotments as a result of less water availability. It is possible that BLM, other agencies, or private entities could take over maintenance of the public waters for year-round use.

Cumulative Effects

Livestock grazing as stated in Alternative 3: The No Action , Current Condition Alternative, in combination with other identified actions have altered and could continue to alter upland vegetation composition, cover, and densities which may reduce suitable habitat for wildlife. Livestock grazing under Alternative 3, in combination with future recreational activities may further contribute to wildlife habitat fragmentation, habitat loss, alteration of travel corridors, and other disturbances caused by wildlife/human interactions. However, livestock grazing is not expected to adversely impact the viability of the wildlife populations.

Management under a new grazing system, as proposed in Alternatives 1, 2, and 4, could reduce many impacts by sustaining or improving the frequency, cover, and composition of key plant species and other palatable plant species. Alternatives 1, 2, and 4 all have the potential to provide improvements in habitat that are expected to yield long-term positive cumulative impacts to wildlife throughout each of the allotments. The improved vegetative conditions over the long-term with Alternatives 1, 2, and 4 is expected to indirectly benefit wildlife, migratory birds, and most special status species by providing cover, forage, shelter, and nesting sites.

Increased off-highway vehicle use may have an adverse effect on wildlife in the allotments by increasing habitat fragmentation, destroying suitable habitat, and decreasing the ability of the habitat to maintain long-term population numbers. Increased disturbance by off-highway vehicle users could concentrate wildlife in isolated areas and could result in decreased productivity or habitat impacts.

4.1.3 **LIST OF PREPARERS**

William Boyett	Project Manager
Victoria Anne	NEPA, Planning and Environmental Coordinator
Chad Benson	Wild Horse and Burro Specialist
Michael Blanton	Range Management Specialist
Donald McClure	Assistant Field Manager
Ramone McCoy	Outdoor Recreation Planner, Wilderness Specialist
Sally Oliveri	GIS Specialist
Rebecca Peck	Wildlife Biologist
Wade Reaves	Fire Ecologist
Karen Reichhardt	Project Manager
Julie Suhr Pierce Ph.D	Socioeconomic Specialist
Timothy Watkins	Archaeologist

Resource Advisory Committee Subcommittee Affiliates	
Interest	**Member**
Subcommittee Chair	Doug Traub, Resource Advisory Committee
Subcommittee Co-chair	Dawn Hubbs, Resource Advisory Committee
Private Property Rights	Patrick Bray, AZ Cattle growers
Wildlife/Hunting	Gunnar Erickson, AZ Game and Fish Department Dee Kephardt (later in process)
Ranching	Clay Overson, Mojave Livestock Association
Business/Economics	Gary Watson, Mojave County Supervisor
Conservation	Jack Ehrhardt, Local Sustainability Representative
Vegetation/Soils	Anita Waite, Cane Springs Ranch

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5.2 List of Acronyms and Abbreviations Used in this EA

ACEC	Area of Critical Environmental concern
AZGFD	Arizona Game and Fish Department
AML	Appropriate Management Level
AMP	Allotment Management Plan
AU	Animal Unit
AUM	Animal Unit Month
BLM	Bureau of Land Management
BMEMP	Black Mountain Ecosystem Management Plan
CFR	Code of Federal Regulations
CQFM	Cerbat, Quail Springs and Fort MacEwen Allotments
DOI	Department of the Interior
DPC	Desired Plant Community
EA	Environmental Assessment
EIS	Environmental Impact Statement
HA	Herd Area
HMA	Herd Management Area
I	Improve
KFO	Kingman Field Office
LMNRA	Lake Mead National Recreation Area
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
NRCS	Natural Resources Conservation Service
PM	Particulate Matter
p.z.	Precipitation Zone
RAC	Resource Advisory Committee
RMP	Resource Management Plan
USDA	United States Department of Agriculture
USC	United States Code

6 APPENDICES

Appendix A. List of Common and Scientific Names of Plants

Table A-1. Common and scientific names of plants by growth form.

Common Name	Scientific Name
Grasses	
3-Awn	*Aristida* sp.
Big galleta	*Pleuraphis rigida (Hilaria rigida)*
Black grama	*Bouteloua eripoda*
Bush muhly	*Muhlenbergia porteri*
Cheatgrass	*Bromus tectorum*
Desert needle grass	*Stipa speciosa*
Muttongrass	*Poa fendleriana*
Red brome	*Bromus rubens*
Sideoats grama	*Bouteloua curtipendula*
Shrubs and Trees	
Bladdersage	*Salazaria mexicana*
Turbinella oak	*Quercus turbinella*
Catclaw acacia	*Acacia greggii*
Cheeseweed	*Hymenoclea salsola*
Chuckwalla's delight	*Bebbia juncia*
Desert rock-pea	*Lotus rigidus*
Flat-top buckwheat	*Eriogonum fasiculatum*
Globemallow	*Sphaeralcea ambigua*
Greythorn	*Zizyphus obtusifolia*
Mesquite	*Prosopis velutina*
Mormon tea	*Ephedra nevadensis*
Menodora	*Menodora scabra*
Range ratany	*Krameria parviflora*
Shrubby buckwheat	*Eriogonum wrightii*
Winterfat	*Eurotia lanata*
White bursage	*Ambrosia dumosa*
White-stem paperflower	*Psilostrophe cooperi*
White ratany	*Krameria grayii*
Wolfberry	Lycium *andersonii*
Wooly-fruited bursage	*Ambrosia eriocentra*
Forbs	
Two-colored beard tongue	*Penstemon bicolor roseus*
Malta starthistle	*Centaurea melitensis*
Puncture vine	*Tribulus terrestris*
Mediterranean grass	*Schismus barbatus*

Appendix B. Desired Plant Community Objectives

DPC objectives were developed in the CQFM Rangeland Health Evaluation (USDI BLM 2010) for each key area to establish the criteria for meeting Standard 3 of the Arizona Standards for Rangeland Health (USDI BLM 1997). The composition objectives were developed based on the site potential described in the ecological site guides developed by the NRCS, measured field observations, and professional judgment (Page 17 of Rangeland Health Evaluation). The DPC objectives were only established for key forage species because these are the species that have a clear cause and effect relationship with cattle grazing. Key species are those that serve as indicators of change in the community since it is unfeasible to establish objectives for every species in a community (Coulloudon et al.1999).

At key areas, cover is collected by the following groupings: herbaceous perennial, woody perennial, cryptogam (biological soil crusts), litter, rock, gravel, and bare ground. Cover objectives are for total perennial cover (basal and canopy) by species and are based on long-term cover data. Composition by weight is collected for all perennial plant species encountered. An assumption is made that proper management of the key species provides for the physiological requirements of the other desirable species on the allotments that are not specifically monitored.

Table B-1. Desired plant community objectives for Cerbat Allotment.

Allotment Name	Key Area	ESD Name	Key Species	Composition Objective	Cover Objective*
Cerbat	1	Sandy Loam Upland 10-13" p.z.	Big galleta Black grama Bush muhly 3-Awn	26 to 47%	20 to 30%
			Flat-top buckwheat Mormon tea Range ratany Bladdersage	3 to 12%	
Cerbat	2	Granitic Hills 10 to 13" p.z.	Big galleta Black grama Desert needle grass 3-Awn	17 to 33%	25 to 35%
			Flat-top buckwheat Mormon tea Range ratany Bladdersage	31 to 45%	
Cerbat	3	Granitic Hills 10 to 13" p.z.	Black grama Desert needle grass 3-Awn	17 to 33%	25 to 35%
			Flat-top buckwheat Buck brush	31 to 45%	
Cerbat	17	Clay Loam Upland 10-13" p.z.	Big galleta Black grama Bush muhly	22 to 38%	10 to 20%
			Flat-top buckwheat Mormon tea Range ratany	11 to 23%	
			Flat-top buckwheat Mormon tea Range ratany	2 to 9%	

*Maintain total (basal and canopy) live perennial vegetative cover

Table B-2. Desired plant community objectives for Quail Springs Allotment.

Allotment Name	Key Area	ESD Name	Key Species	Composition Objective	Cover Objective*
Quail Springs	5	Clay Loam Upland 10-13" p.z.	Big galleta Black grama Bush muhly	22 to 38%	10 to 20%
			Wolfberry Mormon tea Winter fat White-stem paperflower	1 to 12%	
Quail Springs	6	Clay Loam Upland 10-13" p.z.	Big galleta Black grama Bush muhly	21 to 35%	10 to 20%
			Wolfberry Mormon tea Winter fat White-stem paperflower	2 to 6%	
Quail Springs (within Joint Use Area)	8	Basalt Hills 10-13" p.z.	Big galleta Desert needle grass 3-Awn	9 to 24%	10 to 20%
			Flat-top buckwheat Mormon tea Range ratany Bladdersage Wolfberry	17 to 43%	
Quail Springs	9	Sandy Loam Upland 10-13" p.z.	Big galleta Black grama	20 to 35%	20 to 30%
			Flat-top buckwheat Mormon tea Range ratany Bladdersage	3 to 12%	
Quail Springs Allotment	10	Granitic Hills 10-13" p.z.	Black grama Sideoats grama Desert needle grass 3-Awn Bush muhly	17 to 38%	25 to 35%
			Flat-top buckwheat Menodora Buck brush	30 to 45%	
Quail Springs	14	Granitic Hills 10-13" p.z.	Sideoats grama Desert needle grass Black grama 3-Awn	16 to 33%	20 to 40%
			Flat-top buckwheat Shrubby buckwheat Mormon tea Range ratany Bladdersage	31 to 45%	
Quail Springs	15	Sandy Loam Upland 10-13" p.z.	Big galleta Black grama	20 to 35%	20 to 40%

*Maintain total (basal and canopy) live perennial vegetative cover

Table B-3. Desired plant community objectives for Fort MacEwen Allotment.

Allotment Name	Key Area	ESD Name	Key Species	Composition Objective	Cover Objective*
Fort MacEwen (within Joint Use Area)	11	Basalt Hills 6 to10" p.z.	Big galleta Bush muhly 3-Awn	15 to 8%	20 to 30%
			Flat-top buckwheat White ratany Range ratany	3 to 15%	
Fort MacEwen	12	Sandy Loam Upland 10-13" p.z.	Big galleta	1 to 5%	10 to 20%
			Flat-top buckwheat Mormon tea Range ratany	3 to 15%	
Fort MacEwen	13	Sandy Loam Upland 10-13" p.z.	Big galleta	1 to 5%	10 to 20%
			Flat-top buckwheat Mormon tea Range ratany	2 to10%	
Fort MacEwen (within Joint Use Area)	18	Basalt Hills 10-13" p.z.	Muttongrass Big galleta 3-Awn	2 to 10%	10 to 20%
			Shrubby buckwheat Flat-top buckwheat Mormon tea Range ratany Bladdersage	17 to 35%	
Fort MacEwen (within Joint Use Area)	20	Limy Hills 10-13" p.z.	Big galleta 3-Awn	10 to 15%	15 to 20%
			Mormon tea Range ratany	6 to 15%	
Fort MacEwen (aka Lost Cabin Spring located in Squaw Pocket Pasture within Joint Use Area)	21	Sandy Loam Upland 10-13" p.z.	Bush muhly Big galleta	2 to 10%	10 to 20%

*Maintain total (basal and canopy) live perennial vegetative cover

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