U.S. Fish and Wildlife Service

Bitter Creek National Wildlife Refuge Proposed Habitat Management and Restoration Plan

Environmental Assessment, Compatibility Determination

ENVIRONMENTAL ASSESSMENT

for

Grassland Habitat Management and Restoration

Bitter Creek National Wildlife Refuge
Hopper Mountain National Wildlife Refuge Complex
Kern County, California

30 September 2008
Comment Due Date
All comments must be received by the contact person below on or before this date.

31 March 2008
Date

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Abstract

This environmental assessment evaluates the impact of the proposed action and the alternatives for managing approximately 9,400 acres of grassland on the Bitter Creek National Wildlife Refuge, which is part of the Hopper Mountain National Wildlife Refuge Complex: California Condor Recovery Program. This assessment is consistent with the mission of the U.S. Fish and Wildlife Service, the purposes and goals of the Refuge, and with applicable federal and state statutes and regulations. The preferred alternative would implement a seasonal grazing regimen with supplementary mowing, herbicide application, and periodical prescribed burning to reduce non-native vegetation. The preferred alternative would promote the establishment of native plants and enhance the habitat for native species, with a special emphasis on threatened and endangered species and species of concern.

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Introduction

Section 1: PURPOSE AND NEED FOR ACTION

1.1 Introduction and Background

Bitter Creek National Wildlife Refuge (Refuge) is located approximately ten miles southwest of the town of Maricopa in the arid foothills of southwestern Kern County, California. Although initial acquisition began in 1985, most of the Refuge's acreage was acquired in 1986. The Refuge encompasses approximately 14,095 acres. This Environmental Assessment covers 9,400 acres of grassland habitat found on the refuge.

Acting under the authority of the Endangered Species Act and the Land and Water Conservation Act, the former Hudson Ranch and adjoining properties were acquired by the U. S. Fish and Wildlife Service (Service) to conserve plants and wildlife listed as endangered species or threatened species. Although the Refuge provides habitat for many listed species, the primary goal for the establishment of the Refuge was to preserve essential foraging and roosting habitat for the California condor (*Gymnogyps californianus*), a species that received a priority objective in the Region in 1975 (USFWF 1975). The Bitter Creek National Wildlife Refuge was categorized as an essential foraging habitat in the original Biological Assessment for establishment of the refuge (Lawrence 1983).

The Refuge is located in the northern reaches of the Transverse Range, an ecologically diverse region where the Coast Ranges, Sierra Nevada mountains, western Mojave Desert, and San Joaquin Valley converge. The Refuge is described as an integral link in the chain of unique habitats that create a vital corridor for wildlife from the deserts of the Mojave to the Pacific Ocean. Bitter Creek canyon and surrounding lands serve as an important part of California's natural heritage.

The habitat on the Refuge is primarily annual grassland and varies in elevation from 1,600 to 4,680 feet above sea level. The Refuge's most notable feature is the steep Bitter Creek Canyon. Historically, this area was used as a cattle ranch and also used extensively by wild condors before their captivity. Bordered on the south by the U.S. Forest Service's Los Padres National Forest (LPNF), interest in acquiring the Refuge property was initiated when plans to subdivide the area were made public. It was feared that substantial development and the associated increase in human activity would not be compatible with the condors' use of the area.

In addition to providing historical roosting and foraging habitat for condors, the Refuge is also used extensively by several species of raptors including golden eagles (*Aguila chrysaetos*), red-tailed hawks (*Buteo jamaicensis*), northern harriers (*Circus cyaneus*), American kestrels (*Falco sparverius*), Cooper's hawks (*Accipiter cooperii*), and prairie falcons (*Falco mexicanus*). Mammals include mule deer (*Odocoileus hemionus*), pronghorn antelope (*Antilocapra americana*), tule elk (*Cervus nannodes*), mountain lion (*Felis concolor*), bobcat (*Lynx rufus*), coyote (*Canis latrans*), badger (*Taxidea taxus*), endangered San Joaquin kit fox (*Vulpes*

macrotis), grey fox (*Urocyon cinereoargenteus*), spotted skunk (*Spilogale putorius*), raccoon (*Procyon lotor*), kangaroo rats (*Dipodomys* sp.), and numerous other native rodent species. Among the reptiles found on the Refuge are western fence lizard (*Sceloporus occidentalis*), gopher snake (*Pituophis melanoleucus*), and the endangered blunt-nose leopard lizard (*Gambelia silus*). Native flora found on the Refuge are the California sagebrush (*Artemisia californica*), goldenbush (*Haplopappus linearifolius*), pine bluegrass (*Poa scabrella*), yellow wallflower (*Erysimum maniliforme*), golden poppy (*Eschscholzia californica*) and several other species. For a comprehensive list of native species see Appendix B.

Historically, the Refuge landscape experienced natural disturbances such as periodic wildfire and ungulate grazing. The Bitter Creek area was first subject to minor anthropogenic changes when Native Americans utilized the area seasonally and backfired annually upon their departure. Severe landscape modifications began with the arrival of Spanish settlers who simultaneously introduced large numbers of livestock (e.g. cattle, horses, and sheep) and Mediterranean grasses and forbs. As the surrounding landscape was converted to agricultural land and urban developments, the Refuge was intermittently grazed by livestock, and certain areas were converted to cropland. After purchasing the Refuge in 1985, the Service allowed grazing to continue. From 1985 to 1995, the Refuge was managed as part of the Kern National Wildlife Refuge Complex. Management activities were limited to oversight and adjustment of the grazing program, and clean up and the monitoring of species and habitats. The Hopper Mountain National Wildlife Refuge Complex (Complex) took over management of the Refuge in 1995, with continued oversight and modification of the grazing program, limited herbicide application, monitoring for the presence of native species, and other habitat management activities (including installation of permanent fencing around riparian and designated sensitive areas). In order to better serve the mission of the Service and to accomplish the purposes for the initial establishment of the Refuge, modifications to the current grazing practices are desired.

1.1.1 Relationship to Other Refuge Plans

Recovery Plan for California Condor 1975 (1996)
Recovery Plan for Upland Species of the San Joaquin Valley, California. 1998
Environmental Assessment for Hudson Ranch 1984
BCNWR: Wildland Fire Management Plan 2001- 2006
BCNWR Grazing Program Review 1996
EA for Grassland Habitat Management and Restoration 2006
Compatibility Determination Grazing 2006

1.2 Purpose and Need for the Proposed Action

The purpose of this environmental assessment (EA) is to evaluate alternatives for restoring and sustaining a healthy grassland ecosystem that will further the objectives listed below. With the National Wildlife Refuge System Administration Act of 1966, the National Wildlife Refuge

System Improvement Act of 1997, and Refuge Manual mandates, and policies associated with compatibility and biological integrity, diversity, and environmental health.

Planning Goals:

- Protect and restore refuge grasslands to historic conditions to support pre-settlement abundance and diversity of grassland-dependent special status species.
- Provide optimal feeding habitat for the endangered California condor as required by the refuge purpose.
- Further the goals of the recovery of the California condor.
- Contribute to the restoration of natural species diversity of upland species in grassland habitats of the San Joaquin Valley, California.
- Restore the integrity and environmental health of the Bitter Creek watersheds to improve water quality for wildlife.

Objectives for Grassland Habitat Management and Restoration

- Within a year of implementation of the selected alternative, conduct a baseline inventory of plant species in grassland habitats on the refuge to determine the existing composition and relative abundance.
- Over the next five years, starting from implementation of the selected alternative, reduce and maintain biomass of residual dry matter (RDM; the amount of old plant material left on the ground at the beginning of a new growing season) to 1000 lbs per acre in upland grasslands, in order to improve and maintain habitat for the special status species and secondarily to minimize hazardous fuel conditions.
- Restore a healthy native southern California grassland ecosystem by enhancing native plants and animals through reduction of exotic cool season grasses and non-native invasive species.
- Maintain and possibly enhance biodiversity and genetic diversity. Starting from the implementation of the selected alternative, over the next 10 years, increase the percent cover of native upland plant species by 15 % and maintain or increase richness of native species, including vascular plants, to help restore the historic community structure of the upland grassland.
- Within three years of implementation of the selected alternative, increase riparian surface areas, depth, and inundation (flooding) time by 10 to 15 percent to enhance riparian ecosystem function (e.g. hydrologic processes, nutrient cycling).
- Starting from the implementation of the selected alternative, reduce the cover of invasive weeds to less than 10% throughout the Refuge over the next 10 years to restore biologic integrity to the area.
- Monitor adverse impacts and benefits of the habitat management and restoration program.

Since the acquisition of lands within the Refuge, the Service progressively modified the grazing program in an effort to support the recovery of the California condor. The initial purpose for

maintaining grazing on the Refuge was to provide a food source for the California condors (cattle dying on the refuge). However, this practice has not been effective in providing adequate forage for condors (USFWS 1996). In 1996, following a review of the grazing program, the Service made a decision to encourage, enhance, and provide a healthy habitat for native wildlife, including native ungulates (USFWS 1996). A healthy native wildlife population would provide a natural food source for condors and contribute to the long-term survival of the California condor. The California condors in the wild are supplementally fed still born calves, which is a clean (non-contaminated) source of food for the endangered species.

Shifts in species composition on the Refuge is the result of complex interactions of several variables including current and historical land use patterns, the abiotic environment, and annual climatic variation. In addition, the historical expansion of European annual grass species and non-native invasive species coincides with the introduction of livestock grazing and agriculture (Bartolome et.al 1980, Elstein 2004, Harrison 1999, Jackson 1985, McNaughton 1968). High productivity of non-native annual grasses has produced high levels of plant biomass (Germano et al 1997). Natural processes are not capable of reducing this excessive biomass which accumulates as litter (dead plant material left at the end of the growing season) in upland areas. Litter accumulation has been shown to decrease native plant diversity and abundance by altering competitive dynamics and germination conditions (Bartolome et.al. 2002, Jackson 1985, Kimball and Schiffman 2003). Therefore, without an annual disturbance regime to prevent litter buildup, a healthy native grassland ecosystem can not be maintained. The California condors are dependent on healthy native grassland ecosystems, which provide for natural food sources like tule elk and mule deer.

The need for this project is to restore and sustain a healthy grassland ecosystem that has been degraded by the introduction of non-native European annual grasses. In order to effectively improve upland grassland and enhance habitat for priority species, the Service must modify current management techniques.

1.3 Scoping, Issues, and Development of Alternatives

A comprehensive review of grassland management techniques was conducted to identify potential management strategies that would achieve the habitat goals and objectives defined for the Refuge. Available literature, as well as experts in the field, were consulted in order to identify management concerns relating to the grassland habitat and associated sensitive species. The ideas generated during this preliminary scoping process were later formulated into the action alternatives of this EA.

Scoping primarily consisted of phone conversations and meetings with representatives from conservation and land management agencies, private consultants, and the public. The agencies that were consulted included the Bureau of Land Management, the California Native Grass Association, and the California Department of Fish and Game. U.S. Fish and Wildlife Service fire specialists introduced issues pertaining to prescribed burning in an urban area and proposed mitigation techniques. A formal public scoping meeting concerning the activities covered in this

EA was not held because of the limited scope and intensity of environmental impacts anticipated from each alternative and the lack of anticipated controversy.

Some of the issues raised during the scoping process included:

1. Effect on native species with a special emphasis on threatened and endangered species (T & E Species) and species of concern.

2. The domestic species used for grazing (e.g. sheep, cattle, horses).

3. Managing the land for San Joaquin kit fox, and other umbrella species ensures that habitat is provided for other priority species.

4. Preliminary discussion on prescribed burning and its possible effect on the local community.

5. The precise timing and intensity of the seasonal grazing regime.

These issues, among others, were thoroughly explored and informed the development of the proposed action and its alternatives. Personal Communications Section contains names and addresses of those agencies and individuals who were consulted during the scoping process.

1.4 Decision to be Made

Since the acquisition of Refuge lands in the mid 1980s, management efforts protect special status species and their habitats have focused on specific habitat enhancements. The Refuge is proposing to expand the current duties of management in order to increase the viability and distribution of the special status species and to provide optimal foraging habitat for the California condor. This decision is compatible with the National Wildlife Refuge System's mission.

The analysis in this Environmental Assessment together with public comments will assist, the Service in selecting an alternative that best fulfills the purpose and need for the project.

Section 2: ALTERNATIVES INCLUDING THE PREFERRED ACTION

The following section describes the habitat objectives for the Refuge and the five management alternatives:

Alternatives

Alternative A: Prescribed Year- Round Grazing as Primary Strategy - Secondary Herbicide Application (No Action Alternative)

Alternative B: Prescribed Seasonal Grazing as Primary Strategy - Secondary Mowing and Herbicide Application

Alternative C: Prescribed Burning as Primary Strategy - Secondary Mowing and Herbicide Application
Alternative D: Prescribed Seasonal Grazing as Primary Strategy - Secondary Prescribed Burning, Mowing, and Herbicide Application (Preferred Alternative)

2.1 Alternative A - Prescribed Year-Round Grazing as Primary Strategy B Secondary Herbicide Application (No Action Alternative)

Until October 2005, the Refuge had a year round grazing program in place utilizing a cow/calf operation on approximately 9,200 acres of land. The grazing was authorized pursuant to an annual Special Use Permit (SUP) which was not renewed for Fiscal Year 2006 in order to allow the Service the necessary time to conduct preliminary baseline data surveys and allow sufficient time for the transition. When the SUP was in place lower elevations were grazed during Winter/Spring from December 15 to June 15, alternating with higher elevations from June 15 to December 15. The base herd could not exceed 370 animal units (defines forage consumption on the basis of one standard mature 1,000-pound cow, either dry or with calf up to 6 months old) at any one time, for a maximum of 4,400 animal unit months (the amount (780 pounds) of air-dry forage calculated to meet one animal unit's requirement for one animal unit for one month). See Appendix C for the Special Use Permit specifications. Under the No Action Alternative, the Service would not seek to reissue a grazing permit for this 9,200 acre unit, but instead pursue a Cooperative Land Management Agreement (CLMA) (50 CFR 29.2). A CLMA would be established by and between the Refuge and the livestock cooperator(s). The CLMA would establish a share-in-kind program where the refuge would benefit by meeting the habitat objectives for the benefit of the ecosystem and associated wildlife. The cooperator(s) would be selected, from a list of individuals that indicate a desire to exercise grazing privileges on the Refuge and meet eligibility criteria, under guidelines mandated by the habitat management section of the Refuge Manual (USFWS 1982: 5 RM 17).

In addition, a second permittee grazes two additional refuge units, totaling 240 acres, under an annual Special Use Permit. The refuge units are surrounded by the permittee's private property. A 160 acre parcel known as Unit 4 is grazed by steers from late August to December. Additionally, an 80 acre parcel known as Unit 5 is grazed using a cow/calf operation from May to October. Both units are not properly fenced which allows cattle to move freely between the Refuge lands and private property. Under this alternative the current management approach would remain unchanged, employing an annual Special Use Permit, until it becomes necessary to alter the existing agreement between the private land owner and the Service (6 RM 9.10C (6)). Service regulations would be employed in the event that the existing arrangement would require alteration. See Appendix D for refuge map.

In all the areas of the Refuge as regulated, mowing and herbicide application are used to combat infestations of invasive plant species, specifically yellow star thistle (*Centaurea solstitialis*) (YST). Herbicide application at the Refuge strictly adheres to all label recommendations and is only conducted by a licensed applicator. Additionally, the Refuge follows the National Wildlife Refuge System policy for pesticide use. The herbicide is always applied at the lowest possible pressure and not applied when wind velocity exceeds 5 miles per hour, when vegetation is wet, or when precipitation is occurring or is forecast in the following 24 to 36 hours. No application would occur within an immediate rainfall period. Additional precautions include spraying only target plants, preventing over spraying onto non-target plants, and spraying the targeted plants with backpack units within a quarter mile of sensitive areas. Every effort is made to avoid impact to sensitive plant species by concentrating spray efforts on weed-infested areas, using target specific herbicides (USFWS Pesticide Use Permit: YST 2006).

Biological field monitoring would remain limited to surveys yielding long-term trend information on the following: RDM, tri-colored blackbird nesting, invasive species, California condor utilization, and presence/absence of native wildlife species.

2.2 Alternative B: Prescribed Seasonal Grazing as Primary Strategy B Secondary Mowing and Herbicide Application

This alternative would use seasonal livestock grazing as the primary tool for enhancing the habitat for the priority species. Approximately 9,200 acres would be seasonally grazed in order to achieve the above listed management objectives (Hadlik 2005, Saslow 2005). Secondary management strategies, utilizing mowing and herbicide spraying would also be employed in order to best achieve management objectives.

Livestock would be introduced approximately one month after the first fall rainstorm (generally mid-November). At this time, non-native annual grasses are approximately 3-4 inches tall and palatable to livestock. The timing for moving livestock on and off the grazing units would not be tied to specific dates, but in response to annual vegetation and yearly variation in climate (Murphy 1970). Additionally, grazing intensity (i.e. the number of animal units per acre per month) would depend on annual precipitation. Livestock would be reintroduced during the summer months (mid-June through August) to further reduce RDM, if needed to achieve target levels. The USFWS will use adaptive management to adjust the grazing program (e.g., number of AUMs, turn-in-date, length of grazing season) to ensure that the habitat objectives are met. An annual grazing plan would be developed as a means to identify adaptive management goals for a given year. Only a livestock operator flexible enough to allow for the execution of an adaptive grazing management regimen that is appropriate for the given year's precipitation would be selected as a cooperator. The Refuge would reserve the right to adjust the grazing pressure or remove livestock from the site at any time. The cooperator would be given fourteen days from written notification to comply with modification to the grazing program.

An annual range analysis would be used as a guide to estimate the stocking rate or number of animals per acre for years with average, favorable (wet), and unfavorable (drought) forage

production. The range analysis estimates forage production and the number of animals that can be supported during the prescribed period given the soil type, annual precipitation, temperature, and current forage conditions (George et al 2001). Manipulating grazing intensity annually would preclude the potential negative impacts of over-grazing, such as excessive soil disturbance and trampling of vegetation, small animals, and burrows.

Cattle would be the preferred livestock species because they preferentially forage on annual grasses, which are the target non-native species at the Refuge. Additionally, cattle are locally available and economically feasible. Beef cattle would be the preferred breed, as they tend to disperse well and move relatively far from water sources, minimizing trampling and loafing near sensitive areas. Additionally, strategic placement of watering troughs and salt licks would aid in reducing the time cattle spend loafing around particular areas. This would diminish the chance for cattle excrement to decrease water quality. Livestock would be held in a designated refuge unit for two days to allow for the passage of undesirable seeds prior to grazing on the Refuge (USFWS: Compatibility Determination 2006).

The grazing portion of the habitat management and restoration program would be re-evaluated after three years to determine the effects of cattle on slopes (i.e. stair stepping on slopes), which specifically impact erosion rates. If it is determined that there has been no improvement or a negative impact, sheep would replace cattle in certain areas in order to protect habitat values.

A Cooperative Land Management Agreement (CLMA) would be established by and between the Service and the livestock cooperator, which would establish a share-in-kind program for the benefit of the ecosystem and associated wildlife. The share-in-kind program would ensure that certain capital improvements would continue to be made, including interior fencing, which would better facilitate movement of wildlife while continuing to maintain cattle in appropriate units. Additionally, fencing would be installed to protect riparian and sensitive areas. Further construction work would include the potential modification of the existing water system, which presently limits access and availability to wildlife and removes water resources from the source.

Under this alternative, the 240 acres surrounded by private property, as described prior, could continue to be grazed by the private land owner under the guidance of the Service. In order to maintain consistency, an annual CLMA would be utilized, as described in the Compatibility Determination.

In order to meet the range of management objectives for grassland areas of the Refuge, herbicide would be sprayed on isolated stands of unpalatable invasive species prior to seed set (e.g. yellow star thistle). Herbicide spraying would continue to follow all specifications listed in the annual Pesticide Use Permit. In cases where stands of invasive weeds are especially large or dense, they would be removed using a mower, at the appropriate time of growth.

Under this alternative, all current monitoring procedures would remain in place, but they would be expanded to more accurately and reliably monitor populations of special status species with respect to the proposed management strategy. As funding allows, additional monitoring would

include: 1) upland vegetation composition; 2) species richness and relative cover of native grassland plants and the effects of grazing through qualitative assessment during the grazing season, quantitative measures of RDM following livestock removal, and permanent photo points; 3) distribution of priority invasive species (e.g. yellow star thistle, saltcedar *Tamarix Ramosissima*, Tree of Heaven); 4) natural spring water quantity and quality; and 5) reproductive activity and occurrence of special status species.

2.3 Alternative C: Prescribed Burning as Primary Strategy – Secondary Mowing and Herbicide Application

This alternative would implement prescribed burning as the primary management strategy for reducing RDM and enhancing habitat for special status species. Mowing and herbicide spraying would be used to combat infestations of fast growing invasive species during times when prescribed burns are not possible, namely drought years and the non-burn season. The majority of the upland area would be burned the first year following plan approval. Following the initial fire, prescribed burns on the Refuge would be conducted every three to four years to prevent further litter accumulation and to stimulate native plant growth. Areas dominated by non-native annual grasses and/or invasive weed species would be targeted for burns. Burn sites would be thoroughly surveyed for special status species burrows prior to burning. If active burrows were found, a buffer would be established to protect the burrow and surrounding area. Buffer size would be dependant on the particular wildlife species and their needs. These areas would be treated as control plots and would not be burned. Non-burned control plots would be established in the unburned vegetation to compare species richness and percent cover before and after the burn and evaluate the effects of fire on non-native vegetation, species richness, and special status species populations.

The Bitter Creek National Wildlife Refuge Fire Management Plan was designed to suppress fires occurring on the refuge. Although evidence shows the benefit of prescribed fires in habitats associated with the Refuge, further investigation and planning have to be developed in order to implement a prescribed fire program. At a minimum, the following would be incorporated when a prescribed fire plan and program would be implemented on the Refuge.

Prescribed burns would be conducted in the fall/winter/spring in order to minimize potential impacts to the special status species while complying with temporal restrictions set by Kern County. Although fall burns can reach extreme intensities in dry years, crushing or rolling tall grass fuels prior to ignition would minimize the negative effects associated with severe fire. These actions work to lower flame height without removing the fuel needed to carry the fire. Existing earth roads would be utilized as fire lines to protect shrubs and trees. Sufficient personnel would be present at the burn site.

To minimize potential negative effects, prescribed burns on the Refuge would be conducted under restrictions imposed by the Kern County Fire Department, the San Joaquin Valley Air Basin of the California Air Resource Board, the mandates of a Fish and Wildlife Service Regional Fire Management Officer, and the Bitter Creek National Wildlife Refuge Revised Fire

Management Plan. Additionally, a detailed Burn Plan would be written for each prescribed burn and submitted to the Hopper Mountain National Wildlife Refuge Complex Project Leader, the Kern County Fire Department, and the Air Quality Management District for approval. Local agencies may restrict ignitions under certain wind speeds/directions, humidity, or other conditions that would cause local air quality to be degraded. All Burn Plans would meet all local, state, and federal requirements.

Earth roads throughout the refuge, which are generally 10 to 12 feet wide, would be utilized as firebreaks. Twenty five miles of roads are maintained annually to provide access. Additionally, fire breaks are maintained adjacent to all roadways.

2.4 Alternative D: Prescribed Grazing as Primary Strategy B Secondary Prescribed Burning, Mowing, and Herbicide Application (Preferred Alternative)

This alternative is identical to Alternative B, except it allows prescribed burning to be used as a secondary management strategy, as described in Alternative C. Prescribed burning would not commence until grazing, mowing, and herbicide application have been employed alone for 3 to 5 years. At this time, if monitoring results demonstrate that habitat objectives are not being achieved, prescribed burning of selected upland sites would commence on an as-needed basis. The primary objectives of prescribed burning would be to 1) enhance the habitat for threatened and endangered species and species of concern, 2) reduce the cover of unpalatable invasive weeds, and 3) reduce RDM. A detailed description of the specifications proposed under the grazing regiment is contained in Section 1 of this EA in the section describing the relationship of this project to other Refuge plans. (See also the Compatibility Determination: Grazing 2006 (USFWS Compatibility Determination 2006)).

Prescribed burns would be conducted according to the methods and restrictions described in Alternative C. Under this alternative, proposed burn sites would be limited in size and would be located in upland areas with high densities of non-native species, primarily unpalatable invasive species. Considering the rough topography and remote locality of the Refuge, burn plots would be established and monitored in order to determine the effectiveness and feasibility of burning on a larger scale. Therefore, following the approval of the revised fire management plan, areas would be designated as test sites and burned, yielding valuable information for determining reasonable sizes of burns given the large area and its attributes.

2.5 Alternatives Considered and Dismissed

Possible alternatives that were initially considered but were dismissed for various reasons included the sole use of mowing, herbicide spraying, prescribed fire, or grazing. If employed alone, independent of other management strategies, individual treatments would be unable to achieve most of the desired habitat objectives, thereby failing to meet the identified purpose and need. Using prescribed burning as the sole management technique has additional drawbacks, including the inability to burn in drought years and the possible difficulty in securing sufficient personnel to monitor the prescribed fire (Menke 1982). Likewise, if grazing was employed

without secondary management strategies, RDM may not be reduced to desired levels and unpalatable invasive species would not be eradicated (Kimball and Schiffman 2003).

Economic constraints also prohibit the use of individual management strategies. While mowing and herbicide effectively remove small pockets of invasive species, they become an expensive and impractical means to treat large areas. Since mowing only mechanically mulches vegetation but does not remove it, personnel or additional equipment would be required to gather mulched vegetation and remove it from the refuge. Continuous herbicide treatment is not an effective means of eliminating widespread non-native annual grasses because it is time intensive and potentially hazardous over the long-term to native grassland species.

Another dismissed alternative required the complete removal of livestock grazing and limited mowing, herbicide application, and hand pulling of weeds. The nature of non-native invasive plant species is to create a monoculture. In order to minimize the negative effects of invasive plant species, only management strategies that control the spread of and eliminate new infestations would meet the purpose and need for the project. This alternative would be dependent on the native herbivores, for example tule elk and mule deer, which have the ability to shape plant communities as a result of their use of a given habitat. Virtually ignored areas have a tendency to be dominated by native perennials, while areas of heavy use tend to be either bare or dominated by non-native annual species (Seabloom and Richards 2003). This alternative would only be practical in the event that the native wildlife populations were of sufficient number to maintain the grasslands at a level beneficial to the declining listed species or reducing the hazardous fuel conditions. Consequently, the habitat management and restoration of the grassland ecosystem is dependent on a higher level of interference.

Table 1. ***Comparison of Alternatives Matrix***

	Acres habitat maintained	**Acres habitat enhanced**	**Habitat management measures: primary strategies**	**Habitat management measures: secondary strategies**
Alternative A (No Action Alternative)	9,440	Variable	Year round grazing	Herbicide Mowing Hand pulling of weeds
Alternative B	9,440*	9,200*	Seasonal Grazing	Herbicide Mowing Hand pulling of weeds
Alternative C	9,200	9,200	Prescribed fire	Herbicide Mowing Hand pulling of weeds
Alternative D (Preferred Action)	9,440	9,200	Seasonal Grazing	Prescribed fire Herbicide Mowing Hand pulling of weeds

*9,440 minus 9,200 equals the 240 acres surrounded by private property and therefore not subject to the proposed change in management at this time.

Section 3: AFFECTED ENVIRONMENT

3.1 Physical Environment

The Refuge, situated in the upper foothills at the southwestern corner of the San Joaquin Valley, is located within the "California Dry Steppe Province" according to Bailey's Life Zones (Townsend 1988). This Life Zone is characterized by hot, dry summers and mild, foggy winters. Temperature extremes may climb above 100 degrees in summer and drop below freezing in winter. Precipitation levels peak December through April.

Weather can vary considerably on the Refuge depending on the elevation and specific site. Higher elevations, especially above 4,000 feet, are relatively cool and receive more moisture; snow is common during winter storms. Lower sites, particularly in Bitter Creek Canyon, which range down to 1,600 feet, are warmer, receive less moisture, and rarely receive snow. North facing slopes are cooler and wetter than slopes with other aspects and, as a result, normally support some type of woody vegetation and denser stands of annual exotic grasses.

A variety of anthropogenic (development of human race) features are present on the Refuge including: 1) old home sites with relic non-native trees and shrubs, water wells, and other structures; 2) twenty-five miles of dirt roads located throughout the refuge; 3) miles of barbed wire fencing; 4) various metal debris and old equipment; 5) structures associated with the grazing program including corrals, water lines, water tanks, and troughs; and 6) an overhead operational utility line. Large portions of the fence lines, built approximately 60 to 70 years ago, are dilapidated and no longer functional. Priority sections, including fence lines located along the exterior boundary, adjacent to roads, and sensitive areas, have been replaced and continue to be replaced as funding becomes available. Fence lines are constructed with metal or wooden posts, t-posts, and barbed and smooth wire, spaced to allow passage to wildlife, but maintain livestock in appropriate units.

3.1.1. Air Quality

The state of California's air quality is governed by the California Air Resource Board, which manages 15 air districts or air basins. The Refuge lies within the San Joaquin Valley Air Basin. Policies, regulations, and standards have been developed to regulate the smoke effects from prescribed burns, one of two major sources of air pollution within the basin. Towns within the basin, located in proximity to the Refuge, are Maricopa, Taft, Cuyama, New Cuyama, Venticopa, and Pine Mountain Club is considered off-site smoke sensitive areas.

3.2 Biological Environment

3.2.1 General - Soil

In general, the surface soil needs to be maintained and protected to enhance its ability to absorb precipitation (Pieke and Avissar 1990). Organic matter, soil particles, texture, plant and litter

cover, and slope all influence the ability of soil to absorb moisture and therefore function (Blackburn 1975).

The Refuge has an interesting soil profile due to presence of the San Andreas Fault Rift Zone that bisects the Refuge northwest to southeast. The rift zone has helped to form a valley parallel to the fault scarp. Uplift during recent geological time has created extremely steep canyons, especially due to fault displacement along the San Andreas Rift. The steep canyons facilitate severe erosion and the movement of sediment (Townsend 1988).

Rock types on the Refuge are sedimentary and consist of sandstone, shale, and conglomerate. The most common geologic formations in the eastern side of the fault are Santa Margarita sandstone, McDonald shale, Maricopa shale, and Bitterwater shale. Ricardo sandstone, conglomerate, and tuff, Pattiway sandstone, and Simmler conglomerate and sandstone formations are found on the western side of the fault (Townsend 1988).

3.2.2 Grasslands

California grasslands are among the most threatened ecosystems in the state, due in large part to the invasion of exotic species, urbanization, and conversion to cropland (D'Antonio et al 2002, Seabloom et al 2003, Stylinski and Allen 1999). Prior to European settlement, it is believed that perennial bunchgrasses dominated wetter areas, while annuals where common in the drier habitats (D'Antonio et al 2002).

Temperature and precipitation greatly control the growth of annual vegetation in the southern California climate (D'Antonio et al 2002, George et al 2001, Pitt and Heady 1978, Zavaleta et al 2003). Typically, climate for the refuge is characteristically mild, a wet winter followed by a long dry summer. In addition, soil fertility and moisture are vital factors shaping the grassland ecosystem (Roberson 1996). Ensuring the ability of the soil to retain moisture in the wetter months of the year will positively influence the landscape structure (Hull and Muller 1976).

The spread of annual species has been directly correlated to soil disturbance (Seabloom et al 2003). Additionally, the competitive nature of annuals verses perennials may be geographically dependent. In the Central Valley, *N. pulchra* seeds had difficulty settling in thickets of exotic annual species, but once established, the perennial seedlings and adult plants could compete with exotic annuals (Seabloom et al 2003).

In general, annual grasses and forbs go though a slow growing period following the first fall rain. After winter, warmer temperatures set in, causing annual vegetation to experience rapid growth, limiting resources for delayed native perennial species (D'Antonio et al 2002, Seabloom et al 2003). In late spring and into the summer, the plants flower, set seed, and dry up, providing food and shelter for wildlife species, but also creating a hazardous wildfire condition (Larson and Duncan 1982).

As mentioned above, annual vegetation has a tendency to crowd perennial species, even reduce its growth potential (Peart 1989). The competitive nature is linked to competition over water resources (Hamilton et al. 1999). Also, even though annuals (early and late) differ from perennials in structure and reproduction characteristics, traits related to competition seem to have a large effect on the community structure (Hooper 1998, Moloney and Chiariello 1998). Each group's, including the nitrogen fixers, competitive nature seems to have an influence much greater than the physical characteristics of the individual species. The introduction and consequent spread of non-native annual vegetation in California grasslands has produced a large modification in the composition, resulting in a shift in the system.

Annual grassland is by far the most common habitat type on the Refuge. The historical species composition of grasses before settlement, and the relative proportion of annual versus perennial species, is not well known. However, the introduction of dominant exotic annual grass species and their subsequent replacement of native vegetation in California are well documented (Elstein 2004, Germano et al. 2001, Jackson 1985, Safford and Harrison 2001). These exotic species include soft chess (*Bromus mollis*), red brome (*Bromus rubens*) and ripgut brome (*Bromus rigidus*), and they now dominate the grassland communities on the Refuge, displacing native perennial species (Hull and Muller 1976, Menke 1982, Twisselmann 1995).

3.2.3 Riparian and Wetland Habitat

Riparian areas are dependent on groundwater and runoff from the surrounding areas. Depth to the water table is the most important factor in determining plant composition of riparian areas (Haltiner et al 1996, Martin and Chambers 2001). Maintaining a level of diversified vegetation along the banks of streams, in addition to the surrounding areas, ensures the ability of the soil to absorb the moisture that fuels the system (Bellows 2003).

In addition, riparian habitats act as filters providing and maintaining water quality, necessary for healthy ecosystems. Native vegetation growing along spring banks mimic filtering systems in reducing the sediment and biological pollutants which would otherwise enter the stream (Bellows 2003, Roberson 1996). Also, the plants provide a form of protection from compaction and other disturbances, which invasive and upland species are not capable of providing.

Only a fraction of riparian areas remain in the U.S. today, and yet a large percentage of animals are dependent on these areas for breeding (Bureau of Land Management 1998, Partners in Flight 1998). Many have been severely degraded resulting in species composition modification and productivity declines (Martin and Chambers 2001).

In general, two types of springs occur of the refuge, 1) springs whose origins are derived from the precipitation within the watershed, and 2) springs whose origins are derived from deep within the earth and make their way to the surface, which may be associated with the fault line.

Several areas of riparian habitat occur on the Refuge along the course of Bitter Creek, Toad Pond, Spanish Springs, Orchard Springs, Speed Springs, Cottonwood Spring, Asmal Springs,

some springs in the "Irish" or western area of the Refuge, and an ephemeral (transitory) wetland area in the lower Emerson Valley. Red Lake is a year round standing body of water about a half acre in size on the Western portion of the Refuge. Wetland and riparian habitats that were fenced from cattle are showing a dramatic comeback. Prior to fencing, the ponds and springs were devoid of bank vegetation and the pools were contaminated with cattle dung. The wetland and riparian areas that were protected from cattle continue to rebound naturally, without employing active restoration practices.

3.2.4 Other Habitat

The Refuge habitat type also includes interior live oak woodland, chaparral, juniper brushland, and pinon pine/juniper/oak community. Juniper brushland is common on much of the western portion of the Refuge, especially west of Cerro Noroeste Road, at an average elevation of 4,000 feet. Although other plants are found interspersed with juniper in this habitat type, the variety and productivity of other species are limited, in part, due to the allelopathic nature of juniper, which inhibits growth of competing plants. These areas serve as wildlife habitat, providing food and shelter, and as valuable roosting habitat for foraging condors.

Chaparral is interspersed in the wetter areas on the north and east facing slopes. However, even in severe drought conditions, chaparral seems to survive, which can be attributed to its extensive and deep root system (Harrison et al. 1971).

Interior live oak woodland habitat (*Quercus wislizenii var. frutescens*) is found in relatively few areas of the Refuge, primarily on north facing slopes (Twisselmann 1995). This habitat type offers shade, cover, and forage for wildlife such as mule deer, dark-eyed junco (*Junco hyemalis*), and bobcat (Huntsinger and Fortmann 1990, Stuart and Sawyer 2001).

The pinion pine/juniper/oak association is found principally on the steep north and east facing slopes at the head of Bitter Creek Canyon. Bureau of Land Management owns about half of this habitat type in the Bitter Creek drainage. This habitat has considerable value for a variety of wildlife species and provides abundant cover, pine nut, acorn, and other food production (Stuart and Sawyer 2001), and is adjacent to the year round flows of Bitter Creek.

The pinion pine/juniper/oak habitat is a particularly important roosting habitat for condors because of its undisturbed location opposite historic feeding areas across the canyon. Condors historically have roosted in some of the larger pinion pines in this area. Management considerations center on protecting this important area from wildfire. This habitat also represents the core area for the small, resident mule deer population.

3.3 Special Status Species

Endangered and threatened species and species of special concern – worldwide – are mainly displaced by habitat loss and invasion of exotic species (Germano et al. 2001). For a complete

list of threatened and endangered species and species of special concern found on the Refuge refer to Appendix B.

3.3.1 California Condor, *Gymnogyps californianus*

The California condor (condor) is a member of the family Ciconiidae. During the Pleistocene Era, 10,000 years ago, the condor's range extended across much of North America. At the time of the arrival of pioneers, the condor ranged along the pacific coast from British Columbia south through Baja California, Mexico. By 1940, the range had been reduced to the coastal mountains of southern California with nesting occurring primarily in the rugged, chaparral-covered mountains, and foraging in the foothills and grasslands of the San Joaquin Valley. Today condors are being reintroduced into the mountains of southern California north of the Los Angeles basin, in the Big Sur vicinity of the central California coast, near the Grand Canyon in Arizona, and more recently in Baja California, Mexico.

Condors require large areas of remote country for foraging, roosting, and nesting. They roost on large trees or snags, or on isolated rocky outcrops and cliffs. They typically roost into mid-morning and in the later part of the afternoon, but have been known to roost all day. Roost sites are generally near nest sites or foraging habitat (USFWS 1996).

The condor is one of the largest and most rare birds found in the world. Males and females cannot be distinguished based on size or plumage. Most condors reach sexual maturity at approximately five or six years of age. Courtship and nest site selection occur in the winter months, possibly into early spring. Nests are placed in shallow caves and rock crevices on cliffs where there is minimal disturbance. The mature pair will lay one egg every other year, normally in late January to early April. Both parents will take turns incubating the egg for approximately 56 days and will continue to share in the feeding responsibility once the egg hatches. Young are altricial (eyes closed, unable to leave nest, wholly dependent on parents for food and care), ptilopaedic (partially covered with down, usually over back and lower parts), and nidicolous (remain at nest and cared for by parents). The chick remains in the nest cavity for the first couple of months and ventures in the immediate vicinity until fledging at six to seven months old. The fledgling continues to be dependent on its parents for another year, where upon it integrates into the population (USFWS 1996).

Foraging habitat includes open grasslands and oak savanna foothills that support populations of large mammals such as deer and elk (Bakker 1965, Sibley 2001, Williams et al 2004). Condors may fly 150 miles a day in search for food. Formally, when the condors were found throughout the Southwest, they also fed on beaches and large rivers along the Pacific coast. Condors are opportunistic scavengers, feeding only on the carcasses of dead animals (Clark and Wheeler 2001, National Geographic 1999). Typically, they will fly circles above the carrion, then spend hours roosting in a near by snag or on the ground near the food source before feeding. Condors are highly social with an established structural hierarchy; therefore, dominant individuals take precedence at feeding sites.

The California condor is federally and state listed under the Endangered Species Act as an endangered species. Unnatural factors contributing to present mortality include shooting, lead poisoning, and collisions with man-made objects. Historical contributions to the species decline are numerous and vary depending on time. In 1983, only 25 condors remained, of which 16 were in the wild and 9 were in captivity. Presently, there are 289 condors, of which 138 are in the wild, while the rest remain a vital part of the ongoing captive breeding program (Stockton 2006). Of the 138 now found in the wild, three are the result of successful fledglings, two in the Arizona population and one in the Southern California population. Also, the last wild condor captured back in the1980s, AC-9, was released in 2002. The remainder of the wild population, born in captivity, have spent their lives in the wild, some of whom have been in the wild for over ten years foraging, roosting, and, in some cases, reproducing.

The primary management objective of the Refuge is to support native ungulate population, including mule deer (*Odocoileus hemionus*) and tule elk (*Cervus nannodes*), for the California condors (USFWS 1996). Steps continue to be taken to encourage the enhancement of a natural food source for the condors.

3.3.2 San Joaquin Kit Fox, *Vulpes macrotis mutica*

The San Joaquin kit fox (kit fox), of the Family Canidae, is the smallest canid species in North America. Historically, prior to the 1930s, kit foxes where found throughout the San Joaquin Valley, from southern Kern County to northern Tracy County, west though San Joaquin County and east to Stanislaus County near La Grange (Brown et al 2005, Ralls et al 2001). By the 1930s their range had been reduced by half, mostly in the southern and western parts of the valley. Current distribution includes prior historic range in patchy populations.

Kit foxes prefer loose-textured soil, but can be found on all types. They inhabit dens with numerous entrances and frequently relocate, typically twice a month, especially during the summer months. They use the dens for shelter, reproduction, means to flee predators, and temperature regulation (Conover 2001, Ralls et al 2001). Even though they are capable of digging their own dens, they are known to modify burrows from other animals, including coyotes (*Canis latrans*), badgers (*Taxida taxus*), and ground squirrels (*Spermophilus beecheyi*) (Whitaker, Jr. 1996). Most dens are found on hillsides that have a maximum slope of 40 degrees. The home range of a kit fox can be anywhere from 2.6 to 31 square kilometers depending on the abundance of prey (USFWS 1998).

Generally, kit foxes have a slim body, relatively large ears set close together, narrow nose, and a long, bushy tail, typically carried low and straight (Ingles 1965). They reach adulthood at one year old, but typically do not breed their first year (USFWS 1998). Pairs remain together in the same home range. Mating and conception take place in late December through March, followed by a gestation period of approximately 50 days (Brown et al 2005). Litters of two to six are born between February and May (Ingles 1965, Ralls and Eberhardt 1997). The females typically do not hunt while lactating and are dependent on the males for food (USFWS 1998). When the pups are approximately one month old they emerge from their den (Brown et al 2005). In

August or September, when the pups are approximately 4 to 5 months old, they began to disperse (Koopman et al 2000, Ralls et al 2001). Reproductive success is based on the availability of prey (Brown et al 2005). Healthy populations depended on immigration and dispersal of individuals for maintaining reproduction, increasing populations, and encouraging genetic diversity (Koopman et al 2000, Reed and Frankham 2003).

Kit foxes are mostly nocturnal. In turn, their diet consists of nocturnal rodents, such as kangaroo rats (*Dipodomys*) and pocket mice (*Perognathus*) (Whitaker, Jr. 1996). They also feed on California ground squirrels, leporids (black-tailed hares or jackrabbits *Lepus californicus* and desert cottontails *Sylvilagus audubonii*), grassy vegetation, and insects (Cypher and Spencer 1998, Ralls and Eberhardt 1997, Warrick, G.D. and B.L. Cypher 1999). Kit fox diet is dependent on the seasonal, annual, and geographic variables of their prey species.

Historically, kit foxes inhabited native plant communities found throughout their range. Over time, as the native communities began to be altered by human activities, kit foxes began utilizing modified grasslands, scrublands, and agricultural fields (USFWS 1998).

The San Joaquin kit fox is federally and state listed as endangered. Natural mortality has been attributed to predation, starvation, flooding, disease, and drought (Cypher and Spencer 1998, USFWS 1998). Human caused mortality includes shooting, trapping, poisoning, road kills, and suffocation. In addition, agriculture, industrialization, and development have contributed to the loss and fragmentation of the habitat (Boarman 2002, Conover 2001, Koopman et al 2000, Ralls and Eberhardt 1997, Warrick, G.D. and B.L. Cypher 1999).

Furthermore, the habitat requirements needed by the kit fox are also vital to other species of concern, making its recovery critical (USFWS 1998). The kit fox acts as an umbrella species (Conover 2001). By preserving, protecting, and when appropriate, enhancing habitat for the kit fox, other species such as giant kangaroo rats (*Dipodomys ingens*) and blunt-nosed leopard lizard (*Gambelia sila*) benefit.

3.3.3 Western Burrowing Owl, *Speotyto (Athene) cunicularia*

The western burrowing owl (BUOW), of the Family Strigidae, is a small to medium sized raptor that inhabits open grassland habitat predominately in the western United States, Mexico, and Florida (Fisher et al 2004, Orth and Kennedy 2001). This ground-dwelling species uses abandoned burrows for nesting and roosting (Fisher et al 2004, King and Belthoff 2001, Sibley 2000). BUOW have been documented using abandoned burrows of a variety of species including Beechey ground squirrels *(Spermophilus beecheyi)* in Oakland, California (Thomsen 1971), prairie dogs (*Cynomys ludovicianus*) in the mid-west (MacCracken et al. 1985, Orth and Kennedy 2001), rock squirrels (*Spermophilus variegatus*) in New Mexico (Martin 1973), and badgers in Saskatchewan (Haug and Oliphant 1990). These natural burrows are renovated and maintained by using their feet, bill, and outstretched wings (Thomsen 1971). BUOW has recently adapted to using certain manmade structures such as cement or metal culverts; cement,

asphalt, or wood debris piles; openings beneath cement or asphalt pavement; and artificial burrows (Trulio 1997, Zambrano 1998).

Habitat requirements for BUOW include low-growing vegetation (< 6 inches in height) and burrow availability (Orth and Kennedy 2001). Suitable habitat is found in annual and perennial grasslands, deserts, and arid scrublands (Zarn 1974). Grasslands grazed by livestock are utilized because vegetation is relatively short (MacCracken et al. 1985, Haug and Oliphant 1990, Plumpton and Lutz 1993). However, if the pasture is overgrazed, BUOW will not burrow due to the over abundance of bare ground (Haug and Oliphant 1990). The BUOW exhibits strong site-fidelity and it may use the same site for breeding, wintering, foraging, and/or migration stopovers year after year (Dechant et al 2001).

Burrowing owls are highly gregarious (sociable) and often form colonies with 10-15 burrows. If suitable BUOW habitat is identified, detecting a BUOW, molted feathers, cast pellets, prey remains, eggshell fragments, or excrement at or near the burrow entrance can verify occupancy (Zambrano 1998). A site should be assumed occupied if at least one burrowing owl has been observed at the burrow within the last three years (Rich 1984).

Unlike most strigiforms (belonging to the order Strigiformes, comprising the owls), BUOW are sexually dimorphic (male is larger). In general, males appear lighter due to greater plumage fading. Males sing by the burrow and conduct bowing displays to attract females (Martin 1973). They are territorial when forming breeding pairs and remain so until chicks fledge (Thomsen 1971). In California, the mean clutch size is 7.0 with a range of 1 to 11. Upon hatching, like condors, the young are altricial, ptilopaedic, and nidicolous.

Burrowing owls are diurnal (active during the daytime rather than nighttime), but they are not migratory (Thomsen 1971). Their principle food source is insects, but they also feed on Norway rats, toads, birds, beetles, vegetation, small mammals, reptiles, and carrion (Brown 2005, Dechant 2001, Robertson 1929). Four foraging methods are used: 1) ground foraging-main winter method observed, 2) observation foraging-perching, 3) hovering, and 4) flycatching (Thomsen 1971).

The western burrowing owl is listed as a species of concern both federally and in the State of California. Habitat loss due to development and agriculture and secondary poisoning due to recent efforts to control ground squirrel populations have caused declines in BUOW populations throughout much of their range (Dechant et al 2001, Gervais and Rosenberg 1999, Griebel and Savidge 2003, King and Belthoff 2001, Zambrano 1998).

3.3.4 Blunt-nosed Leopard Lizard, *Gambelia sila*

The blunt-nosed leopard lizard (lizard) belongs to the Family Iguanidae and was historically found on the San Joaquin Valley and the Sierra foothills, from Stanislaus County down to Tehachapi Mountains, in addition to Kettleman, Carrizo Plains, and Cuyama Valley in San Luis Obispo, Santa Barbara, and Ventura counties.

The lizard inhabits undeveloped arid areas with spotted vegetation on the San Joaquin Valley floor typically associated with alkaline (having a pH greater than 7) and saline soils (Stebbins 1985). In the foothills, they inhabit chenopod shrubs communities such as common saltbush (*Atriplex polycarpa*) and spiny saltbush (*Atriplex spinifera*) associated with non-alkaline and sandy soils. Vegetation is typically bunch and annual grasses and saltbush (USFWS 1998). The lizards are found between 30 and 792 meters (98 to 2,600 feet) in elevation. They are not known to occupy areas with seasonal flooding, steep slopes, or thick vegetation (Sandoval et al 2005).

The lizards are 3 to 5 inches long with a blunt snout and long regenerating tail (USFWS 1998). Males tend to be larger than females. They are multicolored with striped patterns on their back, which divides into spots as they grow (Stebbins 1985). During the breeding season, females tend to exhibit a bright red-orange color on the sides of their head and body and the underside of their tail and thighs (Stebbins 1985, USFWS 1998). The males exhibit a salmon to rusty-red color beneath their entire body. Males heads tend to be broader compared to the females (Stebbins 1985).

In addition to creating their own tunnels, they seek shelter in abandoned burrows created by ground squirrels and kangaroo rats. They also create temporary shelters beneath rocks and berms (USFWS 1998). Females' ranges can extent out to 1.1 hectares (2.7 acres), whereas the males' ranges can be as much as 1.7 hectares (4.2 acres) (USFWS 1998).

Their activity is limited by the climate, specifically the temperature. The most favorable temperature is 25 to 35 C (77 to 95 F), with the soil temperature averaging 22 to 36 C (72 to 97 F). As with other diurnal animals, during severely hot temperatures the lizards are active only during dusk and dawn. During the colder months they remain in a state of dormancy underground. The adults emerge in the spring, typically March and April, and remain active until July. The juveniles hatch in August and remain active until October (USFWS 1998).

Under favorable environmental conditions, the females typically reach sexual maturity following their second dormancy, while the males take longer. The lizards breed once they emerge in the spring and into June. The pair may remain together and typically use the same tunnel system. In areas where a male's territory overlaps more than one female, he may mate with multiple females. In June or July, the female lays two to six eggs, followed by a two-month incubation period, after which the young hatch. During harsh conditions, the egg laying may be delayed by several months or not occur at all. On the other hand, if conditions are favorable, she may lay multiple clutches.

Both males and females are territorial and exhibit behaviors, such as the headbob (one vertical head motion) and pushup (up and down motion involving the forearms and head). In addition, the males exhibit rocking threat/fighting motions toward each other. It involves a simultaneous inflation of the body, expansion of the dewlap (loose skin fold attached to the neck) and hind limbs arching the back and doing pushups in quick repetition (USFWS 1998).

Their diet mostly consists of insects like grasshoppers, crickets, and moths. In addition, they are opportunistic feeders and may consume animals, specifically lizards that they can capture and overcome (Sandoval et al 2005).

Natural predators include gopher snakes (*Pituophis melanoleucus*), common king snakes (*Lampropeltis getulus*), American kestrels (*Falco sparverius*), and American badgers (*Taxidea taxus*).

The blunt-nose leopard lizard is federally and state listed as an endangered species. Since the 1870s, approximately 95 percent of their former range has been destroyed. Their decline has been facilitated by cultivation, recreation, and extraction resulting in habitat loss. Human activity has resulted in habitat fragmentation creating small pockets of populations throughout its former range (USFWS 1998).

3.3.5 Tricolored blackbird, *Agelaius tricolor*

The tricolor blackbirds (TRBL) are a small passerine (birds from the order Passeriformes, including perching birds and songbirds) colonial (living in a colony) species of the Family Icteridae. Although mostly found in the Central Valley, they are also known to inhabit the surrounding foothills and coastal California, Oregon, and Baja (DeHaven et al 1975, National Geographic Society 1999, Sibley 2000). Population surveys have shown significant drops in population size in the past two decades. Declines in population have been attributed to widespread habitat loss throughout their historical range (Beedy and Hamilton 1997).

Traditionally, TRBL colonies were found among cattails (*Typha* sp.) and bulrushes in freshwater marshes. Presently, colonies are found among blackberries (*Rubus* sp.), nettles (*Urtica* sp.), and surprisingly among agricultural fields of silage and grain (Hamilton 2005).

During the winter months, the tricolors tend to congregate in the Sacramento-San Joaquin River Delta and California's central coast (Hamilton 1998). During the breeding season they flock to locations in Sacramento County and San Joaquin Valley (Beedy and Hamilton 1997). They tend to utilize the same breeding habitats year after year, if suitable resources are available (Hamilton 2005). Additionally, tricolors may re-nest in the same year, but in a different location, a pattern known as itinerant breeding (Hamilton 1998).

The tricolors have three basic requirements for nesting habitat: 1) access to open water, 2) thorny or flooded substrate for nesting, and 3) an adequate insect population available within a few kilometers of the nesting colony as a food source (Hamilton 2005).

Females tend to breed their first year; however males tend to wait until their second year. Females undertake the construction of the nest (Beedy and Hamilton 1997). If a female loses a nest, she may re-nest in the same season. Nests may fail due to rough weather, predation, and agricultural activity (Hamilton 2005). Breeding starts toward the latter part of March into April (Hamilton 1998). Nests are suspended in dense vegetation, at least two centimeters above water

or ground and up to two meters high, higher if constructed in the canopies of willows (Sibley 2001). The deep cup nest takes approximately four days to build and consists of three layers: the outer layer is created with long leaves from cattails or forbs formed tightly around the substrate, the middle layer is formatted with mud or algal fibers, and the inner layer part of the nest consists of plant down (fine soft plant material) (Hamilton 2005). Typically, three to four eggs are laid, one per day, approximately four days after arriving at a colony (Beedy and Hamilton 1997, Emlen 1985). The incubation period lasts for eleven to twelve days. Once hatched a nestling takes nine days before it attempts to jump out of the nest and an additional fifteen days before it is no longer dependent on parental care (Beedy and Hamilton 1997). Therefore, it takes one pair at least 45 days for a successful reproductive cycle.

Flocks of TRBL males flying above colonies during settlement indicate individuals that have not established nesting territories. Individual males that have established territories typically remain hidden within the substrate (Hamilton 2005). Usually, females outnumber males two to one. While the females incubate the eggs, the males remain in groups within a couple of kilometers from the colony. During incubation, the females remain inactive and the colony seems deserted (Beedy and Hamilton 1997).

Adult TRBL diet consists of plant matter and insects (Skorupa et al 1980). TRBL nestlings feed on various insects including beetles, grasshoppers, and various larvae. They typically forage away from their nesting colony, but usually within 5 kilometers. Pastures, agricultural fields, and seasonally dry pools provide an excellent resource for insects (Skorupa et al 1980). Large flocks of TRBL can be seen foraging in an area, with the continued exchange of individuals. During winter, TRBL congregate in large flocks and are mostly dependent on plant material as a food source (Hamilton 2005).

Unfortunately, their highly colonized nature leaves them susceptible to large nesting failures. The top ten largest colonies account for seventy percent of the breeding population (Hamilton 2005). Natural predators include ravens (*Corvus corax*), northern harriers (*Circus cyaneus*), and barn owls (*Tyto alba*). Human urbanization has systematically encroached on their historical habitat. Additionally, TRBL breeding colonies that utilize agricultural crops are destroyed during management operations, although partnerships have developed between private landowners to mitigate management timing in order to protect established colonies (Hamilton 2005). Furthermore, tricolors are not tolerant of human disturbance and may completely abandon established colonies (Beedy and Hamilton III 1997).

In 1992, California Department of Fish and Game marked the TRBL as a state species of special concern. In 1995, the Service identified the TRBL as a non-game bird species of management concern. The key objective is to manage for a healthy self-sustaining population within its existing range.

3.3.6 Giant Kangaroo Rat, *Dipodomys ingens*

The giant kangaroo rats (kangaroo rat), of the Family Heteromyidae, are found in portions of the San Joaquin Valley and surrounding areas and in the plateaus of inner coastal ranges. Historically, they were found throughout the western San Joaquin Valley, Carrizo Plain, and Cuyama Valley. Currently, six clusters remain in their former range, divided into approximately 100 populations (Williams 2005). These clusters are separated by various obstacles such as steep terrain, unsuitable habitat, and development.

The kangaroo rats are considered keystone species (central supporting element) in grasslands and shrub communities. The population as a whole seems to have no preference in soil types, but prefer areas with slopes less than 22 percent and elevation of 2,850 feet or lower. However, of the remaining suitable habitat, they seem to show a preference for annual grasslands of gently rolling hills (less than 10 percent) and friable (brittle, readily crumble), sandy-loam soils. Their estimated home range is the same for either sex, 60 to 350 square meters (71 to 420 square yards).

The kangaroo rat is dependent on bipedal locomotion. It hops on its hind limbs. The front limbs are considerably smaller, the neck is very small, and their head is large and flattened. In addition, their tail is longer in length than the head and body combined and it ends in a large tuft. Furthermore, the kangaroo rat is larger than other coexisting species such as San Joaquin kangaroo rat (*D. nitratoides*) and heermann's kangaroo rat (*D. heermanni*) (USFWS 1998).

Being nocturnal (active at night), the kangaroo rats forage above ground starting around sunset through the night, but are typically most active in the first two hours of the night (Williams 2005). Their activity tends to increase with the availability of their preferred food source. They are also active throughout the year, regardless of the weather (USFWS 1998).

Kangaroo rat reproduction is tied to population density and food availability. Typically, reproduction cycles range from December to April, but in colonies with fewer numbers, females reproduce into late summer (Whitaker, Jr. 1996). Under the right conditions, they can produce more than one litter. Generally, they have up to three per litter. If sufficient space and forage is available, juvenile females may reproduce their first year. The gestation period lasts between 30 to 35 days. Dispersal generally occurs eleven to twelve weeks after birth. (USFWS 1998)

The majority of their diet consists of seeds, but they can also consume green vegetation and insects. They place seedpods in shallow pits located above their burrowing systems and cover them (Ingles 1965, Whitaker, Jr. 1996).

The kangaroo rats' natural predators include the San Joaquin kit fox, American badger, and burrowing owl.

Studies have suggested that certain kangaroo rat populations are genetically isolated, which can have devastating affects on the particular group (Storfer 1999). In order for a population to

thrive, there must be diversity for the exchange of genetic material (Reed and Frankham 2003, Moritz 2002). At present the isolation status of the Refuge population is not known.

The giant kangaroo rat is federally and state listed as an endangered species. Since the 1970s, most of the historical range of the species has been lost to cultivation. In addition, up until the 1980s, rodenticides where used to control ground squirrel and kangaroo rat populations. Also, the infrastructure for petroleum exploration and extraction, mineral extraction, roads, communication, and energy have all contributed to fragmentation and habitat loss.

3.4 Contaminants

Known contaminants which are associated with disturbed homestead sites located throughout the Refuge include asbestos and lead paint. As funding permits, the sites have been and will continue to be cleaned up and the debris will be properly disposed of. The contaminants pose no known danger to the proposed management and restoration of grassland habitat associated with this EA.

3.5 Social and Economic Environment

3.5.1 Local Population Base

Three small communities are located within a 25-mile radius of the Refuge. The nearest town of Maricopa, located 15 miles to the northeast of the refuge, and the town of Taft, located six miles north of Maricopa, are both in Kern County. Cuyama and New Cuyama located in the Cuyama Valley, west of the Refuge, are in Santa Barbara County, bordering San Luis Obispo County. Pine Mountain Club community, located 20 miles southeast of the Refuge, is part of Ventura County. Although the majority of the individuals in the surrounding communities are Caucasian, Asian, Black or African American, and Hispanic or Latino people are also represented in significant numbers, among other cultures and ethnicities (U.S. Census Bureau 2005).

In 2004, the surrounding counties accounted for approximately 5% of the total population in California, with Kern and Ventura Counties 2% each, and Santa Barbara 1% (California Employment Development Department 2004). The surrounding community has 19 public schools, accommodating students from kindergarten to twelfth grade (Taft City School District, Taft Union High School District, Maricopa Unified School District, Cuyama Joint Unified School District, and El Tejon Unified School District 2005). In addition, the surrounding counties, including Los Angeles County, are home to 34 higher education community or technical institutions and 54 private and 10 public colleges or universities.

3.5.2 Economy

According to the California Association of Realtors, the median price of existing homes sold in November of 2005 in Kern County was $270,000, Santa Barbara County $498,250, Ventura County $605,000, and Los Angeles County $ 500,000.

Kern County is among the top five agricultural producing counties in the U.S., in addition to being one of the leading petroleum-producers (California Employment Development Department 2005). Also, some of the world's largest companies have built their distribution centers in the county due to the location and access to major highways in the Southwest. The economy associated with the local area consists of agriculture, petroleum, livestock, services, and recreation. Additional information in regards to the surrounding work force is available in Table 2 below.

Table 2: Number of individuals employed by industry (not adjusted seasonally) for March 2005. Source: California Employment Development Department 2005.

Employment Categories	Kern Co.	Santa Barbara Co.	Ventura Co.	Los Angeles Co.
Total Wage and Salary	242,700	184,800	311,500	4,025,000
Total Non-farm	214,500	170,200	286,700	4,017,800
Service Providing	178,200	146,600	243,700	3,426,100
Total Private	158,500	134,000	229,900	3,391,000
Residual-Private Services Providing	122,200	110,400	186,900	2,799,300

The Employment Development Department predicts the fastest growth (in percentage) of occupations between 2001, as the estimated year, and 2008, as the projected year, are as follows. Kern County predictions were computer support specialist (47.1), computer software engineers, applications (46.2), special education teachers, preschool, and kindergarten (40.0), computer software engineers, systems software (37.5), and helpers, construction trades, all other (36.4). Santa Barbara projections were computer support specialist (53.9), network and computer systems administrators (43.6), construction and related workers, all other (41.2), computer software engineers, applications (40.6), and computer specialist, all other (40.0). Ventura County estimates included desktop publishers (60.0), postsecondary teachers, all other (59.5), extruding, forming, pressing, compacting machinery (57.1), network and computer systems administrators (51.1), and computer support specialist (51.2). Los Angeles County jobs included computer support specialist (53.4), network and computer systems administrators (46.0), computer software engineers, applications (42.6), computer software engineers, systems software (40.7), and desktop publishers (38.9).

In the immediate vicinity of the Refuge, most private properties of large acreage are associated with the livestock industry, agriculture, or oil excavation. Agricultural fields harvest alfalfa, grapes, and pistachios. The livestock industry includes both dairy and beef cattle and sheep. Private properties with beef cattle graze steers and/or cow/calf seasonally and year-round. The Wind Wolves Preserve, a private wildlife preserve located east of the Refuge, utilizes steers seasonally, November through May, in elevations lower than 3,500 feet (Clendenin 2003-5). Carrizo Plain National Monument managed by the Bureau of Land Management, located north of the Refuge, utilizes seasonal grazing as a management tool to provide optimal habitat for

native wildlife, including special status species, and continues to monitor and research the effects of grazing (Braun 2002-5).

3.5.3 Public Use Programs

The Refuge is currently closed to the public and has been since its establishment in 1985 due to the sensitivity of its resources. Despite boundary signs and perimeter fences around the property, unauthorized use of the Refuge is an ongoing problem. Trespassers have tampered and cut locks as well as broken fences to enter the Refuge. The damage includes off-road vehicle use, poaching, and vandalism of homestead sites.

3.5.4 Cultural Resources

Under federal ownership, archaeological and historical resources within the Refuge receive protection through federal laws mandating the maintenance and management of cultural resources. This includes, but is not limited to, the Archaeological Resources Protection Act, the Archaeological and Historic Preservation Act, the Native American Graves and Repatriation Act, and the National Historic Preservation Act of 1966.

Previous cultural resource inventories have recorded sites associated with Native American use of the refuge area along with historic-period resources. Inventory of the refuge and identification of historic properties will continue prior to implementing activities that meet the description of an "undertaking" as directed by Section 106 of the National.

3.5.5 Environmental Justice

Executive Order 12989 ("Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations") directs that agencies analyze environmental effects of their proposals and alternatives on minority and low-income communities. The purpose of the executive order is to avoid the disproportionate placement of any adverse environmental, economic, social, or health effects resulting from Federal actions and policies on minority and low-income populations.

Section 4: ENVIRONMENTAL CONSEQUENCES

4.1 Alternative A: Prescribed Year-Round Grazing as Primary Strategy - Secondary Herbicide Application (No Changes to Existing Action)

Management activities on the Refuge included cattle grazing on approximately 9,400 acres and limited mowing and herbicide application. Additional control techniques are necessary to combat the continued expansion of non-native grass vegetation shifting the ecosystem further from its natural state and threatening populations of special status species.

4.1.1 Impacts on the Physical Environment

The physical environment of the refuge dictates the use and stocking rate of the grazing program. Previously, during dry years, cattle were completely removed during portions of the year and relocated outside the refuge boundary.

Lower elevations receive pressure during the winter and spring months, but higher elevations are subject to grazing pressure during the summer and fall months, encouraging the unwanted species, while discouraging the wanted species.

4.1.1.1 Impacts on Air Quality

An impact on air quality in the area of the Refuge and surrounding properties is limited to the chemical byproducts produced by the fecal material and increased vehicle and equipment air effects required by the of the year-round grazing regime.

Additionally, the use of herbicides to combat the spread of invasive plant species results in the release of particles into the air. The Refuge does prepare an annual PUP that sets limits to prevent the potential spread of the herbicide to uninfected areas and ultimately to the air.

4.1.2 Impacts on Biological Environment

One very noticeable effect of the grazing regime is the negative consequence on the aesthetic (scenery and odor) quality of the habitat. Year round, cattle are visible on the refuge. Areas of bare dirt, stair stepping along hill sides, and manure are visible from the roads.

4.1.2.1 General Impacts – Soil

The impacts of grazing on soils have been well documented and studied since the turn of the century. Livestock notably alters the soil structure and function, altering chemical composition, microbiology, porosity, nutrient cycles, efficiency, and erosion (Gifford and Hawkins 1978, Roberson 1996). Compaction alters the ability of water and air to penetrate the soil, which restricts the ability of plant growth and considerably alters the finer soils and surface layers (Blackburn 1975). The present program facilitates erosion and overgrazing which results in depleted water resources, contributing to water runoff, displacement, and compacted soil, thus reducing the availability of water to wildlife.

In addition, the livestock is habituated to the area and therefore continues to over utilize particular areas, while neglecting others. Certain areas are so compacted that the water is unable to penetrate the surface, resulting in bare soil, which leads to non-native plant invasion.

4.1.2.1 Impacts on the Grassland

The refuge natural grassland ecosystem has undergone major landscape modifications throughout its varied land use history. Consequently, the present state of the vegetation and ecosystem processes do not represent the historical condition. Therefore, continuing with a passive management strategy would not enhance the ecological integrity of the grassland ecosystem.

The primary effects of the no change in current action alternative are the expansion of non-native grasses and limited resources for native species. The current alternative has a limited role in enhancing the habitat for the Service trust resources; it encourages the non-native annual plant species, and is ineffective in controlling non-native invasive species (D'Antonio et al 2002, Harrison et al. 2003, Seabloom et al 2003). Additionally, under heavy grazing, the plant community shifts towards annual species of short stature and thistles, species not necessarily favored by livestock.

Year round grazing does not enable the reduction of cool season grasses. Without additional non-native plant control efforts to combat the continued expansion of non-native grass vegetation and non-native invasive species, presently shifting the grassland ecosystem further and further from its natural state, it is anticipated that the grassland habitat will continue to be degraded. In addition, the year round grazing schedule encourages the continued depletion of wanted native perennial species, by providing grazing pressure during their growing season in higher elevation units, while removing grazing pressure during the non-native annual species season.

Certain invasive plant species are treated under a pesticide use permit which is updated and processed annually, for each chemical used, to ensure that any possible negative effects form the use of herbicides is considered and mitigated. Each negative effect is considered and evaluated to insure safety to the environment.

Overgrazing encourages the colonization of yellow star thistle (YST) (DiTomaso et al 2003). The current use of herbicide on the Refuge is an effective means to remove isolated patches of invasive species prior to the onset of seed production. Transline herbicide has been used to control YST for the past five years. As recommended, all new infestations are sprayed only up to five years, most patches respond to two consecutive years of treatment. Measures taken to avoid impacts to sensitive areas include: spraying only when wind speeds are less than or equal to 5 mph, stopping spray application when wind speeds exceed 5 mph, spraying target plants, preventing over spray onto non-target plants, spraying target plants with backpack units within .25 mile of sensitive areas, and spraying only during dry, calm weather. Application never occurs within immediate rainfall.

4.1.2.2 Impacts on the Riparian and Wetland Habitat

Not all wetland and riparian areas have been fenced out from cattle and therefore cattle continue to decimate ponds by removing all vegetation growing along the edges and loafing in the

immediate area. In addition, some areas are unfeasible to fence due to topography, location, and size, and are therefore subject to livestock pressure for six months a year, notably altering their system and value to wildlife. As funding permits additional sections continue to be protected.

Riparian areas are capable of capturing water runoff, filter sediments, and recycle nutrients; however that cycle is interrupted when the upland areas are compacted and bare (Bellows 2003, Roberson 1996). Grazing increases the nitrogen deposition in riparian areas, which can lead to an increase in biomass. However, it can also lead to a decrease in root production, altering plant structure and composition, which leads to a negative effect on long-term productivity of riparian areas (Martin and Chambers 2001).

Isolated patches of saltcedar and yellow star thistle, found in riparian and wetland areas, are hand pulled to minimize any possibility of large infestations and to limit the possible negative effects of herbicides and mowing.

4.1.2.3 Impacts on Other Habitat

Juniper brushland communities have been removed from grazing and continue to be as funding permits, in areas were cattle are still permitted the compacted soil and lack of vegetation beneath the trees is evidence of the negative effects.

Past grazing practices have limited regeneration of both shrub and tree species. Both the juniper brushland and oak woodland provide habitats with high wildlife diversity and have suffered in the past from over-grazing by cattle. In addition, concerns have been raised in regards to the lack of regeneration and sustainability of oaks (Hall et al 1992, Ratliff et al 1991). Fence construction during 1998 through 2000 has resulted in the protection of most of the live oak stands on the Refuge.

Additionally, oak root systems are negatively affected by compaction by reducing the available oxygen, thereby making them vulnerable to pathogens, resulting in their decline (Roberson 1996).

4.1.3 Impacts on Special Status Species

Year-round grazing has not improved habitat for Service special status species as well as those species important for maintenance of biological integrity, diversity, and environmental health (Hadlik 2005, Saslow 2005). It encourages overgrazing, resulting in displacement of water resources, compacted and eroded soil, and the removal of food and shelter. Since the establishment of the refuge, the animal units allowed have been reduced to reflect management objectives. Yet the effects remain the same, with some areas grazed down to bare soil. In addition, the program in place does not allow the flexibility to move cattle between units at beneficial intervals resulting in further depletion of resources.

Given the southern California climate and lack of water resources, the native wildlife populations require access to all water resources available. The use of natural springs and underground water sources for the development of cattle watering facilities has greatly reduced water availability for native wildlife during critical times of the year. Part of the long term plan is to re-evaluate and modify the existing water system, but the year round operation would still hinder access to the limited resources during the critical part of the year, when resources are not plentiful and readily available.

Additionally, native wildlife has to compete with livestock in any given unit for six months out of the year. Thereby, the livestock provides a contact pressure on resources. The lower elevations are grazed by livestock from December to June and the higher elevations are grazed the remainder of the year. In the same respect, the wildlife moves with the warmer weather to higher elevations. In effect, the regime creates a contact competitor for resources.

Monitoring surveys have not adversely affected special status species. When collecting data, refuge staff and volunteers minimize walking within sensitive areas and around riparian zone as much as possible during the growing/breeding season to avoid trampling and disturbance of special status species. Care is taken to avoid walking on burrows. The Refuge remains closed to the public, thereby eliminating potential negative effects that could arise from over-trampling.

The secondary strategy of using herbicides to combat the continued encroachment of non-native invasive species is safeguarded by Service policy. When applied by a licensed applicator, within the recommended time frame, according to all label recommendations, the continued use of this herbicide is not expected to affect invertebrates, vertebrates, special status species, or water quality.

4.1.3.1 Impacts on California condor

The California condor's long-term survival is dependent on healthy ungulate populations as a food source. Although, the grazing regimen does remove a potential fire hazard by removing dry vegetative matter, it also displaces the native ungulate populations (Stafford 2005). Native wildlife has to compete with domestic livestock for resources, especially basic needs essential for survival. In addition, numerous wildlife species, even with adequate resources, are unable to cohabitate with domestic livestock. Condors will travel long distances in search for food. The continued presence of contaminants and hazardous materials in the human environment has caused deaths in the condor population (Stockton 2005). Therefore, managing areas like the Refuge for the survival and enhancement of native ungulate populations benefits the long term survival of the condor population and achieves Refuge purposes. As a refuge management economic use, a grazing program must contribute to achieving the Refuge's purpose and System mission (50 CFR 29.1). The grazing program under the No Action Alternative does not contribute to achieving either. The No Action Alternative does not contribute to the long term recovery of the California condors, because the year round program contributes to the displacement of native ungulate populations. The No Action Alternative negatively affects native wildlife species resulting in not achieving the mission of the System.

4.1.3.2. Impacts on San Joaquin Kit Fox

Kit fox populations are effected by grazing in as much as the practice influences their prey species (USFWS 1998). Therefore, the grazing regimen indirectly poses a negative effect on the kit fox populations by depleting food, shelter, and water resources required by native wildlife species. All wildlife has three basic needs for survival: food, shelter, and water.

Additionally, kit foxes rely on burrows for shelter which may become crushed by cattle. Also, the removal of water resources effects the population negatively, by removing a principal element required for survival.

4.1.3.3. Impacts on Western Burrowing Owl

As with other species, the burrowing owl is dependant on grasslands for food and shelter. Overgrazing has depleted resources required for owl survival. Also, the burrowing owls and their prey need access to uncontaminated water resources. Even though the burrowing owl is one of the few species that can survive in heavily grazed environments, long term lack of basic survival elements will contribute to the decline of the population (Dechant et al. 2001).

4.1.3.4. Impacts on Blunt-nosed Leopard Lizard

Blunt-nose leopard lizards and giant kangaroo rats benefit from gaps in the substrate which allow for the unimpaired mobility, making it easier to flee from predators or capture prey (Boarman 2002, George et al 2004, USFWS 1998). The present program results in underutilization or overgrazing. Sections within grazed units are under grazed resulting in two to three feet of vegetation, too thick to maneuver in. While overgrazed areas result in bare soil, devote of shelter, resulting in the inability to escape predators. In addition, depleting valuable water resources, trampling or destroying burrows, and providing grazing pressure at the inappropriate time of year, can lead to further declines of these species (USFWS 1998).

4.1.3.5 Impacts on Tricolored Blackbird

Overgrazing on the Refuge adds to the decline of tri-colored blackbird (TRBL). They are dependent on higher vegetation (two to four feet) for survival, as are northern harriers (*Circuc cyaneus*) and long-eared owls (*Asio otus*) (Stafford 2005). TRBL require riparian areas with the appropriate substrate for breeding (Hamilton 2005). Current practices encourage the continued depletion of the upland watersheds and riparian areas resulting in direct negative consequence to the population.

4.1.3.6 Impacts on Giant Kangaroo Rat

See section 4.1.3.4 above for discussion.

4.1.4 Impacts on Contaminants

Given that known contaminants are associated with structures found on old homestead sites and the proposed activities under this EA are associated with grasslands, there should be limited possibility of livestock coming in contact with the contaminants.

4.1.5 Impacts on Social and Economic Environment

An unfortunate consequence of grazing on a wildlife refuge is the alteration of the aesthetic (scenery and odor) quality of the habitat. Even after the livestock has been removed, the imprint on the environment remains.

4.1.5.1 Impacts on Local Population Base

Under this alternative, there should be limited change in the impacts associated with the local population base.

This alternative includes the opportunity for all qualified applicants to pursue a cooperative agreement with the Service. Thereby, a potential effect to the former cooperator may exist if the former cooperator does not qualify for and/or is not issued the cooperative agreement through the fair and equal applicant process described.

4.1.5.2 Impacts on Economy

The economy should not be affected by implementation of any of these alternatives. Grazing will be established under a Cooperative Land Management Agreement. Services-in-kind (i.e., fence repair, water system rehabilitation, habitat restoration) will be rendered in substitution of grazing fees. Therefore, an economical exchange will not occur.

The former permittee had a positive economic effect resulted from the privilege of grazing on the Refuge. The future permittee, selected utilizing a fair and equal application process, would also gain a positive economic result.

4.1.5.3 Impacts on Public Use

Public use would remain the same as current levels under all alternatives, so no impacts are anticipated.

4.1.5.4 Impacts on Cultural Resources

The proposed action includes a variety of activities, some of which have the potential to effect historic properties and are considered undertakings. The following is a brief discussion on how cultural resources will be treated for each of the proposed alternatives.

The No Action Alternative is not considered an undertaking. However, new locations of water tanks and salt licks that attract cattle to gather in one location is considered an activity with the potential to effect historic properties, therefore, an identification effort will be completed prior to placement of tanks and salt licks. Activities that lead to concentration of livestock in a confined area are included in the Service's programmatic agreement with the California State Historic Preservation Office as an Appendix B type of project.

4.1.5.5 Impacts on Environmental Justice

None of the proposed management actions would have a disproportionately negative outcome on low-income or minority populations.

4.2 Alternative B: Prescribed Seasonal Grazing as Primary Strategy - Secondary Mowing and Herbicide Application

4.2.1 Impacts on Physical Environment

Grazing distribution is affected by numerous factors, including topography, weather, type of animal used, and distribution of shade, water, supplements, and fences (Anderson and Currier 1973, Barry and Larson 2004, Clendenin 2005, D'Antonio et al 2002). Unlike the current management (Alternative A), this alternative would have the flexibility to continue to amend the grazing pressure by adjusting stocking rates. Therefore seasonal grazing would be implemented in a rotational strategy that would enhance the habitat for the Service trust resources (Popolizio et al 1994). Also, incorporating rotational grazing program would increase native vegetation diversity (Beetz 2002). Implementation of rotation in the grazing program would periodically rest units thereby minimizing impacts to wildlife habitat (Hall et al 1992, Loomis et al 1991).

Adapting grazing practices specific to the local topography and improving infrastructure such as fencing protects the sensitive plant communities and soils from continued degradation (Allen-Diaz et al 2004).

4.2.1.1 Impacts on Air Quality

The effects on the air quality under this alternative would be similar to the No Action Alternative, with the exception that the grazing would be limited to approximately half the year as appose to year-round. Therefore, the effect would be limited to six months. See section 4.1.1.1 above for discussion for additional information.

4.2.2 Impacts on Biological Environment

4.2.2.1 General Impacts - Soil

Grazing has been used successfully as a management tool to maintain native vegetation on infertile soil types, however on fertile soil, grazing actually encouraged the spread of invasive

species (Safford and Harrison 2001). Therefore, each unit on the refuge has to be evaluated and managed as a separate component in order to maximize the enhancement of the habitat. In the current management (Alternative A), the units are basically separated into two large units, one winter/spring and the other summer/fall. There are minor adjustments made with one particular unit do to the presence of poor soil, but that is on a limited basis. Alternative B would allow for movement of livestock between units on a shorter time table, therefore allowing the soil to rebound and maintain its porosity. By contrast, the No Action Alternative maintains constant pressure to particular areas for six month duration, limiting the ability of the soil to maintain its function. This alternative would lead to improved soil conditions as compared to No Action Alternative.

4.2.2.2 Impacts on Grasslands

The impacts of livestock grazing on the grassland ecosystem can be separated into three distinct components: forage consumption, trampling, and nutrient input. While each of these impacts can have negative effects on the ecosystem if grazing is not properly managed, the effects of a low intensity, seasonal grazing regimen can improve grassland habitat and ecosystem functions. Under proper management, forage consumption by cattle has been demonstrated to efficiently reduce annual grass biomass, benefiting grassland plant community dynamics and hydrology. Non-native annual grasses exhibit rapid growth rates early in the season, depriving the slower growing native forbs of light and nutrients (Jackson and Roy 1986, Gordon et al. 1989). By preferentially consuming the taller, more palatable non-native grasses, cattle effectively increase light and nutrient availability for the native forbs during a key stage in their development. Under the current management (Alternative A) constant grazing of native grasses has reduced their vigor and allowed non-native grasses to prevail. In addition to the direct competitive effects of non-native annuals, the accumulation of annual litter alters temperature, moisture levels, and light availability at the soil surface, creating a micro-environment that favors the germination of non-native seeds and inhibits the emergence of certain native annual forbs (Heady 1956, Evans and Young 1970, Goldberg and Werner 1983, Knapp and Seastedt 1986, Facelli and Pickett 1991, Bosy and Reader 1995). By preventing this buildup of plant matter, known as RDM, cattle may increase the proportion of native perennial forb seeds that germinate. Unlike the current alternative (Alternative A), the livestock pressure under this alternative would be applied during the non-native annual grasses germination, resulting in the availability of resources for the native species. Maintaining an appropriate RDM (1,000 lbs per acre) discourages erosion, retains water in the soil, and provides vigor for perennial plants (Barry 1995, Bartolome et al 1980, D'Antonio et al 2002).

In addition, incorporating vegetation surveys during the growing season will provide the Refuge with plant community composition data and can assist in identifying and isolating a target plant community to better focus management objectives (George et al 2001, Pokorny et al. 2004). Furthermore, encouraging and maintaining plant community diversity creates a healthy ecosystem less susceptible to invasion by non-desired species (Eviner and Chapin 2001). Focusing efforts on a particular plant species can lead to isolation and dysfunction, therefore management objectives will be based on functional groups.

California's annual grassland vegetation has been shaped by 150 years of livestock grazing. Although intensive livestock grazing contributed to the displacement of California's native vegetation by European annual species in the past, complete exclusion of livestock from grassland habitat can result in increased cover of non-native annual grasses, with concomitant reductions in the diversity and abundance of native species. Seasonal grazing practices have been endorsed as a tool for promoting biodiversity in native grassland (Eviner and Chapin 2001). A flexible winter grazing regimen (i.e., from approximately mid-November to May) is expected to directly and indirectly impact grassland habitat and associated native and endangered species with positive overall results. In comparison to the No Action Alternative, this alternative would result in long term beneficial effects to the grasslands.

4.2.2.3 Impacts on Riparian and Wetland Habitats

The continued fencing of the riparian and wetland areas within the grazing units will yield a benefit to the native wildlife populations. A number of riparian and wetland habitats have been fenced. In addition, by employing a seasonal grazing regime, majority of the year the pressure imposed by the livestock will be minimized by rotating the livestock between units and removing them completely for half the year. Even though fence lines have been modified to allow passage to wildlife, including ungulate populations, the fact remains that the sole purpose of the fence lines is to keep livestock out of these areas. Thereby, the gates leading to the sensitive areas could actually remain open during most of the year and only be utilized while livestock remains in a particular unit.

In addition, areas that have not been fenced out or are not feasible to do so, mainly due to topography, size, and location, can be managed by employing rotational grazing thereby minimizing adverse affect of livestock. Allowing for very specific prescription of impact, can be mitigated and lessened (Bellows 2003). This action would result in long term improvements on effects associated with the riparian and wetland habitats, as compared to the No Action Alternative.

Mowing on the refuge would occur primarily in designated sensitive areas and only take place in riparian areas after the saturated soils have dried in order to avoid damage to sensitive species when the soil is too soft to support the mower. Particular areas to be mowed include large expanses (>10 acres) of unpalatable invasive species, and distinct areas will vary annually.

4.2.2.4 Impacts on Other Habitats

The difference in the grazing regime under this alternative as compared to the No Action Alternative is that this alternative involves rotating livestock between units at short intervals, typically a couple months and then completely removing the livestock between May through November. Therefore, even if the livestock have access to sensitive areas like the interior live oak and juniper brushlands, the effect is minimized by the short duration. Under the No Action Alternative, livestock utilize an area for six months thus prolonging the negative effects of compacting soil, removing all vegetation beneath the tree and bush species, and reducing

required resources for native wildlife. In comparison to the No Action Alternative, this alternative would result in long-term advantageous effects to the other habitats found on the Refuge in association with the grasslands.

4.2.3 Impacts on Special Status Species

The impact of grazing on the federally-listed species occurring on the Refuge can have both positive and negative effects, however, the potential negative effects can be avoided with low intensity grazing that is properly timed according to the phenologies (study of periodic biological phenomena, such as breeding and flowering) of native species and the climatic conditions of a given year (Barry 1995, Clendenin 2005, Germano et al. 2005, Griggs 2000, Saslow 2005). Forage consumption by cattle would be a benefit by removing non-native annual grasses thereby increasing available nutrients during the winter grazing season. Additionally, by reducing the thick litter canopy, cattle will increase available habitat for native forb germination and establishment. However, over-trampling has resulted in habitat fragmentation, compaction, and burrow destruction (USFWS 1998). Furthermore, the application of a constant grazing regimen over many years has been implicated in the displacement and degradation of natural water sources. These negative effects can be avoided by employing a low intensity, flexible grazing regime that is amenable to the annual variation in climate.

The overall positive effect of winter/spring grazing on the grassland ecosystem and its special status inhabitants offsets the potential negative effects. Furthermore, the use of a low intensity grazing regimen that is carefully timed would circumvent the occurrence of possible adverse effects. Monitoring populations of priority species, plant species composition, and RDM would allow the Refuge to detect the first sign of any negative effects of livestock trampling on special status species and adapt grazing prescriptions accordingly (Buechner 1989, Germano et al. 2005). Monitoring surveys would not adversely affect special status species. Extensive monitoring should allow for the detection of any unacceptable negative effects due to livestock and the immediate removal of cattle and adaptation of the management plan for future years.

In 1997, a group of investigators, in cooperation with state, federal, and private entities, began to study the effects of livestock grazing on species at risk in the San Joaquin Valley in California (Germano et al. 1997). The study is ongoing, but certain trends have developed. Unfortunately, effects on species at risk are inconclusive, due to the low number represented. There are however treads in regards to other species, common on the Refuge. Western meadow larks (*Sturnella neglecta*) seem to prefer ungrazed areas, while horned larks (*Eremophila alpestris*) are more abundant in grazed areas. Sideblotched lizards (*Uta stansburiana*) and western whiptails (*Cnemidophorus tigris*) seem to prefer grazed plots, but are found throughout the study area. Heermann's kangaroo rats (*Dipodomys heermanni*) and San Joaquin pocket mice (*Perognathus inornatus*) prefer ungrazed plots, while the opposite is true for short-nosed kangaroo rats (*Dipodomys nitratoides brevinasus*) (Boarman et al 2001). The results of this study will continue to be considered and relevant outcomes will be incorporated into management strategies.

Secondary management strategies, including mowing, herbicide spraying, and hand pulling would be used to reach habitat objectives not fully obtained by prescribed grazing activities alone. These strategies should not impact any of the special status species or habitats. The only strategy that may pose a risk would be the application of the herbicide Transline, but since the Service is required to do an annual pesticide permit to authorize the use of the chemical, any possible negative effects will have to be mitigated or the chemical would not be authorized.

With proper timing and preparation, mowing in sensitive areas should not negatively affect any special status species on the Refuge. It may incur some wildlife disturbance to ground nesting birds and small mammals, but these will be avoided by surveying the area to be mowed prior to mowing and timing activities post breeding season.

Transline would continue to be used under this alternative with effects identical to those described in section 4.1. Therefore, the chemical would be used on patches of yellow star thistle in hopes of controlling the continued invasions by the invasive species.

Hand pulling would continue to be employed on tamarisk and isolated plants of yellow star thistle to reduce the chance of spread.

Having all strategies available to the manager will provide a more reliable means to achieve the purposes and goals of the Refuge.

4.2.3.1 Impacts on California Condor

In the absence of adequate native ungulate populations, California condors can benefit from livestock grazing, not as a source of food, but as a tool to manage their foraging habitat. The cattle would provide a necessary service of maintaining vegetation at a level beneficial to native wildlife, thereby contributing to a healthy habitat for the condors. In addition, by employing a low impact rotational grazing program, native ungulate populations will have access to water and shelter resources during critical times of year; therefore, minimizing the potential negative consequence from competition. Also, the grazing pressure from cattle would be limited to particular areas and rotated, therefore the impact and disturbance to a particular area would be limited to a short time period as opposed to the current regime of six months. Of course, in years of higher vegetation yields, grazing would be extended to achieve desired levels. In comparison to the No Action Alternative, this alternative would result in long term minimal enhanced effects to California Condors.

4.2.3.2 Impacts on San Joaquin Kit Fox

Light to moderate livestock grazing should not negatively effect the kit fox populations, unless it results in destruction of shrub species and displacement of prey species (USFWS 1998). Therefore, steps have been taken to remove shrub communities from grazing. Those communities that have not been safeguarded should fare considerably better than the present program, were they are exposed to six months of livestock pressure, as appose to the couple

months proposed under this alternative. Furthermore, nocturnal rodent species, which are a part of the kit fox diet, may be negatively affected by the grazing. Thus, by implementing a lighter intensity of grazing and utilizing a smaller class of livestock, the hope is that the potential of crushing burrow and displacing rodent populations will be minimized. Consequently, as with the California condors, the effects of improperly timed or concentrated grazing can negatively effect the survival of the species. Therefore, this alternative should result in long term minor enhanced effects on the kit fox population as compared to the No Action Alternative.

4.2.3.3 Impacts on Western Burrowing Owl

A moderate reduction in grass height due to forage consumption and trampling by cattle in the upland areas would benefit populations of burrowing owl, giant kangaroo rats, and blunt-nosed leopard lizards. All three species prefer short grass habitat because it enhances predator detection and forage ability (Orth and Kennedy 2001, USFWS 1998). As mentioned before, the present regime fosters uneven utilization of the grasslands by overgrazing some areas and underutilizing others. Overgrazing depletes the habitat of needed resources vital to the long term survival of the above mentioned species. In addition, higher vegetation impedes their ability to maneuver, making it hard to capture prey and evade predators. This alternative would promote a more even distribution of livestock and the ability to readily move them between units to better utilize the habitat. The current cow/calf operation depends on cattle that are habituated to the area and do not distribute themselves evenly. Additionally, the cattle have calves throughout majority of the year or are pregnant, making it difficult to move them between units for fear of separating the cows from their offspring or imposing unnecessary stress on the expecting cows.

Also, California ground squirrels are a primary burrow provider for burrowing owls (BUOW), furnishing potential aestivation (resting) and nesting site for BUOW. Although cattle have the potential to crush existing burrows (Zambrano 1998), the low grazing intensity employed at the refuge should prevent over-trampling of any one area and minimize negative effects (USFWS 1998).

Furthermore, BUOW are more aggressive in defending their nests from intruders post hatching and during lower winds and temperatures (Fisher et al 2004). Therefore, disturbances would have to be mitigated in order to prevent possible abandonment, especially in units known for excessive wind conditions. This alternative would result in short-term minor beneficial effects on the BUOW as compared to the No Action Alternative.

4.2.3.4 Impacts on Blunt-nosed Leopard Lizard

Another outcome of light to moderate grazing is horizontal disturbance, the opening of gaps within the substrate created by cattle trampling, wallowing (resting), and tract creation (creating paths) (Noy-Meir et al 1989). The blunt-nosed leopard lizards and giant kangaroo rats benefit from gaps in the vegetation, resulting from opening their habitat (USFWS 1998). On the other hand, gaps pose a potential substrate for invasive species to take hold (Burns 2004). Therefore,

in managing these specific species a balance has to be achieved between providing an optimal habitat and controlling possible invasions.

As with the BOUW, the blunt-nosed leopard lizards and the kangaroo rats are dependent on burrows. Unfortunately, as mentioned before, the cattle do pose a risk to burrows and their inhabitants, therefore only a low intensity rotational grazing program would allow the flexibility to maintain minimal risk to the special status species.

Additionally, water resources would have to be evaluated and adjusted to insure quality and quantity of the resources were available to the wildlife. Additional steps will be taken to continue to safeguard water resources from the negative effects of livestock by incorporating barriers, such as fence lines, as necessary. In comparison to the No Action Alternative, this alternative would result in short-term minor beneficial effects on habitat requirements for the blunt-nosed leopard lizard.

For additional information please note section 4.2.3.3 above.

4.2.3.5 Impacts on Tricolored Blackbird

Tricolored blackbirds nest in various locations on the refuge utilizing nettles and cattails growing in natural springs and artificial ponds. In addition, TRBL forage in the grasslands located within a five mile radius of their nesting habitats (Hamilton 2005). They prefer grasslands with moderate to high vegetation. The TRBL arrive on the refuge toward the end of March and the fledglings remain through the summer months. Therefore a moderate grazing regime should not alter their ability to nest or forage, as long as the cattle remain excluded from their nesting habitat and the grasslands are no more than moderately grazed. Unlike the current regime, the seasonal regime would decrease the likelihood of overgrazing and maintain a level of vegetation required by the TRBL for foraging. In addition, the rotational nature of the new regime would be manipulated in a way to remove the livestock pressure from areas used by the TRBL for nesting. This alternative would result in long term minimal enhanced effects on the TRBL nesting colonies as compared to the No Action Alternative.

4.2.3.6 Impacts on Giant Kangaroo Rat

See effects for giant kangaroo rat above in section 4.2.3.3 and 4.2.3.4.

In comparison to the No Action Alternative, this alternative would result in short-term minor beneficial effects on habitat requirements to giant kangaroo rat, similar to blunt-nosed leopard lizard.

4.2.4 Impacts on Contaminants

Given that known contaminants are associated with structures found on old homestead sites and the proposed activities under this EA are associated with grasslands, there should be limited

possibility of livestock coming in contact with the contaminants. In comparison to the No Action Alternative, this alternative would result in long term negligible impartial effects to the contaminants.

4.2.5 Impacts on Social and Economic Environment

As stated in the No Action Alternative, an unfortunate consequence of grazing on a wildlife refuge is the alteration of the aesthetic (scenery and odor) quality of the habitat. Even after the livestock has been removed, the imprint on the environment remains. Little can be done to alter the view, but by minimizing the occurrence of overgrazing and protecting water resources, areas will have the ability to rebound and sustain a higher quality. This alternative would result in long term minor improved effects as compared to the No Action Alternative.

4.2.5.1 Impacts on Local Population Base

In comparison to the No Action Alternative, this alternative would result short term major benefit effect by providing an equal opportunity to the public and long term negligible effect.

4.2.5.2 Impacts on Economy

The economy should not be affected by implementation of this alternative. Grazing will be established under a Cooperative Land Management Agreement. Services-in-kind (i.e., water system rehabilitation, habitat restoration, fence repair) will be rendered in substitution of grazing fees. Therefore, an economical exchange will not occur. The grazer must be willing to follow the strict timing of the proposed grazing regimen and not suffer economic effects from the break in the grazing period (June to November). (Refer to the Service Compatibility Determination: Grazing 2006).

4.2.5.3 Impacts on Public Use

Public use would remain the same as current levels under all alternatives, so no impacts are anticipated.

4.2.5.4 Impacts on Cultural Resources

The proposed action includes a variety of activities, some of which have the potential to effect historic properties and are considered undertakings. The following is a brief discussion on how cultural resources will be treated for each of the proposed alternatives.

New locations of water tanks and salt licks that attract cattle to gather in one location is considered an activity with the potential to effect historic properties, therefore, an identification effort will be completed prior to placement of tanks and salt licks. Activities that lead to concentration of livestock in a confined area are included in the Service's programmatic

agreement with the California State Historic Preservation Office as an Appendix B type of project. Alternative B would be subject to the above provisions.

This alternative would result in short term negligible improved effects as compared to the No Action Alternative.

4.2.5.5 Impacts on Environmental Justice

None of the proposed management actions would have a disproportionately negative effect on low-income or minority populations. As compared to the No Action Alternative, this alternative would result in the short term benefit to the selected cooperator.

4.3 Alternative C: Prescribed Burning as Primary Strategy - Secondary Mowing and Herbicide Application

Grassland ecologists and land managers have recently adopted prescribed fire as an important restoration tool (Barry 1995, Dyer et al. 1996, Gillespie and Allen 2004, Griggs 2000, Menke 1992, Meyer and Schiffman 1999, Wills 2000). Periodic burns have been demonstrated to be effective at reducing the dense canopy of litter that accumulates in undisturbed annual grasslands with a resultant increase in the proportion of native forb species (Heady 1956, Menke 1992, Meyer and Schiffman 1999, Wills 2000). In addition, fires have the potential to restore normal dynamics (structure) to an ecosystem (Wright and Bailey 1982). Prescribed burns conducted at the Refuge every 3-4 years will remove annual grass litter enhancing wildlife habitat. Secondary mowing and herbicide application will control invasive species that establish in non-burn (drought) years, in unburned areas, and during seasons when burning is not possible. The potential for non-native invasive species re-establishment following a burn is approximately three years; therefore burning every 3-4 years could also help control the spread of these species (Menke 1982).

The first year following a prescribed burn, studies have shown a minimal difference between burned areas and unburned control plots. On the other hand, two years following a burn, a substantial increase of vegetation was observed on the burned plots. As with grazing, plant composition was more influenced by the local weather patterns and soil moisture, than the treatment (Larson and Duncan 1982). However, vegetation was greener longer following a burn, but also shorter in height.

Prescribed burns have the potential to threaten public safety. The devastating results of wildfire are known in southern California. Therefore, strict procedures are followed to ensure the safety of the public and their property. Also, prescribed burning will entail some economic costs to the Service.

4.3.1 Impacts on Physical Environment

The effects of climate, as well as species-specific responses to fire, limit the predictability of prescribed fire effects. Fire intensity is strongly affected by prevailing climatic conditions, which influence the moisture level of the fuel load (Wright and Bailey 1982). To account for this, prescribed burns would only be conducted at the Refuge when fuel contains the proper moisture content and weather conditions are favorable, as defined by individual burn plans.

4.3.1.1 Impacts on Air Quality

Prescribed burns have the potential to pose a considerable negative effect on the air quality of San Joaquin Valley Air Basin, therefore all policies, regulations, and standards will be followed. The prescribed burns would be conducted in a manner that does not exacerbate local area air conditions. Each prescribed burn has a developed prescription which includes air quality standards.

In comparison to the No Action Alternative, this alternative would result in short term immediate degraded effect on air quality.

See section 4.1.1.1 above for discussion on the effects resulting from herbicide use.

4.3.2 Impacts on Biological Environment

Prescribed fire would be supported by secondary management strategies including mowing and herbicide spraying as needed. Refer to sections 4.1 and 4.2 for further discussion detailing the effects of secondary uses of mowing and herbicide spraying, which are expected to be identical under all alternatives.

4.3.2.1 Impacts on Soil

The use of prescribed fire under this alternative would lead to a reduction in annual grass litter. This would increase light penetration and temperature fluctuations on the soil surface, which could enhance native forb germination and flower production (D'Antonio et al 2002, Gillespie and Allen 2004, Pollak and Kahn 1998, Wright and Bailey 1982). Reduced organic loads may also positively effect nutrient cycling (Keeley and Zedler 1998).

A negative effect of the implementation of prescribed fire is the disturbance of soil necessary to maintain fire breaks. Fire breaks are needed to protect sensitive areas and prevent the possible escape of fire outside of the prescribed area. Fire beaks would be maintained along already established access roads. Fire breaks within the Refuge would be scraped, not disked, in order to minimize the potential of burrow disturbance.

Presently, the Kern County Fire Department annually disks fire breaks between the edges of the refuge and public roads in order to prevent the spread of wildland fire as required under the

Bitter Creek Wildland Fire Management Plan. These fire breaks are in addition to the fire breaks necessary for the implementation of the prescribed fire program. An unfortunate negative effect of the disk breaks is the predominant occupancy of non-native species such as yellow star thistle and mustard. Additionally, disking has the potential to disturb burrows. Therefore, in order to prevent the possibility of a wildfire and minimize the effect of burrow disturbance, the disking is consistently done utilizing the same route and disking only areas necessary.

This alternative would result in long term minimal beneficial effect s to the soils compared to the No Action Alternative.

4.3.2.2 Impacts on Grasslands

Like grazing, prescribed fire has the potential to both positively and negatively effect the grassland habitat, but adverse effects can be avoided with proper timing and intensity of fire. Late-spring burning, commonly used in grassland restoration projects, takes advantage of the temporal gap between native seed set and that of certain late-blooming invasive species (e.g., YST) (Gillespie and Allen 2004, Wills 2000). Areas with high levels of non-native grasses responded positively to spring prescribed burns with shorter periods between burns (Wills 2000). Additionally, the effects of fall burns would not destroy immature non-native seeds, but the burns would be an effective means to reduce RDM.

One potential negative aspect of fall burns is that they can reach extreme intensity in dry years if fuel levels are high (Pollak and Kan 1998). Therefore, in dry years, crushing or rolling tall grass fuels prior to ignition would serve to reduce flame height and prevent negative effects associated with severe fire.

Climate also has a strong influence over the species composition of the grassland plant community (Zavaleta et al 2003), and may be the primary determinant of changes, or lack thereof, in composition following a prescribed burn (Wright and Bailey 1982). Native forb abundance is influenced by post-burn precipitation, with greater increases in years with more rainfall after the burn. An additional factor contributing to the unpredictable outcome of prescribed burns is interspecific variation intolerance to fire. By comparing pre and post-burn vegetation data, Refuge staff would be able to ascertain which, if any, native species respond poorly to fire and would not burn that vegetation in the future. Spring burns have successfully reduced non-native annual grasses and some native forbs, while increasing other native grasses including perennial grasses (Wills 2000).

The aesthetic (scenery and odor) quality of the grasslands would be temporarily altered due to smoke from the fire. The burns would be closely coordinated with the Kern County Fire Department and would be subject to strict adherence to the standards and guidelines for seasonal prescribed burning prescribed by the county and USFWS. Additionally, conducting small-scale prescribed burns would greatly decrease potential future negative effects resulting from wildfires by reducing the thick fuel layer. In comparison to the No Action Alternative, this alternative would result in long term major improved effects on the grasslands.

4.3.2.3 Impacts on Riparian and Wetland Habitats

Riparian and wetland habitats would not be included in the burn plan. These areas would be managed using other methods as necessary. Protection in the form of fire breaks would be utilized in order to minimize the potential for fire escape. This alternative would result in long term minimal enhanced effects to the riparian and wetland habitats compared to the No Action Alternative.

4.3.2.4 Impacts on Other Habitats

The intention of this alternative is to maintain grassland habitats with the use of prescribed fire, and to safeguard the woodland habitats from the effects of fire. Precautions would be implemented to ensure that the woodland habitats would not be exposed to fire. Although, following a fire, woody species have the potential to replace annuals in chaparral habitats, benefiting the environment (Stylinski and Allen 1999, Wright and Bailey 1982). In comparison to the No Action Alternative, this alternative would result in long term minimal beneficial effects to the other habitats.

4.3.3 Impacts on Special Status Species

Late fall/winter/spring burning is not likely to negatively affect the special-status species at the Refuge. Prescribed burns should not negatively affect neotropical migrant birds or year round burrowing wildlife. Furthermore, all species will benefit from a reduction in litter build-up following the burn.

4.3.3.1 Impacts on California Condor

California condors can benefit, as would other species, from the renewed grassland habitat (Wright and Bailey 1982). Therefore, the grassland ecosystem has the potential to be enhanced by a properly timed and managed burn.

The habitat has the potential to bounce back quickly following a burn; therefore the potential for displacement of ungulate populations is minimal. Furthermore, deer populations have noticeably increased in most areas following a burn (Wright and Bailey 1982). This alternative would result in long term minimal enhanced effects to California condor populations compared to the No Action Alternative.

4.3.3.2 Impacts on San Joaquin Kit Fox

Kit foxes are dependent on nocturnal rodent populations for prey. Short term displacement of these species may occur following a burn. On the other hand, the long term renewal of native vegetation benefits not only the nocturnal prey species, but also the kit fox populations. Therefore, the short term negligible adverse effects of this alternative are minor compared to the

long term beneficial effects to the kit fox populations when compared to the No Action Alternative.

4.3.3.3 Impacts on Western Burrowing Owl

Protecting habitats from fire results in the buildup of dry matter, which in turn results in reduced productivity. The burn would remove the RDM left and open the substrate for the smaller species at risk (Wright and Bailey 1982). Burrowing species survive prescribed fires by remaining in their burrows. Especially since prescribed burns are controlled and maintained at low intensities. By removing the liter build up, the chance of a high intensity wildfire is reduced. In comparison to the No Action Alternative, this alternative would result in short term minimal degraded effects and long term beneficial effects on western burrowing owls.

4.3.3.4 Impacts on Blunt-nosed Leopard Lizard

In the lower elevation, similar in structure to the San Joaquin Valley floor habitat, fire would not be implemented in areas with plants of the genus *Atriplex*. Fire has been shown to be lethal to the particular plants found in the valley floor ecosystem. This plant is known to occur in areas utilized by blunt-nose leopard lizards and giant kangaroo rats. Therefore, this alternative would have a short term minimal adverse effect on blunt-nose leopard lizard and giant kangaroo rat populations occurring in ecosystems occupied by *Atriplex*, but a long term minimal beneficial effects, compared to the No Action Alternative.

For additional information note previous section 4.3.3.3.

4.3.3.5 Impacts on Tricolored Blackbird

Tricolored blackbirds are dependent on grasslands as foraging habitat. As with other species, the initial result of fire decreases the amount of forage habitat. In the long term, the increase of native vegetation diversity and dominants and the decrease of non-native grasses, benefits the blackbirds (Wills 2000). In comparison to the No Action Alternative, this alternative would result in long term minor improved effects to tricolored blackbird foraging habitat.

4.3.3.6 Impacts on Giant Kangaroo Rat

See previous sections 4.3.3.3 and 4.3.3.4 on the effects of fire on giant kangaroo rat populations.

4.3.4 Impacts on Contaminants

The contaminants found on the Refuge are associated with structures on old homestead sites. The proposed prescribed fire activities under this EA are associated with grasslands, there should be limited possibility of personnel coming in contact with the contaminants. This alternative would result in short term negligible degraded effect on contaminants compared to the No Action Alternative.

4.3.5 Impacts on Social and Economic Environment

An unfortunate consequence of prescribed burn areas is the aesthetic quality of the habitat immediately following a burn. This alternative would result in short term minimal degraded effect on the social and economic environment compared to the No Action Alternative.

4.3.5.1 Impacts on Local Population Base

There is a potential for prescribed fires to escape and pose a risk to the local residence. Therefore each burn has a specific burn plan written that takes into account all potential risks and all available measures are taken to prevent any damage to property and people. In comparison to the No Action Alternative, this alternative would result in short term negligible effects on the local population base.

4.3.5.2 Impacts on Economy

As stated in the previous section, prescribed fires are the only potential hazard source and all available measures will be taken to prevent any damage to property or people due to prescribed burning at the Refuge. This alternative would result in short term negligible effects on the local economy compared to the No Action Alternative.

4.3.5.3 Impacts on Public Use

Public use would remain at the current levels under all alternatives, so no effects are anticipated.

4.3.5.4 Impacts on Cultural Resources

The proposed actions include a variety of activities, some of which have the potential to effect historic properties and are considered undertakings. The following is a brief discussion on how cultural resources will be treated for each of the proposed alternatives.

Prescribed burning is a new management strategy that has the potential to effect historic properties. Therefore, prior to implementing a burn plan the parcels to be burned will be reviewed to identify any previously recorded sites and determine the potential for cultural resources. If the potential for prehistoric sites or historic buildings is considered to be high a pedestrian survey will be completed to identify historic properties. The fire lines to be scarped will be along already established roads and therefore should not require to be surveyed for potential historical significance. Prescribed burns in uplands and fire line excavation are included in the Service's programmatic agreement with the California State Historic Preservation Office as an Appendix B type of project.

In comparison to the No Action Alternative, this alternative would result in short term negligible degrading effects associated with prescribed fire.

4.3.5.5 Impacts on Environmental Justice

None of the proposed management actions would have a disproportionately negative effect on low-income or minority populations.

4.4 Alternative D: Prescribed Grazing as Primary Strategy B Prescribed Burning, Mowing, and Herbicide Application (Preferred Action)

This alternative would implement a seasonal grazing regime as the primary management strategy with mowing, herbicide application, and prescribed fire as secondary strategies. The environmental consequences of seasonal grazing, mowing, herbicide use, and prescribed burns are described in detail above in Alternatives B and C (4.2 and 4.3). Grazing remains the primary grassland management tool for the Refuge. One of the expected problems, in the absence of some form of active management in annual grassland ecosystems, is that the grassland will tend toward a rank, less diverse stand of one or more of the more aggressive Mediterranean exotics such as ripgut brome. This situation creates undesirable habitat for small native mammal species and the larger mammal species that prey on them. Management options include intensive grazing just prior to seed set to reduce competition with the more desirable species, or burning to reduce the volume of the seedbed, in addition to the continued use of herbicide and mowing to control invasive species.

The inclusion of prescribed burning in this alternative provides an additional technique available for grassland management. However, as described in Alternative C, prescribed burns threaten public safety. On the other hand, the heavy fuel loads at the Refuge present a wildfire threat that would be attenuated by the burning of the excess fuel in a controlled manner if grazing fails to adequately reduce litter accumulation. Fire would not be utilized until the other strategies are given adequate time to work, usually it takes about three years to see changes following a shift in management strategy (Beetz 2002).

Additionally, grazing and prescribed burns can successfully reduce excess RDM, preventing ripgut brome and soft chess from creating monocultures (Barry and Larson 2004, Hull and Muller 1976). In general, non-native invasive species prefer soil with richer nutrient levels (Burns 2004, Leishman and Thomson 2005). Therefore, native vegetation may benefit from low intensity grazing, since it can survive on poorer soil types (Safford and Harrison 2001).

However, if grazing does not prove to be an effective method for non-native annual grass removal, prescribed burns are considered a cost effective method to removing large areas of non-native vegetation.

Currently, a thick canopy of litter covers many upland areas of the Refuge, while other areas are barren. This affects the ability to sustain water quantity and quality. A review of upland grassland management techniques, as well as advice from ecologists and land managers, indicate that a seasonal management-intensive program will benefit native plants and wildlife (Clendenin 2002-5, Hadlik 2005, Saslaw 2005, Stafford 2005). Specifically, carefully timed seasonal

grazing is an effective means to reduce annual grass biomass and prevent litter buildup. Supplementary mowing, herbicide addition, and prescribed burning will likely aid in the reduction of non-native plants and overall improvement of the ecosystem.

4.4.1 Impacts on Physical Environment

Note sections 4.2.1 and 4.3.1 for discussion on the possible effects on the physical environment imposed by the low impact seasonal grazing and prescribed burns.

4.4.1.1 Impacts on Air Quality

The prescribed fire component of this alternative would result in short term immediate degraded effect on air quality, in comparison to the No Action Alternative.

Note sections 4.2.1.1 and 4.3.1.1 for discussion on the possible effects on the air quality of the San Joaquin Valley Air Basin imposed by the low impact seasonal grazing and prescribed burns.

4.4.2 Impacts on Biological Environment

A crucial component of a healthy ecosystem is the maintenance and, where appropriate, the enhancement of biodiversity (Allen-Diaz 2000, Tausch et al 1993). In addition, diverse plant communities are more prone to survive adverse conditions (Eviner and Chapin 2001). Hence a plan encompassing multiple strategies would allow the flexibility to manage and encourage biodiversity. Therefore, management objectives can be accomplished by having the flexibility of multiple strategies and tools.

4.4.2.1 Impacts on the Soil

This alternative would lead to improved soil conditions as a result of the low impact rotational grazing, as compared to No Action Alternative. In addition, the alternative would also result in long term minimal beneficial effects to the soils as a result of the prescribed burns, compared to the No Action Alternative.

For information on the possible effects associated with low impact seasonal grazing, prescribed fire, and control of invasive species on soil see sections 4.2.2.1 and 4.3.2.1.

4.4.2.2 Impacts on the Grassland

Grasslands not subject to grazing are dominated by tall perennials and annuals, with the composition subject to local climate (Noy-Meir et al. 1989). With the addition of light to moderate grazing, the composition of the grassland has the potential to be dominated mainly by different annual species. Non-native annual species have come to dominate grasslands throughout California, whether grazing is utilized or not (Jackson 1985). Studies have shown that complete removal of grazing from an area does not return the habitat to a native-dominated

ecosystem; however it also shows that removing grazing does not harm the native plant community (Harrison 1999). Therefore, the studies suggest that some form of management is necessary to remove the competition allowing native plants to thrive as appose to being crowded out. Hence in the absence of sufficient ungulate wildlife populations it is necessary to rely on human imposed strategies like grazing and prescribed burns. On the other hand, removing the grazing completely does not harm the habitat. Grazing and prescribed burns are being utilized to control non-native vegetation in addition to removing a potential fire hazard.

Utilizing multiple strategies to combat invasive species increases the chances of eliminating the infestation (Burns 2004). YST, for example, can be controlled with grazing, fire, biological control agents, herbicides, or mowing, if appropriately timed (DiTomaso et al 2000). Depending on the YST stage of development, the various control strategies can be effective in controlling the spread. However, if utilized during the wrong stage of development the control strategies can actually increase the spread. In comparison to the No Action Alternative, this alternative would result in long term beneficial effects to the grasslands.

4.4.2.3 Impacts on Riparian and Wetland Habitats

For information on the possible effects associated with low impact seasonal grazing, prescribed fire, and control of invasive species in riparian and wetland habitats see sections 4.2.2.3 and 4.3.2.3. This alternative would result in long term minimal enhanced effects to the riparian and wetland habitats compared to the No Action Alternative.

4.4.2.4 Impacts on Other Habitats

In comparison to the No Action Alternative, this alternative would result in long-term advantageous effects to the other habitats found on the Refuge in association with the grasslands.

For information on the possible effects associated with low impact seasonal grazing, prescribed fire, and control of invasive species in other types of habitats see sections 4.2.2.4 and 4.3.2.4.

4.4.3 Impacts on Special Status Species

Note sections 4.2 and 4.3 for discussion on the possible effects on the special status species imposed by low impact seasonal grazing and prescribed fire.

4.4.3.1 Impacts on California Condor

In comparison to the No Action Alternative, this alternative would result in long term minimal enhanced effects to California Condors.

For information on the possible effects associated with low impact seasonal grazing, prescribed fire, and control of invasive species on California condor see sections 4.2.3.1 and 4.3.3.1.

4.4.3.2 Impacts on San Joaquin Kit Fox

The grazing strategy of this alternative should result in long term minor enhanced effects on the kit fox population as compared to the No Action Alternative. Additionally, the prescribed burns should result in short term negligible adverse effects and the long term beneficial effects to the kit fox populations when compared to the No Action Alternative.

For information on the possible effects associated with low impact seasonal grazing, prescribed fire, and control of invasive species on San Joaquin Kit Fox see sections 4.2.3.2 and 4.3.3.2.

4.4.3.3 Impacts on Western Burrowing Owl

In comparison to the No Action Alternative, this alternative would result in short term minimal degraded effects and long term beneficial effects on western burrowing owls.

For information on the possible effects associated with low impact seasonal grazing, prescribed fire, and control of invasive species on Western Burrowing Owl see sections 4.2.3.3 and 4.3.3.3.

4.4.3.4 Impacts on Blunt-nosed Leopard Lizard

In comparison to the No Action Alternative, this alternative would result in short-term minor beneficial effects on habitat requirements for the blunt-nosed leopard lizard.

For information on the possible effects associated with low impact seasonal grazing, prescribed fire, and control of invasive species on Blunt-nosed Leopard Lizard see sections 4.2.3.4 and 4.3.3.4.

4.4.3.5 Impacts on Tricolored Blackbird

This alternative would result in long term minimal enhanced effects on the TRBL nesting colonies as compared to the No Action Alternative.

For information on the possible effects associated with low impact seasonal grazing, prescribed fire, and control of invasive species on Tricolored Blackbird see sections 4.2.3.5 and 4.3.3.5.

4.4.3.6 Impacts on Giant Kangaroo Rat

In comparison to the No Action Alternative, this alternative would result in short-term minor beneficial effects on habitat requirements to giant kangaroo rat, similar to blunt-nosed leopard lizard.

For information on the possible effects associated with low impact seasonal grazing, prescribed fire, and control of invasive species on Giant Kangaroo Rat see sections 4.2.3.6 and 4.3.3.6.

4.4.4 Impacts on Contaminants

See sections 4.2.4 and 4.3.4 for effects on contaminants associated with this alternative.

4.4.5 Impacts on Social and Economic Environment

This alternative would result in long term minor improved effects as compared to the No Action Alternative.

See sections 4.2.5 and 4.3.5 for possible effects on social and economic environment which are applicable to the proposed alternative.

4.4.5.1 Impacts on Local Population Base

In comparison to the No Action Alternative, this alternative would result short term major benefit impact by providing an equal opportunity to the public and long term negligible effect.

See sections 4.2.5.1 and 4.3.5.1 for possible effects on local population base.

4.4.5.2 Impacts on Economy

The economy will be positively effected by the implementation of any of the alternatives. If the proposed action alternative D is implemented, grazing will be established under a Cooperative Land Management Agreement, creating a positive economic effect for the cooperator. Services-in-kind (i.e., fence repair, water system rehabilitation, habitat restoration) will be rendered in substitution of grazing fees. The cooperator must be willing to follow the strict timing of the proposed grazing regimen and not suffer economic effects from the break in the grazing period (June to November). (Refer to the Service Compatibility Determination: Grazing).

Prescribed fires are the only potential hazard source and all available measures will be taken to prevent any damage to property or people due to prescribed burning at the Refuge.

4.4.5.3 Impacts on Public Use

Public use would remain the same as current levels under all alternatives, so no effects are anticipated.

4.4.5.4 Impacts on Cultural Resources

The proposed actions include a variety of activities, some of which have the potential to effect historic properties and are considered undertakings. The following is a brief discussion on how cultural resources will be treated for each of the proposed alternatives.

See sections 4.2.5.4 and 4.3.5.4 for potential effects associated with the preferred alternative.

4.4.5.5 Impacts on Environmental Justice

None of the proposed management actions would have a disproportionately negative effect on low-income or minority populations.

4.5 Unavoidable Adverse Impacts

The proposed action would have a beneficial effect, although insignificant, on special status and native species and their habitat on a long-term scale. The action would not degrade habitats, water, or air quality, and would not disrupt or conflict with any land use, social, or cultural factors. No direct or indirect unavoidable adverse effects to the biological environment would result from the selection of any of the alternatives. The Service would prevent incremental adverse effects, such as degradation and loss of habitat over time, to the land and its associated native plants and animals.

The preferred action does eliminate the current cow/calf permittee operating under an annual Special Use Permit. However, with the proposed changes the Service recognizes the need to be unbiased toward the public and therefore will follow the required guidelines and protocols set forth by the refuge manual.

4.6 Irreversible and Irretrievable Commitments of Resources

At the present time, the native ungulate populations are limited in number and therefore unable to maintain the desired and beneficial habitat required for the Refuge purpose and establishment. Therefore, under the no action alternative with only limited habitat management, some plant and animal species could become extirpated over time, causing an irreversible and irretrievable loss.

4.7 Short-term Uses versus Long-term Productivity

The habitat protection and management program proposed as part of the Refuge System is permanent, to the extent possible, and exclusively dedicated to maintaining the long-term productivity of the Bitter Creek National Wildlife Refuge habitats. The local short-term uses of the environment that are proposed would include increased management of wildlife habitats. The resulting long-term productivity would include increased protection and management of endangered and special status species and a myriad of plant and animal species.

4.8 Cumulative Impacts

There are no cumulative effects expected from any of the alternatives.

4.9 Table 3. Summary of Environmental Consequences, Alternatives A-D

Affected Resource	**Alt. A Year-round grazing w/mowing and herbicide (No Changes to Existing Action)**	**Alt.B Seasonal Grazing w/ mowing and herbicide**	**Alt.C Fire w/ mowing and herbicide**	**Alt. D Seasonal Grazing w/ fire, mowing and herbicide (Preferred Action)**
Grassland habitat (RDM reduction)	Variable, some areas overgrazed, others undergrazed.	Positive effect; reduced RDM each year	Positive; reduced RDM every few years	Positive; reduced RDM over longer time
Riparian Areas and designated sensitive areas	Negative	Minimal, positive effects	Minimal, positive effects	Minimal, positive effects
Other Habitats	Negative	Minimal, positive effects	Minimal, positive effects	Minimal, positive effects
California Condor	Variable, some areas overgrazed, others undergrazed.	Minimal, positive effects	Minimal, positive effects	Minimal, positive effects
San Joaquin Kit Fox	Negative, displacement of prey and habitat	Minimal, positive effects	Minimal, positive effects	Minimal, positive effects

Burrowing owl	Variable, uneven	Minimal, positive effects	Minimal direct effects; Positive	Minimal, positive effects
Blunt-nosed Leopard Lizard	Variable, uneven	Minimal, positive effects	Minimal, positive effects	Minimal, positive effects
Tricolored blackbird	Negative, overgrazed and destructive to nesting habitat	Positive overall effect w/ minimal effects	Minimal direct effects	Minimal, positive effects
Giant Kangaroo Rat	Variable, uneven	Minimal, positive effects	Minimal, positive effects	Minimal, positive effects
Refuge Operating Costs	No change, funding would be designated to Region Office	Minimal, funding would be used for habitat restoration	High	Minimal, funding would be used for habitat restoration
Cultural Resources	Variable, dependant on access	Variable	Negative; potential for wildfire	Negative; potential for wildfire

Table 4. Timeline for Monitoring Activities at Bitter Creek for all alternatives.
Note: Pool topography and soil pH of pools will be monitored as needed once baseline data is gathered.

Monitoring Needs	Oct	Nov	Dec	Jan	Feb	Mar	April	May	June	July	Aug	Sept
Annual precipitation to determine grazing onset	X	X										
Water volume and quality		X			X			X			X	
Amphibian populations					X	X	X		X			
BUOW populations								X	X	X		
Upland vegetation species composition	X			X			X			X		
Invasive species abundance							X	X	X	X	X	
Cattle effects; qualitatively estimate RDM	X											X

Section 5: CONSULTATION AND COORDINATION WITH OTHERS

Management strategies and biological field monitoring will be supervised by Hopper Mountain NWRC personnel. All prescribed fires will have the additional supervision of the Service Regional Fire Management Officer, as well as additional staff, if necessary. All Refuge prescribed burns would be conducted under the restrictions imposed by the Kern County Fire Department, U.S. Fish and Wildlife Service Ecological Services Office, California state air quality standards and the mandates of Service Policy.

Distribution and Availability

A letter announcing the start of a 30 day public comment period for this EA and the Compatibility Determination was sent out in June, 2006 to all organizations and individuals on the mailing list (Appendix E). The letter summarized the purpose and need for action, as well as the four alternatives. Individuals with an asterisk (*) beside their name received copies of this EA and the Compatibility Determination with the letter. Other individuals were asked to request copies of the documents if interested or view them directly at the Headquarters for the Hopper Mountain National Wildlife Refuge Complex, in Ventura, CA.

Environmental Review and Coordination

As a Federal agency, the Service must comply with provisions of the NEPA and its implementing regulations. An environmental assessment is required under the NEPA to evaluate reasonable alternatives that would meet stated purpose and needs and to assess the possible impacts to the human environment. The EA serves as the basis for determining whether implementation of the proposed action would constitute a major Federal action considerably affecting the quality of the human environment.

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Personal Communications Scope List

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Braun, Marlene. 2002-2005. Monument Manager. Carrizo Plain National Monument, BLM.

Clendenen, Dave. 2002-2005. Preserve Manager. Wind Wolves Preserve.

Hadlik, Neil PHD. 2005. Resource Manager. City of San Luis Obispo, California.

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Stockton, Michael. 2002-2006. Supervisory Lead Wildlife Biologist. Hopper Mountain National Wildlife Refuge Complex: California Condor Recovery Program, USFWS.

APPENDIX A
Definitions

APPENDIX A – Definitions

Adaptive Management: a form of management flexible to immediate and gradual changes

Animal-Unit (AU): defines forage consumption on the basis of one standard mature 1,000-pound cow, either dry or with calf up to 6 months old; all other classes and kinds of animals can be related to this standard.

Animal-unit-day (AUD): the amount (26 pounds) of air-dry forage calculated to meet one animal unit's requirement for one day.

Animal-unit-month (AUM): the amount (780 pounds) of air-dry forage calculated to meet one animal unit's requirement for one animal unit for one month.

Browse: that part of a leaf and twig growth of shrubs, woody vines and trees available for animal consumption.

Bunch grass: a grass having a growth habit of a bunch, lacking stolons or rhizomes.

Carrying capacity: the average number of livestock and wildlife that may be sustained on a management unit compatibly with management objectives. It is a function of site characteristics, and management goals and intensity.

Class of animal: description of age and sex group for a particular kind of animal, e.g. cow, calf, yearling heifer, ewe, fawn.

Continuous grazing: the grazing of a specific unit throughout a year, growing season, or that part of a year when grazing is feasible.

Cool-season plant: a plant that generally makes the major portion of its growth during the late fall, winter, and spring.

Cover: (1) the plant or plant parts, living or dead, on the ground surface. (2) the proportional area of ground covered by plants on a stated area.

Ecosystem: Organisms that together with their physical environment form an interacting system and inhabit an identifiable space.

Forage: browse and herbage that are available for food for grazing animals or be harvested for feeding. Forage production: the weight of forage that is produced within a designated period of time on a given area (e.g. pounds per acre).

Forb: a non-woody, broad-leafed plant.

Frequency: in reference to a grazing response index, the number of times plants are defoliated during a growing season.

Geographic information system (GIS): a computer system that allows information about land to be as maps. Different characteristics, such as vegetation or soil types, are stored as separate "layers." The layers can be combined to display interactions of characteristics.

Grass: a plant with long, narrow leaves having parallel veins and nondescript flowers. Stems are hollow or pithy in cross-section.

Grass-like plant: a plant that resembles a grass but has stems that are solid in cross-section, including rushes and sedges.

Grazing management: the control of grazing and browsing animals to accomplish a desired result.

Grazing preference: (1) selection of plants, or plant parts, over others by grazing animals. (2) In the administration of public lands, a basis upon which grazing-use permits and licenses are issued.

Grazing pressure: an animal-to-forage relationship measured in terms of animal units per unit weight of forage at any instant.

Grazing system: grazing management that defines the periods of grazing and non-grazing.

Grazing unit: a grazing area enclosed and separated from other areas by fencing or other barriers.

Habitat type: the collective area that one plant community occupies or will come to occupy as succession advances to climax.

Half-shrub: a perennial plant with a woody base whose annual stems die each year.

Herbage: total aboveground biomass of herbaceous plants regardless of grazing preference or availability.

Introduced species: a species not a part of the original fauna or flora of a given area.

Invader: plant species that were absent in undisturbed portions of the original vegetation of a specific range site and will invade or increase following disturbance or continued heavy grazing.

Monitoring: the orderly collection, analysis, and interpretation of resource data over time to evaluate progress toward meeting management objectives.

Native species: a species that is a part of the original fauna or flora of a given area.

Overgrazing: continued heavy grazing that exceeds refuge habitat objectives and the recovery capacity of individual plants in the community and creates a deteriorated range.

Palatability: the relish with which a particular species or plant part is consumed by an animal.

Phenology: the study of periodic biological phenomena that are recurrent such as flowering or seeding, especially as related to climate.

Photopoint: a point from which photos are periodically taken to monitor long-term management responses.

Plant community: as assemblage of plants occurring together at any point in time, denoting no particular ecological status.

Plant succession: the process of vegetation development whereby an area over time is occupied by different plant communities of later ecological stage.

Plant vigor: plant health; relates to the relative robustness of a plant in comparison to other individuals of the same species.

Range condition: the health of range as compared to some standard at a point in time. The standard can be defined in ecological terms or in terms of a particular use. In the ecological determination, the degree of departure from climax determines condition.

Range management: a district discipline founded on ecological principles with the objective of sustainable use of rangelands and related resources for various purposes.

Residual dry matter: (RDM) the amount of old plant material left on the ground at the beginning of a new growing season.

Rest: leaving an area ungrazed for a specific time. Rest period. The length of time that a management unit is not grazed.

Rest-rotation: a grazing-management scheme in which rest periods, usually for a full growing season, for individuals grazing units are incorporated into a grazing rotation.

Riparian zone: the banks and adjacent areas of water bodies, water courses, seeps and springs whose waters provide soil moisture sufficiently in excess of that otherwise available locally so as to provide a moister habitat than that of contiguous flood plains and uplands.

Rotation grazing: a grazing scheme where animals are moved from one grazing unit in the same group of grazing units to another without regard to specific graze: rest periods or levels of plant defoliation.

Species composition: the proportions of various plant species in relation to the total on a given area.

Stocking density: the relationship between the number of animals and the area of land at any given time.

Stocking rate: the number of specific kinds and classes of animals grazing a unit of land for a specified time period.

Suitability: the adaptability of an area to grazing by livestock or wildlife.

Umbrella (Key) Species: a particular species which requires specific requirements (environmental conditions) for survival which mirror requirements of other species. Hence by providing and managing for the "umbrella" species, other species benefit.

Use: the proportion of current years forage production that is consumed or destroyed by grazing animals.

Warm-season plant: a plant that makes most or all its growth during late spring, summer or early fall and is usually dormant in winter.

Weed: (1) a plant growing where unwanted. (2) A plant having a negative value within a given management system.

APPENDIX B
Bitter Creek National Wildlife Refuge
Partial Wildlife List

APPENDIX B

Bitter Creek National Wildlife Refuge
Partial Wildlife List

Amphibians and Reptiles

C = Common, R = Rare, S = Seasonal

Western toad (California)	*Bufo boreas (halophilus)*	C
Pacific Chorus Frog	*Hyla regilla*	C
Blunt-nosed leopard lizard (E)	*Gambelia silus*	R
Coast horned lizard	*Phrynosoma coronatum*	C
Side-blotched lizard	*Uta stansburiana*	C
Western fence lizard	*Sceloporus occidentalis*	C
Western skink	*Eumeces skiltonianus*	C
Gilbert's skink	*Eumeces gilberti*	C
Western whiptail	*Cnemidophorus tigris*	C
Gopher snake	*Pituophis melanoleucus*	C
Common kingsnake	*Lampropeltis getulus*	C
Night snake	*Hypsiglena torquata*	R
Western (Pacific) rattlesnake	*Crotalus viridis (helleri)*	C

Birds

Mallard	*Anas platyrhynchos*	S
Cinnamon teal	*Anas cyanoptera*	S

Turkey vulture	*Cathartes aura*	C
California condor (E)	*Gymnogyps californianus*	C
Northern harrier	*Circus cyaneus*	C
Golden eagle	*Aquila chrysaetos*	C
Sharp-shinned hawk	*Accipiter striatus*	S
Cooper's hawk	*Accipiter cooperii*	S
Swainson's hawk	*Buteo swainsoni*	S
Red-tailed hawk	*Buteo jamaicensis*	C
Ferruginous hawk	*Buteo regalis*	S
American kestrel	*Falco sparverius*	C
Peregrine falcon	*Falco peregrinus*	R
Prairie falcon	*Falco mexicanus*	C
Merlin	*Falco columbarius*	S
Chukar	*Alectoris chukar*	C
California quail	*Callipepla californica*	C
Killdeer	*Charadrius vociferous*	S
Western sandpiper	*Calidris mauri*	S
Mourning dove	*Zenaida macroura*	C
Greater roadrunner	*Geococcyx californianus*	C
Lesser nighthawk	*Chordeiles acutipennis*	R
Common poorwill	*Phalaenoptilus nuttallii*	C
Barn owl	*Tyto alba*	C

Long-eared owl	*Asio otus*	S
Great Horned owl	*Bubo virginianus*	C
Western screech-owl	*Otus kennicotti*	S
Burrowing owl (SC)	*Athene cunicularia (hypugaea)*	R
Rufous hummingbird	*Selasphorus rufus*	
Anna's hummingbird	*Calypte anna*	
Acorn woodpecker	*Melanerpes formicivorus*	
Lewis's woodpecker	*Melanerpes lewis*	
Northern flicker	*Colaptes auratus*	
Red-breasted sapsucker	*Sphyrapicus ruber*	
Black phoebe	*Sayornis nigricans*	
Say's phoebe	*Sayornis saya*	
Ash-throated flycatcher	*Myiarchus cinerascens*	
Western kingbird	*Tyrannus verticalis*	
Cassin's kingbird	*Tyrannus vociferans*	
Loggerhead shrike	*Lanius ludovicianus*	
Steller's jay	*Cyanocitta stelleri*	
American crow	*Corvus brachyrhynchos*	
Common raven	*Corvus corax*	
Horned lark	*Eremophila alpestris*	
Tree swallow	*Tachycineta bicolor*	
Violet-green swallow	*Tachycineta thalassina*	
Cliff swallow	*Petrochelidon puyrrhonota*	

Vaux's swift	*Chaetura vauxi*
White-throated swift	*Aeronautes saxatalis*
Wrentit	*Chamaea fasciata*
Oak titmouse	*Baeolophus inornatus*
House wren	*Troglodytes aedon*
Bewick's wren	*Thryomanes bewickii*
Rock wren	*Salpinctes obsoletus*
Western bluebird	*Sialia mexicana*
Hermit thrush	*Catharus guttatus*
Varied thrush	*Ixoreus naevius*
American robin	*Turdus migratorius*
Northern mockingbird	*Mimus polyglottos*
Cedar waxwing	*Bombycilla cedrorum*
Phainopepla	*Phainopepla nitens*
Orange-crowned warbler	*Vermivora celata*
Yellow-rumped warbler	*Dendroica coronata*
Black-throated gray warbler	*Dendroica nigrescens*
Hermit warbler	*Dendroica occidentalis*
Wilson's warbler	*Wilsonia pusilla*
Western tanager	*Piranga ludoviciana*
California towhee	*Pipilo crissalis*
Spotted towhee	*Pipilo maculates*

Lark sparrow	*Chondestes grammacus*
Black-chinned sparrow	*Spizella atrogularis*
Rufous-crowned sparrow	*Aimophila ruficeps*
Chipping sparrow	*Spizella passerine*
Grasshopper sparrow	*Ammodramus savannarum*
Savannah sparrow	*Passerculus sandwichichensis*
Lincoln's sparrow	*Melospiza lincolnii*
Song sparrow	*Melospiza melodia*
Vesper sparrow	*Pooecetes gramineus*
White-crowned sparrow	*Zonotrichia leucophrys*
Golden-crowned sparrow	*Zonotrichia atricapilla*
Dark-eyed junco	*Junco hyemalis*
Lazuli bunting	*Passerina amoena*
Western meadowlark	*Sturnella neglecta*
Red-winged blackbird	*Agelaius phoeniceus*
Tricolored blackbird (SC)	*Agelaius tricolor*
Great-tailed grackle	*Quiscalus mexicanus*
Brewer's blackbird	*Euphagus cyanocephalus*
Brown-headed cowbird	*Molothrus ater*
Hooded oriole	*Isterus cucullatus*
Bullock's oriole	*Icterus bullockii*
Purple finch	*Carpodacus purpureus*

House finch	*Carpodacus mexicanus*
Lesser goldfinch	*Carduelis psaltria*
Lawrence's goldfinch	*Carduelis lawrencei*

Mammals

Pinion (Chaparral) mouse	*Peromyscus truei*
California (pocket) mouse	*Peromyscus californicus*
Heermann's kangaroo rat	*Dipodomys hermanni*
Giant kangaroo rat (E)	*Dipodomys ingens*
California ground squirrel	*Spermophilus beecheyi*
Desert cottontail	*Sylvilagus audubonii*
Black-tailed jackrabbit	*Lepus californicus*
San Joaquin kit fox (E)	*Vulpes macrotis*
Coyote	*Canis latrans*
Badger	*Taxidea taxus*
Striped skunk	*Mephitis mephitis*
Bobcat	*Lynx rufus*
Tule elk	*Cervus nannodes*
Mule deer	*Odocoileus hemionus*
Pronghorn (American antelope)	*Antilocapra Americana*

APPENDIX C
Special Use Permit No. 81672-05

APPENDIX C

Bitter Creek National Wildlife Refuge
Special Conditions of
Special Use Permit No. 81672-05

Fiscal Year 2005

1. The period of use will be from October 1, 2004 through September 30, 2005. Stocking rates, periods of use and turn-in and turn-out dates are subject to change by the Refuge Manager during the term of this permit due to variable forage conditions and management needs for refuge habitat. Failure to comply with the provisions of the Special Use Permit (SUP) constitutes a breach of the S.U.P. and may result in revocation of the S.U.P.

2. The base herd may not exceed 370 animal units at any one time. An increase in cattle numbers, beyond the 370 animal units, must be approved in writing in advance by the Refuge Manager.

3. Prior notice to cancel the Special Use Permit must be provided, by either party, at least 6 months in advance.

4. If specified on the Special Use Permit, an annual down payment will be required at the beginning of each grazing period.

5. Vehicle, meaning any motorized vehicles (i.e. trucks, cars, heavy equipment, motorcycles, ATV, etc.) travel will be restricted to existing roads only. The only exception will be to access animals in need of medical attention and for facilities repair. Horseback and on foot is the only accepted mode of transportation off road.

6. The permittee must be able to document ownership of the cattle, which will be marked with a brand by the age of six months. The permittee must provide the Refuge Manager with descriptions of brands on cattle grazing the Refuge. This information will be included in the "Record of Payments" block of the Special Use Permit.

7. The permittee must get prior approval from the Refuge Manager for using pesticides on cattle which are on the Refuge or will be on the Refuge at any future time. After gaining approval, the name of the pesticide will be included in the "Record of Payments" block of the Special Use Permit.

8. The permittee must comply with State of California health and sanitation requirements. If a disease is suspected or known to exist within the livestock on the Refuge, the permittee must inform the Refuge Manager immediately.

9. Grazing will be restricted to designated areas of the refuge. From December 15, 2004 through June 15, 2005 grazing will only be allowed in the Bitter Creek Canyon winter pasture (Unit 2). From October 1, 2004 to December 15, 2004 and June 15, 2005 to September 30, 2005 designated summer/fall grazing pastures will be utilized; Units 1, 3, 6 (School Section), 9, 10A and 10B. As stated before, stocking rates and grazing time periods will be dependent on availability of forage and habitat management objectives as determined by the Refuge Manager. The permittee will be responsible at all times for containing cattle within the permitted areas on the Refuge.

10. The permittee will notify the Refuge Manager within five days of changes in cattle numbers and/or their locations (including movements between grazing units on the Refuge and on or off the Refuge property). An accurate record of these movements will be provided upon request to the Refuge Manager.

11. The permittee will be responsible for maintaining all existing facilities that are used for the grazing program including: fences, gates, corrals, watering systems, etc. This includes maintaining the area around water troughs so they do not become too eroded and rutted. The government will provide the materials for maintaining those facilities, however, the permittee must request all such materials in advance from the Refuge Manager. The provision of materials is contingent upon availability of funds. No repairs will be started without first obtaining approval from the Refuge Manager. Hiring of repair professionals by the permittee must be pre-authorized by the Refuge Manager. Permittee shall provide U.S. Fish and Wildlife Service (USFWS) with all receipts and other documentation regarding the costs of approved repairs, and the Refuge Manager will determine the amount to be deducted from the permittees grazing fees to compensate the permittee for such repairs. Costs for unauthorized repairs or improvements are to be borne by the permittee and will not be deducted from the grazing fees owed to the USFWS.

12. The permittee will only use existing or construct only portable (temporary) structures on the Refuge. No temporary structures will be permitted without the prior written consent of the Refuge Manager. No new permanent structures are allowed. All structures constructed or placed on the Refuge become the property of the Refuge unless determined otherwise by the Refuge Manager in writing.

13. No supplemental feeding is allowed on the Refuge except under the following circumstances: feeding of cattle confined to corrals, feeding of cattle when inclement weather conditions makes natural forage unavailable (i.e.: snow, not drought), feeding of molasses-based protein supplements, and the use of salt and mineral supplements. The molasses-based protein and salt and mineral supplements must be placed at least one quarter mile from the nearest source of water and in under-utilized areas.

14. Any use of equipment (example: mechanized equipment) on the Refuge by the permittee must be approved by the Refuge Manager prior to commencement of work.

15. Cattle will not be permitted to freely cross Klipstein Canyon Road from unit 10a to 10b unattended by permittee.

16. The permittee is responsible for insuring that cattle will not access areas closed to grazing including units 11 and 12, all fenced riparian areas, the "Timbers," and all designated sensitive areas.

17. The permittee is authorized to access only those areas open to grazing, all areas not open to grazing are off limits. See attached map.

18. The use of lead bullets to euphonize cattle is forbidden on the Refuge. Only the use of non-lead ammunition is allowed.

19. The Refuge is closed to the public. Only authorized individuals conducting activities relating to the provision of grazing services and the maintenance of facilities are permitted on the Refuge.

20. Events involving recreation, social activities, and food consumption or any event outside of the scope of grazing (for example: barbeque after branding or processing cattle) are not authorized on the Refuge property. Any such activities must take place outside of the Refuge boundary.

21. Under no circumstances is the permittee authorized to change, alter, or in any way interfere with a contractor conducting business with or on behalf of the U. S. Fish and Wildlife Service. All concerns the permittee may have must be directed to the Refuge Manager.

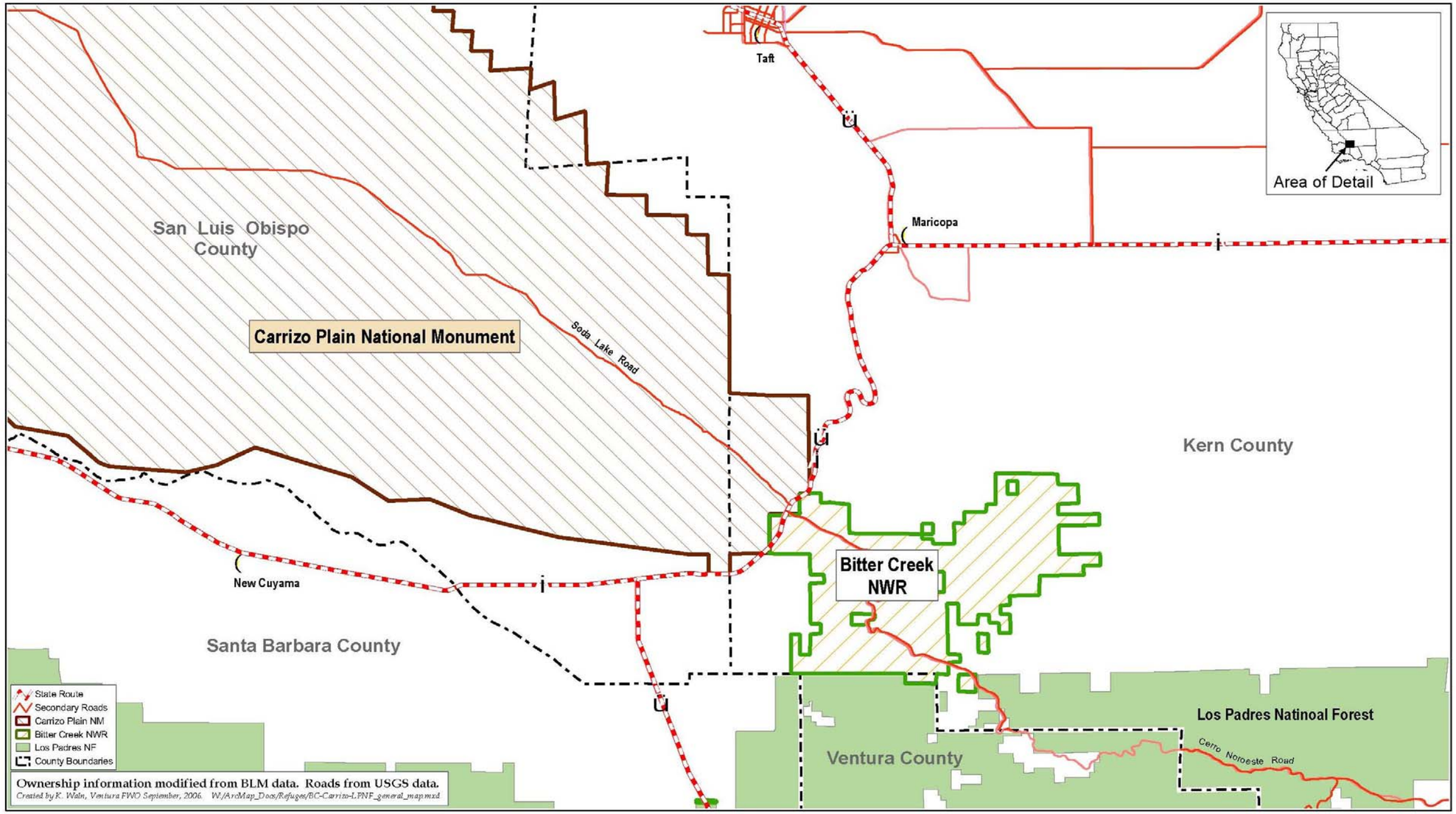
22. Water systems, springs, and water courses may not be altered or changed without prior written consent of the Refuge Manager.

23. In the past, fences have been cut and gates opened or removed by unknown individuals allowing cattle into restricted areas. The permittee must immediately notify the Refuge Manager of such a situation, and if the Refuge Manager is not immediately available, the permittee must attempt to repair the fence or gate and remove trespassing cattle.

24. Domestic animals on the Refuge, such as dogs used in moving cattle, must have current vaccinations and be in control of the owner at all times.

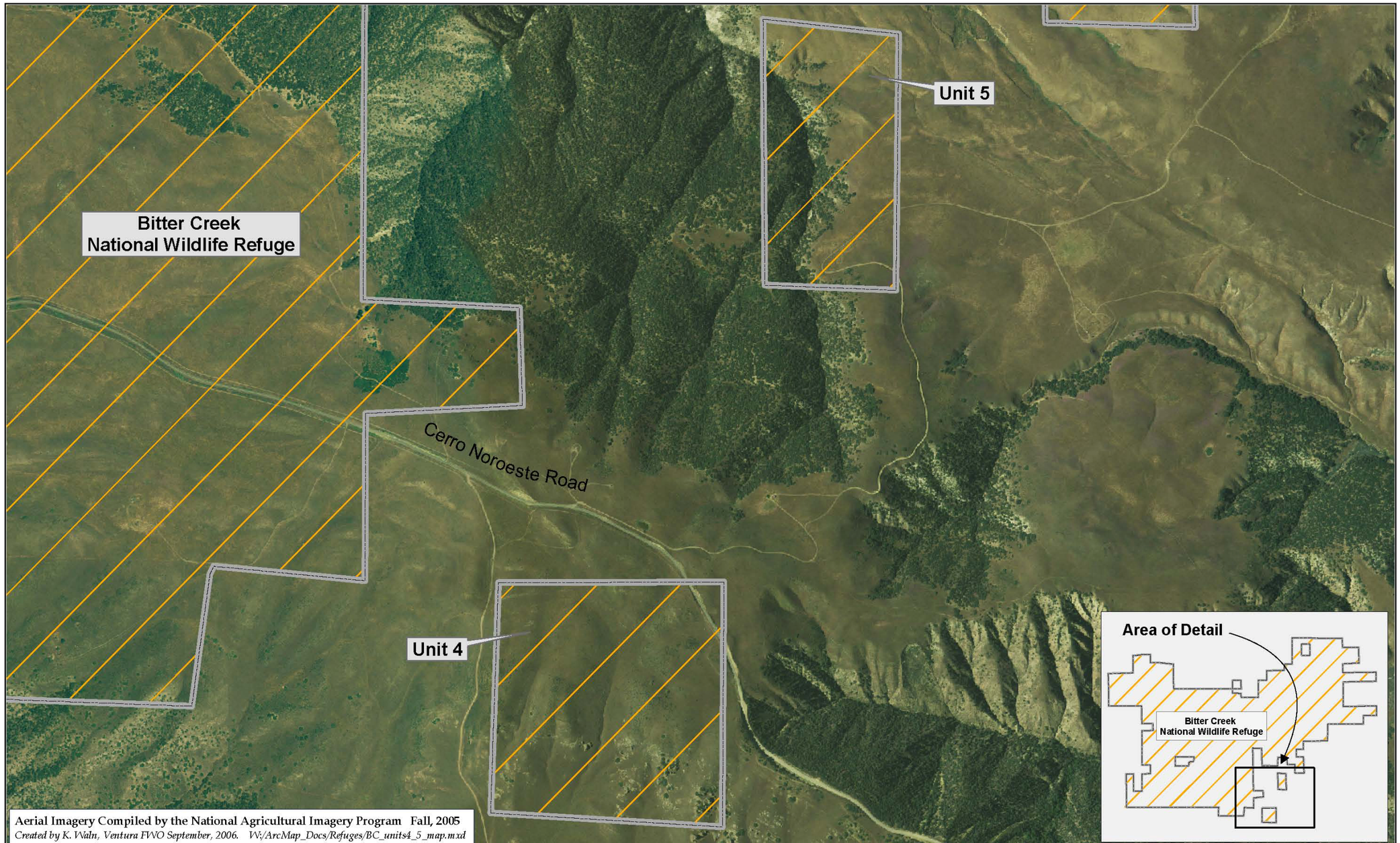
25. Any failure to comply fully with the above conditions may result in the revocation of this Special Use Permit. Failure to comply with the Special Use Permit may also result in denial of future Special Use Permits.

APPENDIX D
Maps



Appendix D: Bitter Creek National Wildlife Refuge and Vicinity

Scale Approximately 1:155,000



Appendix D: Bitter Creek NWR, Units 4 and 5

Scale Approximately 1:10,000

0 0.25 0.5 Miles

0 0.1 0.2 0.4 Kilometers

APPENDIX E
Mailing List

APPENDIX E - Mailing List

Kenneth Bobo

Mr. and Mrs Bogle

Dave Clendenen
Preserve Manager, Wind Wolves Preserve

James Etcheverry
Nick Etcheverry

Juanita Eyherabide

Gerald Howard

Brian and Audrey Green

Teresa King

Mr. and Mrs. Kirschenmann

Thomas Pilcher

Danny Thompson

Augustine Prasciunas

Tom Pileher

Ben Ruddnick

Mr. and Mrs. Snedden

Art Steinbeck and Jill Johnson

Mr. and Mrs. Thomas McWhorter

Abel Vasquez

Government Agencies, Local Organizations & Academics

Bureau of Land Management
Larry Saslaw, Wildlife Biologist, Bakersfield Office

Kathy Sharum, Wildlife Biologist, Carrizo Plain National Monument

Johna Hurl, Carrizo Plain Assistant Monument Manager

Anthony Sarzotti, Fire Management Officer, Bakersfield Office

Kevin Chambers, Fire Management Officer, Bakersfield Office

US Forest Service
Thomas Kuekes, District Ranger, Mt Pinos Ranger District

Marc A Nelson, District Fire Management Officer, Mt Pinos Ranger District

Kevin Cooper, Forest Biologist, Los Padres National Forest

US Fish and Wildlife Service
Timothy J. Keldsen, Wildlife Biologist, San Luis NWRC

Bill Molumby, Fire Management Officer, Southern California

California/ Nevada Operations Office

California State Fish and Game
Bob Stafford, Wildlife Biologist, Santa Maria Office

Joe Hobbs, Elk and Pronghorn Coordinator, Sacramento Office

W.C. Asserson III, Associate Biologist, Kern County

The Honorable Bill Thomas, Washington, DC

Kern County Fire Department
Ken Stevens, Battalion Chief

California State University Bakersfield
David J. Germano, Professor

City of San Luis Obispo, California.
Neil Hadlik PHD, Resource Manager

Kern Audubon Society

Sierra Club – Condor Group

California Native Plant Society

Forest Watch – Santa Barbara, CA

Defenders of Wildlife – Sacramento, CA

Earth Justice – Oakland, CA

Center for Biological Diversity – San Francisco, CA

Habitat Works of Southern California

Buena Vista Highlands

APPENDIX F
Compatibility Determination

APPENDIX F
COMPATIBILITY DETERMINATION

Introduction: This Compatibility Determination has been prepared in accordance with the compatibility provisions of the National Wildlife Refuge System Improvement Act of 1997 (NWRSIA), which amended the National Wildlife Refuge System Administration Act of 1966 (NWRSAA). This determination has also been prepared in accordance with the regulations in Parts 25, 26, and 29 of the Code of Federal Regulations. The purpose of this Compatibility Determination is to evaluate whether the proposed use (seasonal, rotational grazing) is compatible with the purposes for which Bitter Creek National Wildlife Refuge was established and with the mission of the National Wildlife Refuge System. Bitter Creek National Wildlife Refuge is part of the Hopper Mountain National Wildlife Refuge Complex.

Use: Grazing

Refuge Name: Bitter Creek National Wildlife Refuge
Hopper Mountain National Wildlife Refuge Complex, Ventura, California
http://www.fws.gov/hoppermountain/
City/County and State: Maricopa/Kern County, California

Establishing and Acquisition Authorities for Bitter Creek National Wildlife Refuge:

Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1544); and
Land and Water Conservation Fund Act of 1965, as amended (16 U.S.C. 4601-4 – 4601-11).

Refuge Purpose (s):

The lands comprising Bitter Creek National Wildlife Refuge (Refuge) were acquired in stages beginning in 1985 and continuing through 1996. These lands were acquired pursuant to the Fish and Wildlife Service's authorities under the Endangered Species Act and the Land and Water Conservation Act. The U.S. Fish and Wildlife Service (USFWS) acquired these lands "... to conserve (A) fish or wildlife which are listed as endangered species or threatened species … or (B) plants." 16 U.S.C. § 1534 (Endangered Species Act of 1973, 16 U.S.C. §§ 1531-1543, as amended). The primary goal for the establishment of the Refuge was to preserve essential foraging and roosting habitat for the California condor, an endangered species that received a priority objective from the USFWS in 1975. The Refuge contains essential foraging habitat for the California condor (Biological Assessment for creation of the Bitter Creek NWR, USFWS 1984).

National Wildlife Refuge System Mission:

"The mission of the [National Wildlife Refuge] System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee]).

Description of Use:

Former Grazing Program:

Up until 2005, the Refuge had a year round grazing program in place utilizing a cow/calf operation on approximately 9,400 acres of land. This grazing occurred under an annual Special Use Permit, which has now expired. Lower elevations were grazed during Winter/Spring from December 15 to June 15, alternating with higher elevations from June 15 to December 15. The base herd was not allowed to exceed 370 animal units at any one time, for a maximum of 4,400 animal unit months (AUMs). The cow/calf grazing program did not provide sufficient flexibility to implement habitat management and restoration strategies required for the long term benefit of the native species that the Refuge was established to protect. The Refuge's former grazing program is more fully described in section 2.1 of the Habitat Management and Restoration Environmental Assessment (EA), which is incorporated herein by reference (USFWS 2006).

Proposed Grazing Program:

The Refuge proposes to implement seasonal (approximately November to May) rotational livestock grazing program as a tool to enhance grassland habitat and control non-native vegetation. The grazing program includes objectives beneficial for the survival of native species, with special emphasis on threatened and endangered species and species of concern, such as the California condor. The seasonal grazing program is summarized below. The program was fully described in the EA, where it is presented as Alternative D, the Preferred Action (USFWS 2006).

Livestock (beef steers) would be introduced to the Refuge on a seasonal basis during the late fall and winter months (typically beginning in November), on approximately 9,400 acres of grasslands. The grazing season would commence soon after the first fall rains stimulate annual grass germination. At this time, the non-native annual grasses are approximately 3-4 inches tall and palatable to livestock. To avoid negatively impacting native flora, livestock would be removed when native plants germinate. Livestock would be reintroduced in the summer months (typically June through August) if RDM has not reduced to 1,000 lbs per acre by winter grazing as determined by the Refuge Manager.

The timeline for moving livestock on and off the Refuge would not be tied to specific dates, but guided by the response of annual vegetation to yearly variation in climate. Additionally, stocking rates may vary depending on annual precipitation. The Refuge will provide the Cooperator(s) with an Annual Grazing Plan associated with the Cooperative Land Management Agreement (CLMA) that will clearly define the rotation schedule, stocking rates and approximate on/off dates for a given year to ensure that grazing will be used to best achieve the habitat objectives. The Cooperator(s) will be given fourteen days notice when asked to move livestock between units or off the Refuge entirely.

In order to ensure an equal distribution of livestock on grazing units, the Refuge will utilize internal fencing. Some of the existing fencing on the Refuge protects riparian areas, and livestock will continue to be excluded from such areas. Other fencing needs to be replaced or relocated. New fencing will be constructed under the direction of the USFWS, and it will be designed to protect Refuge resources and allow for native wildlife movement. The use of temporary electric fence lines may be utilized. The Cooperator will be required to maintain all fencing. The USFWS will instruct the Cooperator to rotate livestock among grazing units based on vegetation conditions as determined through monitoring.

Livestock distribution would be further managed by the strategic placement of water troughs and salt and mineral licks. These attractants would be placed in areas densely vegetated by annual grasses and at a minimum of 50 meters (m) from riparian areas and designated sensitive areas, such as cultural resource areas and oak woodlands. Specific locations will be stipulated in the Annual Grazing Plan. The USFWS will evaluate potential impacts, if any, from mineral and salt licks. If changes in the placement or use of these devices are warranted, the Refuge Manager will consult with the Cooperator regarding new locations.

Enclosure fences would be maintained by the Cooperator to provide control data on the effects of grazing on soil types, disturbance, and water absorption. The USFWS will compare sets of paired fenced and un-fenced monitoring plots to aid in determining the effects of livestock grazing on the management regime. The overall comparative trend between grazed and un-grazed plots will be used by the USFWS to implement adaptive management.

Beef steers would be the preferred livestock. If USFWS determines that beef steers are causing unacceptable impacts to Refuge resources (e.g., stair stepping on slopes), the use of beef steers would be terminated. The USFWS would then likely evaluate whether to use sheep instead. (For additional information, see section 2.2 of the EA.)

The USFWS will undertake additional management strategies, such as herbicide spraying, mowing, and prescription burning, in conjunction with the seasonal grazing regime in order to meet the range of habitat objectives for the Refuge. These uses are refuge management activities as defined in the National Wildlife Refuge System compatibility policy (603 FW 2) and are therefore not included in this Compatibility Determination.

Seasonal rotational grazing program at the Refuge would be implemented to achieve the following habitat goals and objectives:

Planning Goals:

- Protect and restore refuge grasslands to historic conditions to support pre-settlement abundance and diversity of grassland-dependent special status species.
- Provide optimal feeding habitat for the endangered California condor as required by the refuge purpose.
- Further the goals of the recovery of the California condor.
- Contribute to the restoration of natural species diversity of upland species in grassland habitats of the San Joaquin Valley, California.
- Restore the integrity and environmental health of the Bitter Creek watersheds to improve water quality for wildlife.

Objectives for Grassland Habitat Management and Restoration

- Within a year of implementation of the selected alternative, conduct a baseline inventory of plant species in grassland habitats on the refuge to determine the existing composition and relative abundance.
- Over the next five years, starting from implementation of the selected alternative, reduce and maintain biomass of residual dry matter (RDM; the amount of old plant material left on the ground at the beginning of a new growing season) to 1000 lbs per acre in upland grasslands, in order to improve and maintain habitat for the special status species and secondarily to minimize hazardous fuel conditions.
- Restore a healthy native southern California grassland ecosystem by enhancing native plants and animals through reduction of exotic cool season grasses and non-native invasive species.
- Maintain and possibly enhance biodiversity and genetic diversity. Starting from the implementation of the selected alternative, over the next 10 years, increase the percent cover of native upland plant species by 15 % and maintain or increase richness of native species, including vascular plants, to help restore the historic community structure of the upland grassland.
- Within three years of implementation of the selected alternative, increase riparian surface areas, depth, and inundation (flooding) time by 10 to 15 percent to enhance riparian ecosystem function (e.g. hydrologic processes, nutrient cycling).
- Starting from the implementation of the selected alternative, reduce the cover of invasive weeds to less than 10% throughout the Refuge over the next 10 years to restore biologic integrity to the area.
- Monitor adverse impacts and benefits of the habitat management and restoration program.

In order to assess the achievement of these objectives, the USFWS would establish a detailed monitoring plan. The monitoring objectives and protocols will be identified in an Inventory and Monitoring Plan. The USFWS will review the monitoring results annually to determine the effectiveness of the grazing program in meeting the Refuge's habitat management goals and objectives. The USFWS will use adaptive management to adjust the grazing program (e.g., number of AUMs, turn-in-date, length of grazing season) to ensure that the habitat objectives are met. If the above objectives are being achieved, seasonal grazing would continue to be used as a tool to enhance upland habitat until: a) the mandatory compatibility re-evaluation date in 2016, b) development of the mandatory Comprehensive Conservation Plan, c) any negative effects are detected, d) major new information about the use is found, or e) major changes to the program are proposed or f) for other legitimate purposes.

Livestock grazing is a refuge management economic activity. (See, 50 C.F.R. Sections 29.1 and 29.2.) It is not a priority public use. Economic activities on refuges are permitted provided that the activity contributes to the achievement of the National Wildlife Refuge System mission and is compatible with Refuge purposes. Economic activities may be permitted on a share-in-kind basis under a CLMA if the use will benefit wildlife management of the Refuge (USFWS 1982: 5 RM 17). Because the grazing program is designed to improve habitat for native wildlife, including the endangered California condor, the Refuge will enter into a CLMA on a share-in-kind basis with the selected Cooperator. The Cooperator(s) would be selected from a list of individuals who indicate a desire to exercise grazing privileges on the Refuge and who meet eligibility criteria (see EA: Appendix G) under guidelines mandated by the habitat management section of the Refuge Manual (USFWS 1982: 6 RM 9.10). The Cooperator(s) must demonstrate a willingness to comply with the Refuge's specific grazing rotation guidelines and have access to other grazing land during the prescribed rest periods. When chosen, the selected Cooperator(s) would be responsible for maintaining grazing facilities (e.g. fences, water lines, and corrals) and conducting habitat improvements in exchange for grazing privileges on the Refuge.

Availability of Resources:

Costs to implement the habitat management and restoration program include staff salaries, necessary facility maintenance and construction, supplies and contracted services. It is estimated that the only FTE presently assigned to the station, at the GS-09/11 level, would be required to institute the grassland habitat management and restoration program, with approximately twenty-five percent of his/her duties directly and indirectly related to the program. Additional support would be required by the Wildlife Biologists, GS-11 or GS-05-09, assigned to the Hopper Mountain National Wildlife Refuge Complex, assisting with biological data collection with approximately five percent of his/her duties directly and indirectly related to the program. Initially, staff time would be spent developing a Grazing Management Plan, monitoring habitat conditions on Refuge units open to grazing, developing and administering the CLMA, and monitoring livestock grazing operations. In future years, staff time would be spent monitoring habitat conditions, special status species, native species populations, vegetation changes (i.e. RDM), soil impacts, water quality and quantity, and the overall effectiveness of the grazing

program in accomplishing Refuge objectives. Additional management costs include law enforcement, vehicle use, and office supplies.

The proposed intensive grazing program would require more administrative and management support than the former grazing program. In comparison to the former grazing program however, the proposed grazing program will lead to greater habitat enhancement on the Refuge which will benefit and support native wildlife, including the California condor.

The CLMA, established between the Refuge and the livestock operators, will institute a share-in-kind program in which the livestock operators would maintain grazing facilities (e.g. fences, water lines) and perform habitat improvements (e.g. plant native trees, restore riparian areas, control invasive species) in exchange for the privilege to graze on the Refuge. The rate charged, per AUM, would incorporate the re-evaluation findings of the previous year's fair market value for comparable range based on analysis obtained from the California Agricultural Statistics Service, consistent with a reappraisal conducted every five years by a private consultant (last consultation conducted fall of 2003 at a cost of $2,400). Work performed by the livestock operators would be documented in quarterly reports and the annual total would be equivalent to the total cost associated with grazing on the Refuge.

Sufficient funding exists for the Service to implement the proposed changes to the grazing program. The proposed grazing program would be authorized on a share-in-kind basis which will facilitate the implementation of habitat restoration actions for the benefit of native wildlife.

Category and Itemization	**Responsibility**	**Annual ($/yr)**
Administration and Management:	USFWS	13,250
Maintenance:	CLMA	Variable: Grazing fees
Monitoring:	USFWS	8,700
Special Equipment, facilities, or improvements:	CLMA	Grazing fees

Anticipated Impacts of the Use:

The potential impacts of the proposed livestock grazing program on the Service's ability to achieve refuge purposes and the Refuge System mission are summarized below. Impacts are also discussed in detail in Section 4 of the EA.

Grazing can have negative effects on the ecosystem if not properly managed. Overgrazing can lead to erosion, water runoff, sediment movement, soil compaction, and water contamination (Beetz 2002, Bellows 2003, Roberson 1996). Additionally, unmanaged livestock grazing can lead to creating paths, congregation in certain areas, and selective feeding which can lead to monocultures of non-native species (Bellows 2003). These impacts can be minimized with a properly managed program. The Refuge's proposed seasonal grazing program has been designed to enhance native grasslands, control non-native vegetation, and minimize impacts from livestock.

The analysis in the EA indicates that positive benefits to the Refuge can be achieved through the implementation of a low-intensity, seasonal rotational livestock grazing program. The proposed grazing program would encourage a healthy grassland ecosystem as well as decrease potential fire hazard. Forage consumption by livestock has been demonstrated to efficiently reduce annual grass biomass and litter (Beetz 2002). Non-native annual grasses exhibit rapid growth rates early in the season, depriving the slower growing native forbs and grasses of light, moisture, and nutrients. Also, the accumulation of annual litter alters temperature, moisture levels, and light availability at the soil surface, creating a micro-environment that favors the germination of non-native seeds and inhibits the emergence of certain native annual forbs (Facelli and Pickett 1991, Heady 1956, Roberson 1996). By preferentially consuming the taller, more palatable non-native grasses, livestock effectively increase light and nutrient availability for the native forbs during a key stage in their development (Gordon et al. 1989). In addition to the direct competitive effects of non-native annuals, the accumulation of annual litter alters temperature, moisture levels, and light availability at the soil surface, creating a micro-environment that favors the germination of non-native seeds and inhibits the emergence of certain native annual forbs (Facelli and Pickett 1991, Heady 1956, Roberson 1996). The proposed grazing program will reduce the accumulation of annual litter and thereby enhance growth of native forbs.

The grazing program will incorporate the use of fencing to separate grazing units and protect sensitive resource areas. Many riparian areas on the Refuge have already been fenced. These fences prevent the entry of livestock into riparian areas while allowing for the migration of native wildlife. Under the proposed grazing program, any new or relocated fence lines will be constructed to allow passage to wildlife, while maintaining livestock in designated units.

Livestock grazing will be subject to annual climatic conditions. The number of AUMs will be annually adjusted to compensate for variable precipitation to insure the 1000 lbs per acre RDM is achieved. This type of annual adjustment will reduce impacts to Refuge resources from potential overgrazing.

<u>Endangered/Threatened Species and Species of Special Concern</u>: Sections 3 and 4 of the EA contain detailed information regarding special status species and the impacts of the proposed grazing program on these species. Special status species considered during the development are California Condor (*Gymnogyps californianus*), San Joaquin Kit Fox (*Vulpes macrotis mutica*), Western Burrowing Owl (*Speotyto (Athene) cunicularia*), Blunt-nosed Leopard Lizard (*Gambelia sila*), Tricolored blackbird (*Agelaius tricolor*), and Giant Kangaroo Rat (*Dipodomys ingens*) (USFWS 1996, USFWS 1998). The Service strives to provide optimum habitat for these species whose range has been greatly reduced as a result of urban development and intensive agriculture. Therefore the potential negative impacts that can arise from overgrazing would be minimized with low intensity grazing that is properly timed according to the flowering time of the native plant species and the climatic conditions of the given year (Boarman 2002, USFWS 1998).

The proposed grazing program will be an effective tool to reduce non-native biomass and potential fire hazards. Moreover, the proposed grazing program will enhance habitat for special status species and native wildlife on the Refuge.

Public Review and Comment:

Public review and comment of this CD will be conducted concurrent with the public review and comment period for the EA. A letter announcing a 30 day public review period for these documents will be sent to all organizations and individuals on the refuge mailing list. The mailing list is comprised primarily of neighboring land owners, government and private conservation agencies, and personnel assisting with the preparation of the EA and CD. In addition, notice will be published in the local newspapers with a wide local distribution. All written comments submitted during the 30 day period will be considered and a response incorporated into the final document.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Concerns about protecting rare native plants and animals and the overall integrity of the native grassland ecosystem require that the grazing program follow a strict prescription and be closely monitored. Available literature and experts in the field were consulted to determine the potential effects of livestock on grasslands and the necessary measures to be taken to avoid possible negative impacts. Due to the fact that the impact of grazing at any one site arises out of the complex interaction of several variables including the history of the land use (e.g. cultivation and grazing history), the current and recent management scheme (e.g. age structure of cattle, type of cattle being grazed, timing, intensity, and frequency of grazing), the abiotic environment (e.g. soil type, elevation, precipitation, and temperature) and the species composition of the plant community careful monitoring and management of the grazing program will ensure that Refuge objectives are met.

Adhering to the following stipulations will avoid or minimize unacceptable impacts to refuge resources:

1. Beef steers will be the preferred livestock permitted to graze specified units on the Refuge. Sheep will be considered as an alternative in certain topographic locations (i.e. slopes) if the use of beef steers fails to meet habitat objectives sufficiently. Beef cattle, specifically steers, are the preferred type of livestock because their social habits (more solitary) reduce the chance of excessive trampling in a given area and they have a greater ease of mobility than cows and calves.

2. Livestock will only be permitted on specified units of the Refuge when used to accomplish habitat objectives. When livestock are not actively being used for those purposes, they will not be allowed on refuge lands.

3. The Refuge will prepare an Annual Grazing Plan that will be appended to the CLMA every year no later than September 15. This plan will describe grazing locations, stocking rates, and approximate on/off dates for the livestock operators. Additionally, information will be provided in regards to locations of sensitive areas that will require enclosures, and acceptable placements of salt/mineral licks.

4. The CLMA will contain provisions reserving the Service's right to require the Cooperator to adjust the stocking rates or remove livestock from any or all site(s) at any time. The Cooperator must comply with these orders within fourteen days.

5. The cooperator(s) must demonstrate a willingness to comply with the Refuge's specific grazing rotation guidelines and have access to other grazing land during the prescribed rest periods.

6. Livestock will be introduced to grazing units approximately one month after the first fall rains (typically November) and removed when approximately 1000 lbs of RMD remains (typically May) or native plants begin to germinate. This will prevent livestock from overgrazing and impacting the native plant species.

7. Livestock will only be grazed during the summer months if RDM is not sufficiently reduced by winter grazing as determined by the Refuge Manager.

8. The number of beef steers will be determined on an annual basis by the individual unit objectives and vegetation growth potential. Periodic compliance checks will be conducted by refuge staff to insure this number is not exceeded.

9. Prior to transferring cattle onto the Refuge a reasonable effort should be taken to feed cattle weed-free hay for a necessary amount of time in order to allow for the passage of undesirable seeds. Livestock will be held in a designated refuge unit for two days to allow for the passage of undesirable seeds prior to grazing on the remainder of the Refuge. Efforts will be taken to ensure the designated area sustains minimal impact.

10. Livestock intensity will be manipulated according to annual climatic conditions. In dry years, when native grasslands are more vulnerable, grazing intensity will be reduced or eliminated to protect refuge resources.

11. Watering troughs and salt and mineral licks will be located in areas densely vegetated by annual grasses and a minimum of 50-m from any riparian area or an area of special concern to discourage cattle from congregating around those sites.

12. Compliance and habitat monitoring will be conducted by the Refuge Complex staff. Populations of threatened/endangered species as well as upland plant composition will be monitored according to protocols established by the Service (timeline described in Table 4 of the EA). This will allow the Refuge to determine if habitat objectives are being met and detect the first sign of any negative effects of livestock and adapt grazing prescriptions accordingly.

13. A designated Refuge staff member will maintain a minimum of 24 permanent residual dry matter photo points, already established throughout the grazing units of the Refuge. The points will be monitored at least once a year (September 15 to October 15) with the potential of additional data collected.

14. The Cooperator must have undisputed ownership of the livestock and be able to document ownership as specified in 6 RM 9.6. Cattle will be marked with a brand prior to placement on the Refuge.

15. Only the equipment needed to install and maintain grazing facilities will be allowed on the Refuge. Vehicle (any motorized vehicles i.e. trucks, cars, heavy equipment, motorcycles, ATVs, etc.) travel will be restricted to existing roads only. The only exception will be to access animals in need of medical attention. Horseback and on-foot is the only accepted mode of transportation off-road.

16. The CLMA will include provisions specifying that the Cooperator will be responsible for maintaining all specified existing Refuge owned facilities that are used for the grazing program including: fences, gates, corrals, watering systems, etc. The Service may furnish necessary supplies for repairs (USFWS 1982: 6 RM 9 and 9 RM 2). The Cooperator must also maintain the area around water troughs so they do not become eroded and rutted. The Cooperator may not begin any repairs without first obtaining written approval from the Refuge Manager. Hiring of repair professionals by the Cooperator must be pre-authorized by the Refuge Manager.

17. The cooperators will only use existing or construct only portable (temporary) structures on the Refuge. No temporary structures will be permitted without the prior written consent of the Refuge Manager. No new permanent structures are allowed. All structures constructed or placed on the Refuge become the property of the Refuge unless determined otherwise by the Refuge Manager in writing.

18. The selected cooperator(s) would maintain grazing facilities (e.g. fences, water lines) and conduct habitat improvements in exchange for grazing privileges on the Refuge. Habitat improvement projects may include, but are not limited to, further installation of fencing to protect riparian and sensitive areas and the potential modification of the existing water system.

19. Infractions or non-compliance of conditions stipulated in the CLMA may result in the revocation of grazing privileges for the current and/or subsequent grazing seasons.

Justification:

In the past, introduction and spread of European annual grass species for livestock grazing contributed to the displacement of California's native grasslands. However, complete exclusion of livestock from areas with remnant native grasses can result in increased competition from introduced grasses with greater negative impacts on the native plants and wildlife diversity and increased potential for hazardous wildland fire. Managed grazing practices have been endorsed as a tool for promoting biodiversity in native grassland remnants (Beetz 2002). The proposed flexible winter grazing regime, and when needed, a summer grazing treatment, are expected to directly and indirectly benefit grassland habitat and native and endangered species on the Refuge.

Although livestock grazing has the potential to both positively and negatively affect the grassland ecosystem, the management regime, class of livestock, timing of grazing, and site improvements incorporated in the proposed grazing program are aimed at maximizing the positive effects and minimizing or eliminating possible negative impacts. The proposed livestock grazing program supports the Refuge's habitat objectives and should result in an overall reduction in RDM, increasing abundance of native plant species, and improve functioning of the grassland ecosystem (Bartolome et al. 2002, Boarman 2002, Roberson 1996). Therefore, the use of livestock grazing as a tool for managing grassland habitat would contribute to the Refuge System mission and achievement of Refuge purposes by enhancing habitat for native wildlife, migratory birds, and threatened, endangered and rare species.

Mandatory Reevaluation Date:

_____ Mandatory 15-Year Reevaluation Date (for priority public uses)

11- 2016 Mandatory 10-Year Reevaluation Date (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision (check one below):

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion and Environmental Action Statement

__X__ Environmental Assessment (USFWS). 2006. Environmental Assessment for the Habitat Management and Restoration Plan for the Bitter Creek National Wildlife Refuge of the Hopper Mountain National Wildlife Refuge Complex. November 2006. U.S. Fish and Wildlife Service, Ventura, CA.

_____ Environmental Impact Statement and Record of Decision

Refuge Determination

Prepared by: _____ _____
(Signature) (Date)

Project Leader: _____ _____
(Signature) (Date)

Concurrence

Refuge Supervisor: _____ _____
(Signature) (Date)

Associate California/Nevada
Operations Manager, National
Wildlife Refuge System: _____ _____
(Signature) (Date)

APPENDIX G
Public Notice

APPENDIX G:
PUBLIC NOTICE

Cattle Grazing Opportunity at Bitter Creek National Wildlife Refuge

The Hopper Mountain National Wildlife Refuge Complex is offering by selection, to all eligible applicants, an opportunity to graze grassland on the Bitter Creek National Wildlife Refuge at flexible stocking rates dependent on annual modifications which may be needed due to weather, growing season variables, and wildlife management purposes):

Beef steers from November to May on approximately 9,200 acres of grassland.

All applicants must review and agree to follow the stipulation specified in the Compatibility Determination for Grazing and the Environmental Assessment for Grassland Habitat Management and Restoration. In addition, all applicants **must** meet the following eligibility criteria to be considered for this grazing opportunity:

1) Current rancher on private or grazing permittee holder on public land. Applicant must have a current beef cattle operation.
2) Ability to provide required stocking rate and high quality livestock management to meet vegetation management objectives. Applicant must currently own (or acquire by required date) the needed stocking rate. Applicant must be willing to graze the areas for the total length of time and stocking rate prescribed. Applicant must provide 3 references (neighbors, fellow stockmen/women, past private pasture leaser, county agent, farm bureau agent, banker, veterinarian, public lands administrator, etc.) on demonstrated good livestock management practices. Applicant must not have been delinquent on any prior permit stipulations on private or public land.
3) Ability and willingness to maintain necessary facilities associated with grazing.
4) Applicant must be willing to enter into a Cooperative Land Management Agreement and provide services and/or expenditures equal to a grazing value (calculated rate charged will incorporate the re-evaluation findings of the fair market value for comparable range) benefiting the Refuge habitat management and restoration.

Applications for this grazing opportunity can be obtained at the Hopper Mountain National Wildlife Refuge Complex office by calling (805) 644-5185 or writing to P.O. Box 5839, Ventura, CA 93005. To arrange for a field review or obtain additional information, call Mike Stockton at (661) 343-3332.

Selection of a grazing Cooperator for the Bitter Creek National Wildlife Refuge will comply with all Federal statutes relating to nondiscrimination. The United States Department of the Interior prohibits discrimination in its programs on the basis of race, color, religion, sex, age, national origin and physical or mental disability.