

On-going Livestock Grazing Activities in Jaguar Proposed Critical Habitat on the Coronado National Forest

WILDLIFE BIOLOGICAL ASSESSMENT

Douglas, Sierra Vista, and Nogales Ranger Districts
Coronado National Forest



Prepared by:

Chad Bell Date: 10/25/13

Chad Bell
District Wildlife Biologist
Coronado National Forest

Reviewed by:

Marc Stamer Date: 10/24/13

Marc Stamer
Forest Wildlife Biologist
Coronado National Forest

EXECUTIVE SUMMARY

The US Fish and Wildlife Service (FWS) proposed jaguar critical habitat in 2012 (77 FR 50214) and revised in July 2013 (78 FR 39237). The Coronado National Forest (CNF) contains more than 50 percent of the jaguar proposed critical habitat distributed within the Peloncillo, Santa Rita, Tumacacori, Huachuca, and Whetstone Ecological Management Areas (EMAs). The CNF is proposing to continue livestock grazing activities within jaguar proposed critical habitat (PCH) on 78 Forest allotments and is requesting conferencing under the Endangered Species Act. Although the CNF is not required to conference, we are choosing to be pro-active in livestock grazing management. The FWS has identified 7 primary constituent elements (PCEs) that represent the physical or biological feature and habitat characteristics required to sustain the jaguar's vital life-history functions. Based on these PCEs and our analysis, we have determined that the continued livestock grazing on the CNF **"may affect, but is not likely to adversely modify"** jaguar proposed critical habitat.

LIST OF TABLES AND FIGURES

Table 1. Number of allotments and acreages associated with livestock grazing and jaguar PCH within each EMA.

Figure 1. Map of jaguar proposed critical habitat on the CNF.

APPENDICES

Appendix I. Table displays the CNF allotments within jaguar PCH and the most recent consultation for those allotments.

Appendix II. These maps display the CNF allotments and jaguar PCH within each of the pertinent CNF EMAs.

INTRODUCTION

The purpose of this Biological Assessment (BA) is to assess the continuation of livestock grazing on the Coronado National Forest in sufficient detail to determine to what extent livestock grazing may affect jaguar proposed critical habitat. The BA is prepared in accordance with the legal requirements set forth under the Endangered Species Act (19 U.S.C. 14536(c)) and implementing regulations at 50 CFR 402, and follows procedures established in U.S. Forest Service Manual Direction (FSM 2672.4). Section 7(a)(4) was added to the Act to provide a mechanism for identifying and resolving potential conflicts between a proposed action and proposed species or proposed critical habitat at an early planning stage. A conference is required only when the proposed action is likely to jeopardize the continued existence of a proposed species or destroy or adversely modify proposed critical habitat. However, Federal action agencies may request a conference on any proposed action that may affect proposed species or proposed critical habitat. The FWS also can request a conference after reviewing available information suggesting a proposed action is likely to jeopardize proposed species or destroy or adversely modify proposed critical habitat.

Previous consultations (see consultation history below) have documented the short and long-term effects of ongoing grazing on the CNF. As described herein, the effects of the CNF's livestock grazing management remain similar to those documented previously. Therefore, the CNF is requesting reinitiation of the October 25, 2002 biological opinion (2-21-98-0399-R1) and subsequent consultations for the conferencing of jaguar PCH occurring on 78 livestock grazing allotments on the CNF.

General Consultation History

- Effects of the on-going grazing activities for all allotments were evaluated in the 1998 Biological Assessment which resulted in the FWS biological opinion titled: On-going and Long-term Grazing on the Coronado National Forest and Biological Opinion (2-21-98-399) dated July 29, 1999).
- The 1998 Biological Opinion (BO) expired July 29, 2002 and the CNF re-initiated consultation on April 18, 2002. The FWS issued a BO on October, 25, 2002 (2-21-98-0399-R1) with the term of ten years.
- On September 27, 2004, the FWS issued a Conference Opinion (2-21-98-F-0399-R2) regarding the Mexican Spotted Owl critical habitat for On-going and Long-term grazing on the CNF.
- In 2005, the effects of the CNF's grazing program were assessed in the Programmatic Biological and Conference Opinion on the Continued Implementation of the Land and Resource Management Plans for the Eleven National FORESTS and National Grasslands of the Southwest Region (2-22-03-F-0366, June 10, 2005).

Additional information concerning conferencing/consultation by allotment is available in Appendix I.

PROPOSED ACTION

The proposed action is to authorize the continuation of livestock grazing on 78 CNF grazing allotments that contain a portion of the jaguar proposed critical habitat (78 FR 39237, figure 1). These allotments are located in the Peloncillo, Santa Rita, Tumacacori, Huachuca, and Whetstone EMA's. The number of acres and allotments which contain jaguar proposed critical are described in the table below (table 1). On-going livestock grazing will continue on the CNF as described in the Coronado National Forest Land and Resource Management Plan (LRMP 2012) and we intend this BA to be active until the utilization rate changes within the allotment management plan or the FWS makes changes to the PCEs within the jaguar designated critical habitat (CH).

The CNF has a livestock grazing program with about 200 livestock allotments over about 1,630,000 acres. Approximately 34 percent of those acres are considered unavailable for livestock grazing because of the steep and/or rocky terrain. The remaining 1,068,734 acres are capable of livestock grazing and are used in developing the Allotment Management Plan (AMP). The five EMAs in the proposed action contain about 80 percent of capable grazing acres. The number of capable livestock grazing acres are calculated by the number of acres within each allotment with less than 40% slope. The numbers, time of year, intensity, and duration for each permitted allotment vary based on the current condition and future desired condition. Currently, the CNF permits about 35,000 cattle and few horses. It is important to note that the CNF currently permits cattle and horses only and the CNF doesn't foresee any changes in the type of livestock.

Livestock grazing is administered through a grazing permit system on designated livestock grazing allotments. The grazing permit is composed of three pieces; grazing permit, allotment management plan (AMP), and annual operating instructions (AOI). AMPs have been developed for each allotment on the CNF and specify the goals and objectives of allotment management, management strategies, anticipated maintenance, and monitoring requirements. AMPs were designed to incorporate adaptive management where the monitoring of changing range conditions will assist in evaluating the need for grazing adjustments. Possible adjustments in the AMP may include changes in frequency, duration, timing, and intensity of grazing. Adjustments in grazing are implemented through the AOI which is authorized annually and outlines the duration, timing, and intensity of grazing at the start of each grazing year. The AOI also identifies the sequence and timing of grazing for each pasture based on monitoring of range readiness, ecological condition, water availability, and utilization.

Monitoring is an important component in the adaptive management strategy. The CNF uses two types of monitoring (implementation monitoring and focused effectiveness monitoring) to ensure grazing is meeting the goals and objectives of the AMP (FSH 2005). Implementation monitoring is conducted on an annual basis to measure range conditions for that year's grazing activities. Effectiveness monitoring is conducted at least every three years to measure range conditions and calculate long-term trends in range condition. Effectiveness monitoring will also provide information to compare current condition to allotment desired condition and make adjustments as needed. Forage utilization is managed at a level corresponding to light to moderate intensity in order to provide for grazed plant recovery.

As mentioned above, a detailed proposed action is described in the AMP for each livestock allotment. The AMP description is comprised of several components that are specific to the time of development such as type of livestock (cow and calf) and timing (e.g. May through November). This specificity, however, doesn't provide enough flexibility to address unanticipated changes in allotment conditions. In order to address these changes and meet our management goals, minor modifications to some AMPs were recommended by CNF staff. After careful consideration, we decided that the recommended changes were minor and would not affect previous determinations on species or critical habitat considered within the current or former livestock grazing consultations on the CNF. Minor changes were made to 9 AMPs. These minor changes included shortening the duration of grazing in the Canelo allotment and a reduction in stock numbers in the Alisos, Campini, Carrizo, Harshaw, Manilla, Oro Blanco, Papago, and Post Canyon allotments.

Table 1. Number of allotments and acreages associated with livestock grazing and jaguar PCH within each EMA.

Ecological Management Area	Total Number of Allotments	Number of Allotments with Jaguar PCH	Capable Acres for Livestock Grazing	Total Acres of Jaguar PCH	Total Acres of EMA
Peloncillo EMA	13	12	83,000	57,689	87,986
Santa Rita EMA	18	17	103,000	107,416	148,424
Tumacacori EMA	17	16	169,000	134,326	203,798
Huachuca EMA	34	27	239,000	151,306	276,330
Whetstone EMA	6	6	20,000	37,833	45,022
Total	88	78	614,000	488,571	761,560

ACTION AREA

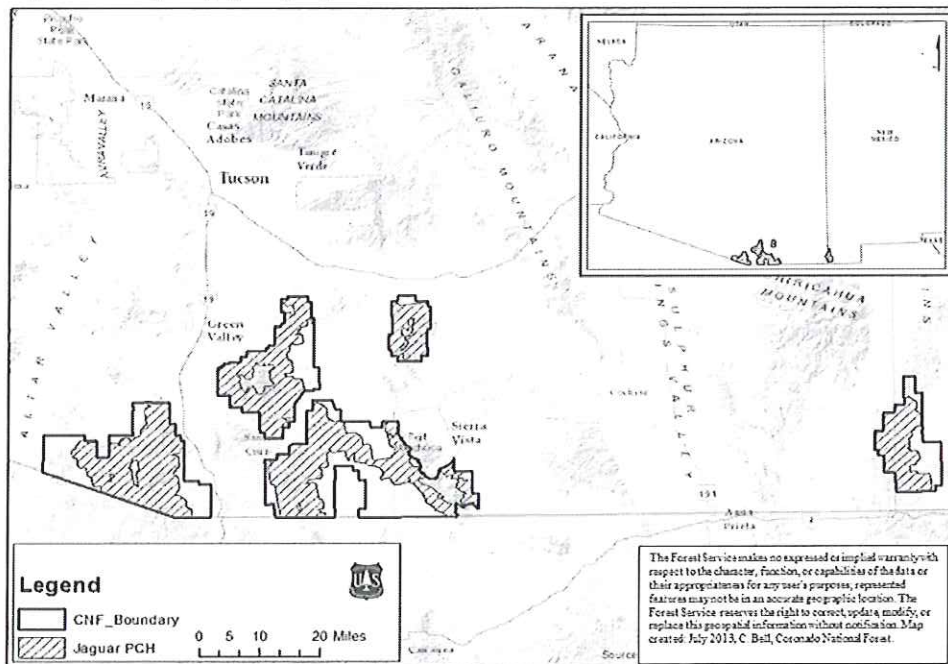
The jaguar proposed critical habitat is located in southeastern Arizona and a small portion in southwestern New Mexico totaling over 858,000 acres. The proposed critical habitat was divided into six units; Baboquivari, Atascosa, Patagonia, Whetstone, Peloncillo, and San Luis. The Coronado National Forest manages about 488,000 acres within the Atascosa, Patagonia, Whetstone, and Peloncillo Units.

The Coronado National Forest is located in southeastern Arizona and southwestern New Mexico and is comprised of approximately 1,780,000 acres ranging in elevation from 3,000 to 10,720ft in twelve widely scattered mountain ranges called the "sky islands." Each of these sky islands present similar but different management challenges thus the CNF has identified each mountain range as an EMA. Each of the EMAs

have slightly different vegetation composition, but the major vegetation community is Sonoran Desert, Madrean woodland, or coniferous forests with moderate amounts of plains grassland, chaparral, and various riparian types.

The proposed action will occur in 78 livestock grazing allotments (see appendix I) located within five EMAs: Peloncillo, Santa Rita, Tumacacori, Huachuca, and Whetstone (see appendix II). A detailed description for each allotment is available in USFS 1998 Biological Assessment and summarized in the USFWS 2002 Biological Opinion.

Figure 1. Map of jaguar proposed critical habitat on the CNF.



DESCRIPTION OF LISTED SPECIES AND CRITICAL HABITAT

Range and Distribution

The jaguar's (*Panthera onca*) primary range extends from central Mexico south through Central and South America to northern Argentina (Swank and Teer 1989). The jaguar was probably an uncommon resident in the southwestern United States in recent history (e.g. Rabinowitz 1999; Seymour 1989). No breeding populations are currently known to exist in the U.S. and individual jaguars are only occasionally sighted in the U.S. Since 1996, five male jaguars have been documented in the U.S. In March 1996, an adult male jaguar (≥ 5 years old) was photographed in the Peloncillo EMA of southeastern Arizona (Glenn 1996). A younger male (2 to 3 years old), in August 1996, was photographed in the Baboquivari Mountains southwest of Tucson. A possible third unidentified jaguar was photographed in the same area (McCain and Childs 2008). In February 2006, another male was photographed in the Animas Mountains of southwestern New Mexico (McCain and Childs 2008). The Arizona Game and Fish Department investigated and confirmed, in November 2011, a single male jaguar in the Whetstone Mountains over 35 miles away from the Patagonia Mountains. Most recently, a male jaguar was photographed in the Santa

Rita Mountains in 2013. Prior to these sightings, the last confirmed report in Arizona was in 1986 when there was a confirmed kill in the Bowie Mountains (Girmendonk 1994).

Jaguars in the United States are likely part of a population, or populations, that occur largely in Mexico. In northwestern Mexico, jaguars occur from the rugged Barrancas connecting northeastern Sinaloa, southeastern Sonora, and southwestern Chihuahua, north to the border with the U.S. The most northern recently documented breeding population of jaguars is now known to be centered in (but not restricted to) east-central Sonora, around Huasabas, Sahuaripa, and Nácori Chico, about 130 miles south of the U.S.-Mexico border (Brown and Lopez-Gonzalez 2001). The Arizona and New Mexico jaguars reported from 1996 through 2009 (Glenn 1996, Childs and Childs 2008, McCain and Childs 2008) almost certainly belong to the northernmost (Huasabas-Sahuaripa) population known in Mexico (Rosas-Rosas 2006).

Life History and Habitat

Range-wide, jaguars occupy a variety of habitats but generally observed on slopes that are well vegetated (Seymour 1989). Ortega-Huerta and Medley (1999) found jaguars were more commonly on moderate to steep slopes in the Sierra de Tamaulipas, Mexico. Swank and Teer (1989) stated that jaguars prefer a warm, tropical climate, usually associated with water, and rarely found in arid areas. Other jaguar populations have also displayed an association with tropical climates in low elevations with dense cover and reliable water sources (Rabinowitz 1999). In South America, jaguars usually avoid open country like grasslands and desert scrub, instead prefer the closed vegetation typically found in tropical forests (Brown and Lopez Gonzalez 2001).

Jaguars have also been documented in arid areas of northwestern Mexico and the southwestern United States which included a variety of habitat communities (Brown and Lopez Gonzalez 2001, Boydston and Lopez Gonzalez 2005, McCain and Childs 2008, Rosas-Rosas and Bender 2012). The more open, dry habitat of the southwestern United States is characterized as marginal habitat for jaguars in terms of the limited water, cover, and prey densities (Rabinowitz 1999). Even though marginal jaguar habitat doesn't meet the identified biological and physical features, McCain and Childs (2008) documented two male jaguars using an extensive area in habitats of Sonoran lowland desert, Sonoran desert scrub, mesquite grassland, Madrean oak woodland in southern Arizona mountain ranges. Therefore, while the southwestern United States may contain marginal habitat, a few jaguars appear to be able to use the more open, arid habitat.

Threats

Numerous threats have been identified as possibly affecting the jaguar and/or its' habitat (Chavez and Ceballos 2006, Medellin et al. 2002, Nunez et al. 2002, Nowell and Jackson 1996). The primary threat to jaguars in the United States is from illegal hunting of the species (59 FR 35675). Jaguars in Arizona declined concurrently with predator control associated with land settlement and cattle ranching (Brown 1983). At least 64 jaguars have been killed in Arizona since 1900 (Brown 1983), one as recently as 1986 (Girmendonk 1994). Modification and destruction of jaguar habitat is also a concern for jaguar recovery. Habitat loss, among several other factors, has been related to a reduction in historical jaguar range (Sanderson et al. 2002, Zeller 2007, Rabinowitz and Zeller 2010). Medellin et al. (2002) reported that

loss, fragmentation, and modification of jaguar habitat have contributed to population declines throughout much of the species' range, including northern Mexico. Other actions such as clearing of habitat, destruction of riparian areas, fragmentation or blocking of corridors that jaguars may use between Mexico and the United States, and trapping or animal control activities that target jaguars or other large predators, have also been reported (59 FR 35675).

EFFECTS ANALYSIS

Jaguars have relatively large home ranges that are highly variable and depend on topography, available prey, and population dynamics (Brown and Lopez Gonzalez 2001). Home ranges need to provide reliable surface water, available prey, and sites for resting that are removed from the impacts of human activity and influence (Jaguar Recovery Team 2012). The jaguar habitat components are large scale and can be described in a landscape or even regional scale. The PCEs of the proposed jaguar critical habitat are also relatively broad in description and can be applied to a large geographic area. Even though there are numerous interactions and attributes that can describe jaguar habitat, the FWS has identified seven PCEs that are essential to jaguar conservation. Therefore, we are analyzing the potential effects of livestock grazing on the seven PCEs within the proposed jaguar critical habitat as identified in the Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Jaguar (78 FR 39237, July 1, 2013) on the CNF.

The primary constituent elements of critical habitat are found in the physical or biological features essential to the conservation of jaguar which consists of expansive open spaces in the southwestern United States of at least 100 square kilometers (38.6 square miles) in size. The primary constituent elements are those which:

1. Provide connectivity to Mexico;
2. Contain adequate levels of native prey species, including deer and javelina, as well as medium-sized prey such as coatis, skunks, raccoons, or jackrabbits;
3. Include surface water sources available within 20 km (12.4 mi) of each other;
4. Contain 1 to 50 percent canopy cover within Madrean evergreen woodland, generally recognized by a mixture of oak, juniper, and pine trees on the landscape, or semidesert grassland vegetation communities, usually characterized by *Pleuraphis mutica* (tobosagrass) or *Bouteloua eriopoda* (black grama) along with other grasses;
5. Are characterized by intermediately, moderately, or highly rugged terrain; and
6. Are characterized by minimal to no human population density, no major roads, or no stable nighttime lighting over any 1-square-km (0.4-square-mi) area.
7. Are below 2,000 m (6,562 feet) in elevation.

Effects of the Action on Jaguar Proposed Critical Habitat

1. Connectivity to Mexico

Jaguars need to be able to move long distances between and within mountain ranges in the US and Mexico. Livestock grazing infrastructure or the presence of livestock will not impede the movement of jaguars to travel through CNF lands and maintain connectivity. Livestock fences are constructed in such a fashion to minimize wildlife impacts as described in the LRMP Plan. Livestock management and infrastructure maintenance occur during the daylight hours and jaguars generally travel at night thus most livestock management activities will be temporally separated. These activities will not interfere or prevent jaguar connectivity.

2. Native Prey Species

Jaguars need adequate levels of native prey such as deer, javelina, and medium-sized prey. Javelina and deer are considered the primary source of food for jaguars. Javelinas are found in many habitats and are opportunistic feeders of flowers, fruits, nuts, berries, bulbs, and most succulent plants. White-tailed deer will eat several species of shrubs, grasses, and forbs. Mule deer feed on grasses and forbs in the spring and summer but are primarily browsers and consume bark, twigs, leaves, and nuts. Mule deer are found in desert shrub, grasslands, pinon-juniper, pine, aspen-fir, and mountain meadows, while white tailed deer habitats include oak-grasslands, chaparral, and pine forests. Other prey species such as coatis, raccoons, and skunks consume a variety of foods like insects, lizards, roots, fruits, nuts and eggs. Jackrabbits are herbivores and rely on grasses, forbs, and some succulents. Overall, the identified prey species are generalist and don't rely on any limiting food source or habitat characteristic for survival and reproduction.

Livestock grazing can modify native prey species' habitat by altering vegetation composition and structure directly by such activities as trampling, clipping, or browsing. These changes could alter prey species distribution and/or density by removing herbaceous vegetation that provides hiding cover. Livestock could also change plant species composition by continually selecting particular plant species for consumption. Livestock management on the CNF adjusts livestock forage utilization based on site specific resource conditions and management objectives, but in general utilization is managed at a level corresponding to light to moderate intensity (15-45% of current year's growth) (LRMP 1996). This level of utilization will provide adequate food and cover for jaguar prey species.

3. Water Sources

Closely spaced water sources are important for jaguar survival. The livestock grazing plan does not eliminate any naturally occurring water sources or exclude jaguars from any water sources. Most livestock water sources are water troughs and ponds which contain water during all or most of the year and these water sources do not exclude use of jaguar or prey species. Therefore, livestock water sources can be used by jaguars and livestock management practices do not deter jaguars from using natural water sources.

4. Canopy Cover

Another important component of jaguar habitat is maintaining canopy cover within Madrean evergreen woodland. Livestock hoof action and trampling could affect plant species composition and structure, but it is unlikely to affect the current or future canopy cover. Livestock generally do not consume woody plant species when more desirable and palatable plant species are available. Livestock first deplete the herbaceous plant growth and then browse some shrub and young tree species thus possibly affecting localized growth and survival of those young plants, but rarely affect mature trees (Bock et al. 1993). The livestock AMPs set utilization to a light to moderate intensity thus livestock should have ample desirable forage and shouldn't consume woody plants. Therefore, livestock grazing activities will not change the current canopy cover within the Madrean evergreen woodland.

5. Terrain

Rugged terrain such as canyons, ridges, and rocky hills is an important component in jaguar habitat. Livestock operations and management will not change the topography. There are no livestock management activities permitted that would cause the alteration of the topography.

6. Human Development

Jaguars require minimal human interaction. The livestock grazing and operations permit does not authorize any housing development, road construction, or stable nighttime lighting. The permit does authorize minor access road maintenance and infrastructure maintenance which typically occurs over the course of a few days to complete each year. All these activities occur during daylight hours. Therefore, the livestock activities on the CNF will not result in increased human-jaguar interactions.

7. Elevation below 2,000 meters

Areas above 2,000 m is considered unsuitable jaguar habitat, even though jaguars can use this higher elevation to meet their needs. Livestock generally do not use the high elevation areas because the slope of the ground is too steep in most areas for cattle to transverse. If this PCE changes in the future to include the area above 2,000 m, livestock grazing will not affect or modify elevation. Regardless of elevation, livestock grazing will not alter vegetation conditions necessary to maintain suitable jaguar critical habitat.

Cumulative Effects

Livestock grazing on State, BLM, and private land adjacent to the project area is expected to continue. The CNF manages a large proportion of the rugged topography and Madrean evergreen woodland within the proposed jaguar critical habitat. Most of the adjacent lands use similar livestock management and operations thus we expect naturally occurring water sources and livestock developed water sources to not exclude jaguar use and jaguars can move through these lands to maintain connectivity. We do not anticipate the management of adjacent lands to change in the foreseeable future.

Private land development on the CNF boundary is expected to continue to meet demands. Rates of future development are difficult to predict, but given the relatively remote location of the CNF, urban development around the CNF boundary will likely be limited to expanding cities. Patagonia, Sierra Vista, and Huachuca City are all expanding populations with increasing land development. We also expect minimal development in more remote locations because water is limited. Developments around the CNF will not likely be built in rugged areas but rather on the moderate to flat topography. Therefore, we do not expect human development to further limit jaguar connectivity or result in additional human-jaguar interactions.

Recreational activities such as hiking, hunting, and off-highway vehicle driving are expected to continue on the CNF over the life of the project. Most hiking on the CNF is on developed trails which are few and not highly used. Hunting for deer and javelina does occur on the CNF typically during the spring and fall but hunting is regulated by Arizona Game and Fish Department and New Mexico Department of Game and Fish and is restricted to relatively few hunters. Off-highway vehicle use is year-around, but levels of activity are low and confined to a few roads. Most of these activities occur during daylight hours when jaguar are less active and less likely to be disturbed.

Mining has been occurring within or near jaguar proposed critical habitat for over a century. These mines range in size of infrastructure footprint and associated interspace of 5 acres (single mine shaft) to >1,000 acres (open pit mine). Mining operations can also expand infrastructure outside the immediate mine site with the construction of roads, power-lines, pipe-lines, or impermeable fences. These changes can directly affect jaguar PCH by removing vegetation cover, modifying prey species, reducing water sources, and increasing human presence.

Mining development can also indirectly affect jaguar PCH by reducing connectivity between mountain ranges and Mexico. Corridors provide the opportunity for jaguars to move from one population to another while providing basic needs for the jaguar, but human development into these corridors can result in the loss of corridor functionally (Rabinowitz and Zeller 2010). Currently, we don't have enough information to fully understand the response of jaguar movements to human development and definitively determine jaguar tolerance to corridor width (Rabinowitz and Zeller 2010). Rabinowitz and Zeller (2010) suggested 10km width as a possible minimum, but this is largely based on studies of mountain lions (*Puma concolor*) (Beier 1993, Kautz et al. 2006).

In 2003, there were 171 active major mines in Arizona and none of which are within the jaguar PCH (USGS 2005). More recently, however, the proposed Rosemont Mine, located at the base of the Santa Rita Mountains, is a large mining operation that is proposed to occupy CNF and adjacent private and state land. The proposed mine is being evaluated through a separate section 7 consultations along with the cumulative effects on adjacent lands. Therefore, the Proposed Rosemont Mine will not be considered in these cumulative effects. We believe the cumulative effects of livestock grazing on the CNF plus the current surrounding mining activities (excluding proposed Rosemont Mine) don't appreciably diminish jaguar PCH on the CNF.

DETERMINATION OF EFFECTS

Based on the above assessment of direct, indirect, and cumulative effects, it is my determination that implementation of the continued livestock grazing on the Coronado National Forest will have “**No Affect**” on the following PCEs within jaguar proposed critical habitat. This determination is based on the following factors:

1. Livestock grazing or livestock management activities will not impede the jaguar movements to travel through CNF lands and maintain connectivity.
2. Livestock grazing or livestock management activities will not eliminate any naturally occurring water sources or exclude jaguars from the use of naturally occurring water sources or developed livestock water sources.
3. Livestock grazing or livestock management activities will not reduce canopy cover within Madrean evergreen woodland.
4. Livestock grazing or livestock management will not permit construction of structures, building roads, or conduct night-time lighting.
5. Livestock grazing or livestock management will not affect the terrain.
6. Livestock grazing or livestock management will not affect the elevation.

Based on the above assessment of direct, indirect, and cumulative effects, it is my determination that implementation of the continued livestock grazing on the Coronado National Forest “**may affect, but not likely to adversely modify**” native prey species (PCE #2) within the jaguar proposed critical habitat. This determination is based on the following factors:

- Livestock grazing removes herbaceous vegetation which may influence prey species abundance and/or distribution, but the effect on jaguar PCH is expected to be minor and not result any adverse habitat modifications.
- Adjacent lands are mostly used for livestock grazing and are managed similarly to livestock grazing on the CNF thus the cumulative effect may also influence prey species. We determined that the cumulative effect would not appreciably increase the effect on prey species and not result any adverse habitat modifications.

LITERATURE CITED

- Beier, P., 1993. Determining minimum habitat areas and habitat corridors for cougars. *Conservation Biology* 7: 94–108.
- Bock, C. E., V. A. Saab, T. D. Rich, and D. S. Dobkins. 1993. Effects of livestock grazing on neotropical landbirds in western North America. General Technical Report RM-229. Fort Collins, CO Rocky Mountain Forest and Range Experimental Station, USDA – Forest Service: 296-309.
- Boydston, E. E., and C. L. Gonzalez. 2005. Sexual differentiation in the distribution potential of northern jaguars (*Panthera onca*). United States Department of Agriculture Forest Service Proceedings RMRS-P-36, 51, 56.
- Brown, D. E. 1983. On the status of the jaguar in the Southwest. *The Southwestern Naturalist* 28: 459–460.
- Brown, D. E., and C. A. López González. 2001. Borderland jaguars: tigres de la frontera. University of Utah Press. 170 pp.
- Childs, J. L., and A.M. Childs. 2008. *Ambushed on the Jaguar Trail: Hidden Cameras on the Mexican Border*. Rio Nuevo Publishers.
- Forest Service Handbook. 2005. FSH 2209.13 Grazing permit administration handbook *in* Rangeland Management Decision Making. Ch. 90: 1-16.
- Girmendonk, A. L. 1994. Ocelot, jaguar and jaguarundi sighting reports: Arizona and Sonora, Mexico. Arizona Game and Fish Department.
- Glenn, W. 1996. *Eyes of fire: encounter with a borderlands jaguar*. Printing Corner Press, El Paso, Texas. 28 pp.
- Hatten, J.R., A. Averill-Murray, and W.E. Van Pelt. 2002. Characterizing and mapping potential jaguar habitat in Arizona. Nongame and Endangered Wildlife Program Technical Report 203. Arizona Game and Fish Department, Phoenix, Arizona.
- Kautz, R., Kawula, R., Hctor, T., Comiskey, J., Jansen, D., Jennings, D., Kasbohm, J., Mazzotti, F., McBride, R., Richardson, L., Root, K., 2006. How much is enough? Landscape-scale conservation for the Florida panther. *Biological Conservation* 130: 118–133.
- Laycock, W.A. 1991. Stable states and thresholds of range condition on North American Rangelands: a viewpoint. *Journal of Range Management* 44: 427-433.
- McCain, E. B., and J. L. Childs. 2008. Evidence of resident jaguars (*Panthera onca*) in the southwestern United States and the implications for conservation. *Journal of Mammalogy*, 89: 1–10.
- Nowell, K. and P. Jackson. (1996). *The Wild Cats: A Status Survey & Conservation Action Plan*. International Union for Conservation of Nature and Natural resources, Gland, Switzerland.
- Oretega-Huerta, M. A., and K. E. Medley. 1999. Landscape analysis of jaguar (*Panthera onca*) habitat using sighting records in the Sierra de Tamaulipas, Mexico. *Environmental Conservation* 26: 257–269.

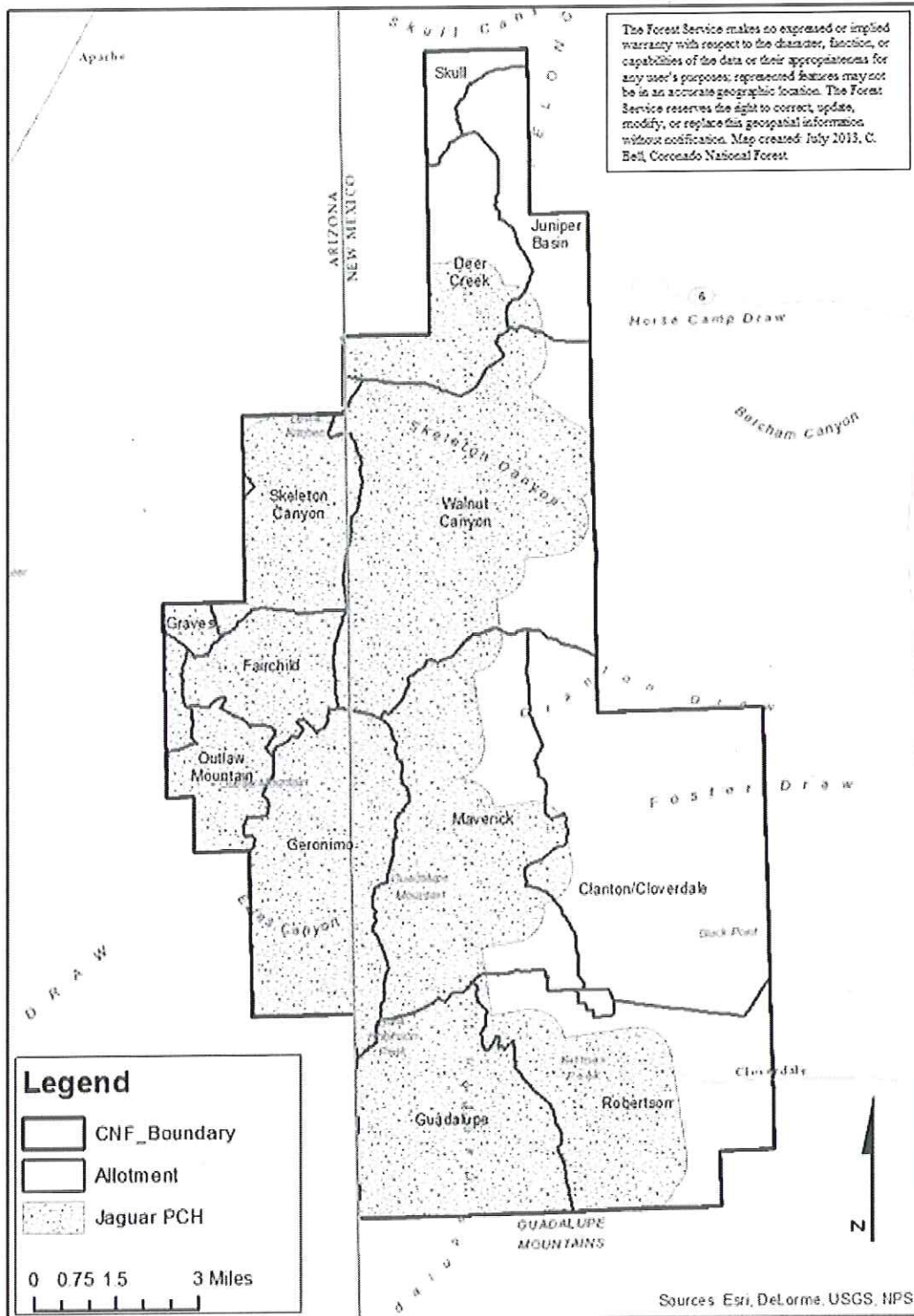
- Rabinowitz, A. 1999. Present status of jaguars (*Panthera onca*) in the southwestern United States. *The Southwestern Naturalist* 44: 96–100.
- Rabinowitz, A. and K.A. Zeller. 2010. A range-wide model of landscape connectivity and conservation for the jaguar (*Panthera onca*). *Biological Conservation* 143: 939-945.
- Rosas-Rosas, O. C. 2006. Ecological status and conservation of jaguars (*Panthera onca*) in northeastern Sonora, Mexico. PhD Dissertation, New Mexico State University, Las Cruces, New Mexico. 94 pp.
- Rosas-Rosas, O. C., and L. C. Bender. 2012. Population status of jaguars (*Panthera onca*) and pumas (*Puma concolor*) in northeastern Sonora, Mexico. *Acta Zoologica Mexicana* 28: 86-101.
- Sanderson, E.W., K.H. Redford, C.L.B. Chetkiewicz, R.A. Medellin, A.R. Rabinowitz, J.G. Robinson, and A.B. Taber (2002). Planning to save a species: the jaguar as a model. *Conservation Biology*, 16: 58-72.
- Seymour, K. L. 1989. *Panthera onca*. *Mammalian Species*, The American Society of Mammalogists. 340: 1–9.
- Swank, W. G., and J. G. Teer. 1989. Status of the jaguar–1987. *Oryx* 23: 14–21.
- USDA Forest Service. 1998. Biological Assessment of on-going and long-term grazing on the Coronado National Forest. Coronado National Forest, Tucson, AZ.
- USDA Forest Service. 2011. Coronado National Forest Land and Resource Management Plan – Draft. Coronado National Forest, Tucson, AZ.
- U. S. Fish and Wildlife Service. 2002. Biological Opinion and Conference Opinion on continuation of livestock grazing on the Coronado National Forest. Arizona Ecological Field Office, Tucson, October 25, 2002.
- U. S. Geologic Survey. 2005. Active Mines and mineral processing plants in the United States in 2003. Geological Survey National Minerals Information Center web page at: <http://minerals.usgs.gov/minerals/> accessed on July 29, 2013.
- Zeller, K. 2007. *Jaguars in the new millennium data set update: the state of the jaguar in 2006*. Wildlife Conservation Society, New York.

Appendix I. The table displays the CNF allotments within jaguar PCH and the most recent consultation for those allotments.

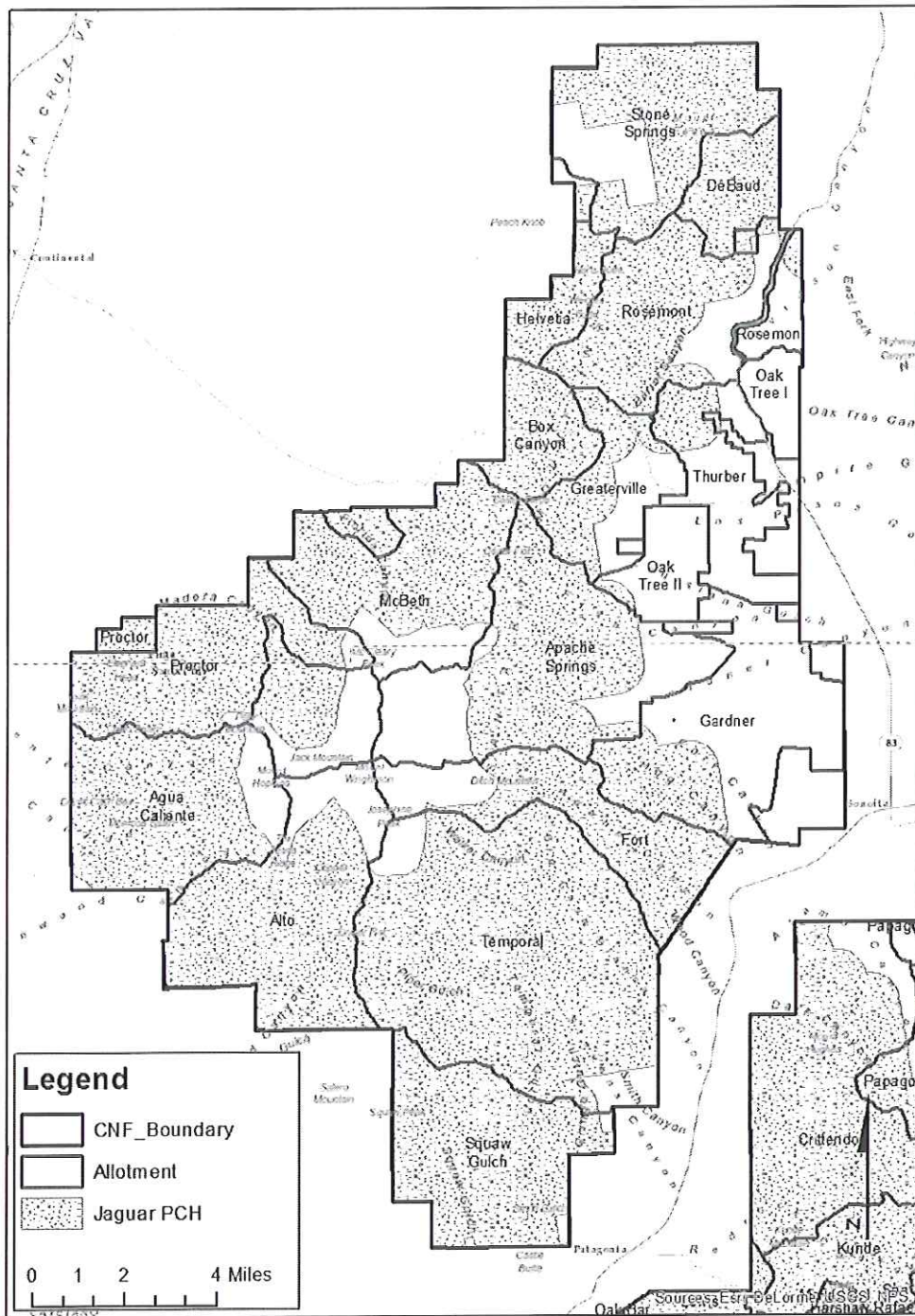
Allotment	EMA	Consultation Number	Allotment	EMA	Consultation Number
Clayton/Cloverdale	Peloncillo	22410-2008-F-0053	Pena Blanca	Tumacacori	22410-98-F-0399R1
Deer Creek	Peloncillo	22410-2008-F-0369	Ramanote	Tumacacori	22410-98-F-0399R1
Fairchild	Peloncillo	22410-2008-F-0369	Rock Corral	Tumacacori	22410-98-F-0399R1
Geronimo	Peloncillo	22410-2008-F-0053	Sardina	Tumacacori	22410-98-F-0399R1
Graves	Peloncillo	22410-2008-F-0369	Sopori	Tumacacori	22410-98-F-0399R1
Guadalupe	Peloncillo	22410-2008-F-0053	A-Draw	Huachuca	22410-98-F-0399R1
Juniper Basin	Peloncillo	22410-2008-F-0369	Alisos/Sierra Tordilla	Huachuca	02-21-04-F-0488
Maverick	Peloncillo	22410-2008-F-0053	Ash Canyon	Huachuca	22410-98-F-0399R1
Outlaw Mountain	Peloncillo	22410-2008-F-0369	Bender	Huachuca	22410-98-F-0399R1
Robertson	Peloncillo	22410-2008-F-0053	Brown Canyon	Huachuca	22410-98-F-0399R1
Skeleton Canyon	Peloncillo	22410-2008-F-0369	Carr Canyon	Huachuca	22410-98-F-0399R1
Walnut Canyon	Peloncillo	22410-2008-F-0053	Chuney	Huachuca	02-21-94-F-013
Agua Caliente	Santa Rita	22410-98-F-0399R1	Collins Canyon	Huachuca	22410-98-F-0399R1
Alto	Santa Rita	22410-98-F-0399R1	Crittendon	Huachuca	22410-98-F-0399R1
Apache Springs	Santa Rita	22410-98-F-0399R1	Duquesne	Huachuca	02-21-04-F-0489
Box Canyon	Santa Rita	22410-98-F-0399R1	Harshaw	Huachuca	02-21-98-F-0488
DeBaud	Santa Rita	22410-98-F-0399R1	Hayfield	Huachuca	02-21-04-F-0489
Fort	Santa Rita	22410-98-F-0399R1	Joe's Spring	Huachuca	22410-98-F-0399R1
Gardner	Santa Rita	22410-98-F-0399R1	Kunde	Huachuca	02-21-98-F-0399-R2
Greaterville	Santa Rita	22410-98-F-0399R1	Lewis	Huachuca	02-21-04-F-0488
Helvetia	Santa Rita	22410-2008-F-0027	Lochiel	Huachuca	02-21-04-F-0489
McBeth	Santa Rita	22410-2008-F-0027	Lone Mountian	Huachuca	22410-98-F-0399R1
Oak Tree 2	Santa Rita	22410-98-F-0399R1	Manila	Huachuca	22410-98-F-0399R1
Proctor	Santa Rita	22410-98-F-0399R1	McFarland	Huachuca	02-21-98-F-0488
Rosemont	Santa Rita	22410-98-F-0399R1	Miller Canyon	Huachuca	22410-98-F-0399R1
Squaw Gulch	Santa Rita	22410-2008-F-0027	Oak Bar	Huachuca	02-21-98-F-0488
Stone Springs	Santa Rita	22410-98-F-0399R1	O'Donnell	Huachuca	22410-98-F-0399R1
Temporal	Santa Rita	22410-98-F-0399R1	Papago	Huachuca	02-21-98-F-0399-R2
Thurber	Santa Rita	22410-2008-F-0027	San Rafael	Huachuca	22410-98-F-0399R1
Bear Valley	Tumacacori	22410-98-F-0399R1	Santa Cruz	Huachuca	02-21-98-F-0488
Carrizo	Tumacacori	22410-98-F-0399R1	Sycamore	Huachuca	22410-98-F-0399R1
Cross S	Tumacacori	22410-98-F-0399R1	U-D	Huachuca	22410-98-F-0399R1
Fresnal	Tumacacori	22410-98-F-0399R1	Benson	Whetstone	22410-2008-F-0335
Jarillas	Tumacacori	22410-98-F-0399R1	Coal Mine	Whetstone	22410-2008-F-0335
Lake	Tumacacori	22410-98-F-0399R1	Knear	Whetstone	22410-2008-F-0335
Mariposa	Tumacacori	22410-98-F-0399R1	Mescal	Whetstone	22410-98-F-0399R1
Marsteller	Tumacacori	22410-98-F-0399R1	Middle Canyon	Whetstone	22410-98-F-0399R1
Montana	Tumacacori	22410-98-F-0399R1	Wakefield	Whetstone	22410-98-F-0399R1
Murphy	Tumacacori	22410-98-F-0399R1			
Oro Blanco	Tumacacori	22410-98-F-0399R1			

Appendix II. The following maps display CNF allotments and jaguar PCH within each EMA.

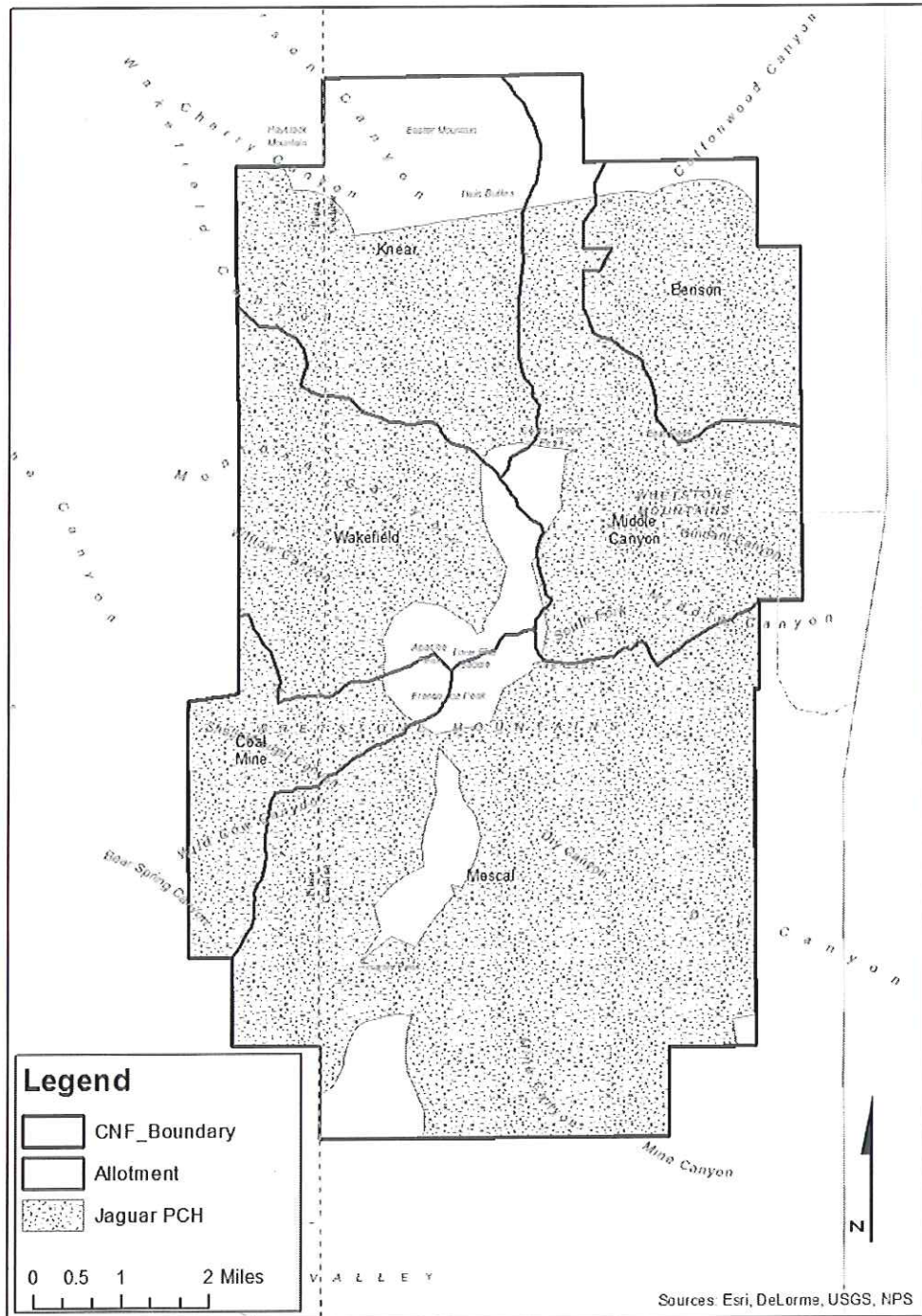
Peloncillo EMA



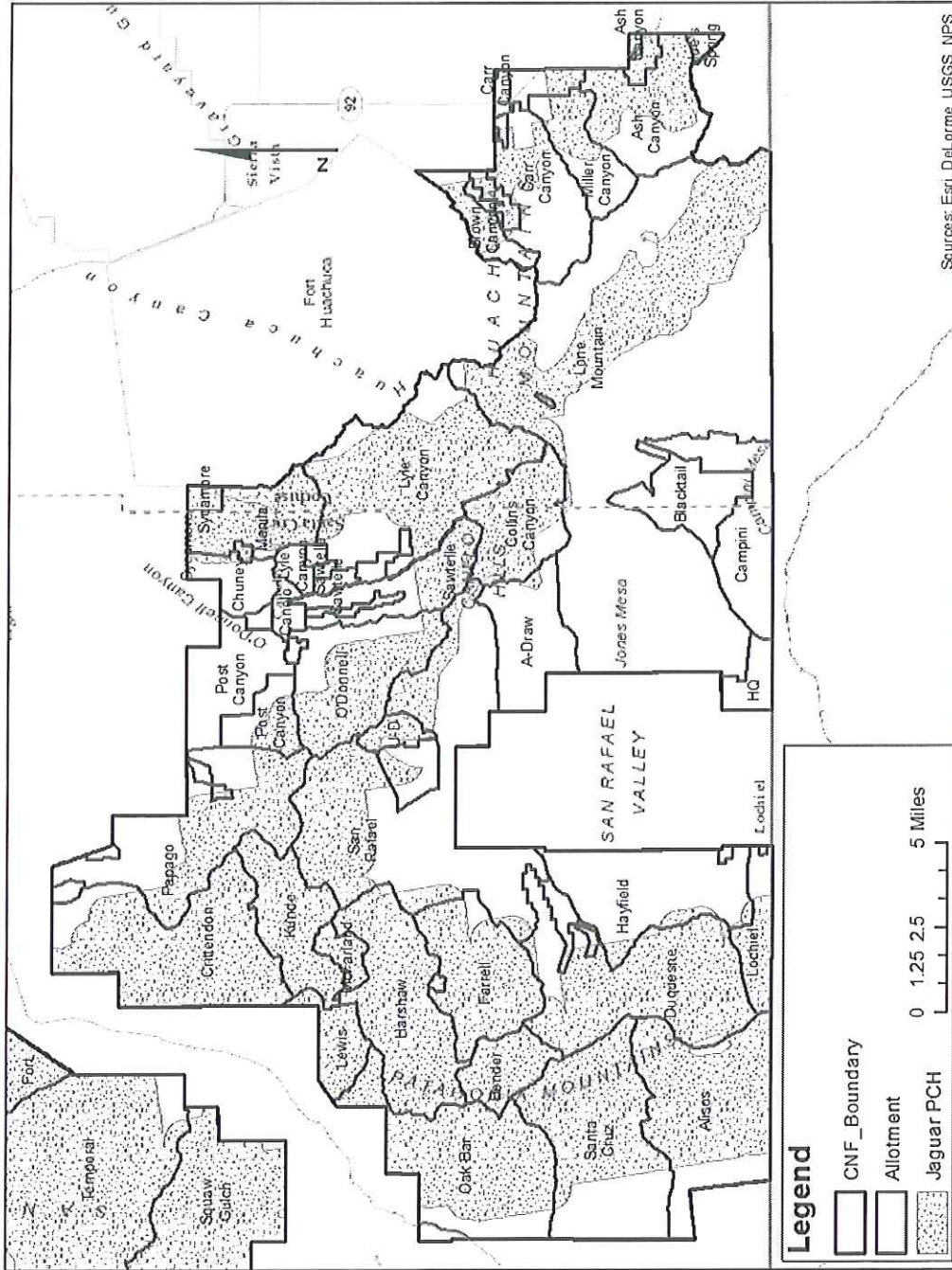
Santa Rita EMA



Whetstone EMA



Huachuca EMA



Tumacacori EMA

