FOREST GUARDIANS

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September 3, 2002

Hon. Gale A. Norton
Secretary of the Interior
U.S. Department of the Interior
1849 C Street NW
Washington, DC 20240

Steven A. Williams, Director
U.S. Fish and Wildlife Service
U.S. Department of the Interior
1849 C Street NW
Washington, DC 20240

BY CERTIFIED MAIL

Re. Petition to Revise the Critical Habitat Determination for the Northern Aplomado Falcon

Dear Secretary Norton and Director Williams:

Pursuant to Section 4(b)(3)(D) of the Endangered Species Act, 16 U.S.C. § 1533(b)(3)(D), and 50 C.F.R. § 424.14, Forest Guardians, the Chihuahuan Desert Conservation Alliance, and Texas Public Employees for Environmental Responsibility hereby petition the United States Fish and Wildlife Service to revise its critical habitat determination for the Northern Aplomado Falcon (Falco femoralis septentrionalis).

Please find enclosed our petition with attachments substantiating the need to revise the Northern Aplomado Falcon's critical habitat determination.

Sincerely,

Nicole J. Rosmarino

Nicole J. Rosmarino, Ph.D.
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for

Chihuahuan Desert Conservation Alliance
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Texas Public Employees for Environmental Responsibility
2001 S. Street NW Suite 570
Washington, DC 20009

cc: U.S. Fish and Wildlife Service Region 2 Director Dale Hall
Jay Tutchton, Esq. Earthjustice
Matt Kenna, Esq. Kenna and Hickox, P.C.

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OFFICE OF THE EXECUTIVE SECRETARIAT
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3/7/51

Northern Aplomado Falcon
Falco femoralis septentrionalis

Petition to the U.S. Fish and Wildlife Service to Revise the Critical Habitat Designation for the Northern Aplomado Falcon

Primary Petitioner

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3 September 2002

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I. EXECUTIVE SUMMARY

Forest Guardians, the Chihuahuan Desert Conservation Alliance, and Texas Public Employees for Environmental Responsibility hereby petition the United States Fish and Wildlife Service (Service or FWS) to revise its critical habitat determination for the northern aplomado falcon (Falco femoralis septentrionalis) (aplomado or falcon) and designate critical habitat for this Endangered subspecies pursuant to the federal Endangered Species Act, 16 U.S.C. 1531 § et seq. (ESA or Act).

The northern aplomado falcon is a distinctive raptor endemic to regions of the southwestern United States and Mexico. This falcon is a subspecies of the aplomado falcon, whose historic range stretched from the southwestern U.S. to the southern tip of South America. The northern aplomado subspecies was considered locally common within its U.S. range until about 1930 (Hector 1987; Montoya and Zwank 1995; Truett, forthcoming). In 1852, the first aplomado falcon was collected in the U.S. at a southwestern New Mexico locality. One century later, in 1952, the last nest site documented in the U.S. was located in the same area (Ligon 1961; Hector 1987, Montoya and Zwank 1995). In 2002, for the first time in fifty years, unassisted by human action, aplomado falcons successfully nested near Deming, in southwestern NM. Until this year (2002), with the exception of reintroductions in South Texas and scattered sightings, the northern aplomado falcon was considered extirpated from the U.S., with small populations remaining in Mexico.

The Service listed the northern aplomado falcon as an Endangered species in 1986 but did not designate critical habitat. Specifically, the Service found that the absence of any breeding pairs from the U.S. made such designation "not prudent," since its authority to designate critical habitat does not extend beyond the borders of the U.S. Because there is evidence that non-reintroduced aplomados are breeding within their U.S. range, the justification for a "not prudent" determination is no longer sound.

Critical habitat designation is especially vital for the aplomado falcon, as protection against jeopardy and the prohibition on falcon take are not providing adequate safeguards to effect falcon recovery. Critical habitat designation is an important tool for species conservation and recovery because it ensures greater protection than the take prohibition and consultation requirement of the ESA. While the Act prohibits "jeopardy" to listed species and protects individuals of the listed species, critical habitat designation prohibits the degradation of essential habitat needed by a species for recovery. Above and beyond the jeopardy standard, the critical habitat provision protects unoccupied as well as occupied habitat of a listed species (16 U.S.C. § 1536(a)(2)). This prohibition against adverse modification of critical habitat is vital from a scientific perspective, which recognizes that the status of a species is integrally linked with the integrity of its habitat.

Threats against the falcon and its habitat make critical habitat designation imperative. Significant threats include:

- Habitat destruction in the form of livestock grazing, oil and gas development, land conversion, and military operations. In particular, livestock grazing's facilitation of brush

encroachment, damage to yucca, role in the decline of avian prey species, degradation of riparian areas and other impacts all harm falcon habitat. Oil and gas development cause habitat fragmentation and potential falcon mortalities.

- Inadequate regulatory mechanisms, most notably the U.S. Bureau of Land Management's failure to safeguard falcon habitat from degradation via livestock grazing and oil and gas development, and the continued extermination by the federal government of keystone rodents who may play an important role in sustaining falcon prey habitat.

- Pesticide contamination and electrocution from power lines.

Reintroduction of falcons into Texas has, ironically, eroded falcon habitat protections in that state. Aplomado falcon reintroductions have been underway in south Texas since 1985, with the peak in efforts occurring in south Texas the late 1990s. Reintroductions into west Texas are now beginning. The reintroductions have been conducted under a "safe harbor" policy that seriously erodes habitat protection.

Additional reintroduction is being considered in New Mexico, despite the documentation of breeding activities by wild falcons in recent years. A breeding pair of aplomado falcons was observed south of Deming, NM in 2001 and successfully fledged three young in the same area in 2002. As petitioners will show, there has in fact been a steady influx of accounts of falcon sightings in recent years – by credible observers – within the aplomado's range in the U.S., outside of south Texas. The number of credible sightings is especially compelling given the difficulty in detecting aplomados in rugged grassland terrain. Despite sightings outside of south Texas, reintroduction of falcons into New Mexico appears imminent. The design of this reintroduction will likely follow the Texas model, wherein habitat protections will be drastically curtailed.

The ESA mandates critical habitat designation when it is valuable to species conservation and recovery. Given that falcons are increasingly being sighted in the U.S. at a time when the Chihuahuan, Mexico population may be declining, it is possible that the U.S. sightings are of birds originating from within the U.S., although there is at least one example of a falcon who flew from Chihuahua to Otero Mesa (NM). In addition, declines in falcons in Chihuahua mandate that FWS take steps to protect falcon habitat in the U.S. as a hedge against extinction and an imperative component of full recovery. While reintroduction may be a component of falcon recovery, critical habitat protection is vital, given that wild falcons – originating in the U.S. or Mexico – are now present in the U.S. Reintroduction must not occur at the expense of these wild birds by eroding their statutory habitat protections for political expedience. Critical habitat designation would ensure against this denial of habitat protections.

The protection of the northern aplomado falcon's habitat would fulfill the ESA's very purpose – ecosystem protection and the recovery of imperiled species. In the southwestern U.S., the falcon is most closely associated with the Chihuahuan Desert. Over the past century, this area has undergone severe degradation from agriculture, municipal development, and, increasingly, oil and gas extraction. In addition, eradication programs targeting keystone rodent species continue to cause direct and indirect declines in the falcon's prey base. The flora and fauna of the

Chihuahuan ecoregion have been drastically impacted from these land uses and human actions and the northern aplomado falcon has not been immune. In its role as a top predator in the Chihuahuan Desert, the aplomado's imperiled status hints at the other signs of a fading and battered landscape – the extirpation of the black-tailed prairie dog (Cynomys ludovicianus) from Arizona and southwestern New Mexico and its decimation in southeastern New Mexico and west Texas; the perhaps irreversible transformation of thriving black grama (Bouteloua eriopoda) grasslands to desert scrub; the massive removal of beavers (Castor canadensis) and consequent impoverishment of southwestern streams; the dramatic and continued decline of grassland songbirds; and the persecution of the falcon's fellow hunters, the jaguar (Panthera onca), black-footed ferret (Mustela nigripes), and the Mexican wolf (Canis lupus baileyi).

This petition invokes the mandates of the ESA for habitat and ecosystem protection and for the full recovery of the northern aplomado falcon from its Endangered status. It then discusses the reasons why immediate critical habitat designation is warranted and suggests areas for such designation. Petitioners request that FWS consider for designation all suitable habitat within the falcon's range in the U.S. (southeastern Arizona, southern New Mexico, west and south Texas) that fits the definition of critical habitat under 16 U.S.C. § 1533(5)(A). Petitioners expect that FWS will carry out its duties under the ESA in processing and acting upon this petition promptly.

II. PETITIONERS

This petition is respectfully submitted pursuant to 5 U.S.C. § 553(e), 50 C.F.R. § 424.14, and the Endangered Species Act, 16 U.S.C. § 1533(b)(3)(D) by Forest Guardians, the Chihuahuan Desert Conservation Alliance, and Texas Public Employees for Environmental Responsibility. Forest Guardians is a non-profit conservation organization located in the southwestern United States. Forest Guardians seeks to preserve and restore native wildlands and wildlife in the American Southwest through fundamental reform of public policies and practices.

The organization has approximately 2,000 members in New Mexico and Arizona. Members engage in wildlife viewing, outdoor recreation, and other activities throughout the Southwest and are particularly concerned with the management of public lands that are essential to the recovery of the northern aplomado falcon. The health and integrity of ecosystems throughout Western public lands is an important part of these members' aesthetic, scientific, and recreational enjoyment of national forests. As a result, members of Forest Guardians are injured by the actions of federal land and water management agencies that impact these ecosystems and harm the habitat of native fish and wildlife. Forest Guardians and its members are particularly concerned with the conservation of the northern aplomado falcon and the native ecosystems that this rare raptor depends upon for survival.

The Chihuahuan Desert Conservation Alliance (CDCA) was originally started in 1986 as the Carlsbad Concerned Citizens for Responsible Land Management and the name was changed to CDCA in 1995. CDCA is involved in a wide variety of activities including outdoor and public education, tree-planting and soil conservations projects, construction of nesting platforms for herons, monitoring of wild populations of birds and other animals, bird-banding activities, and

other conservation activities. CDCA also takes a stand and gets involved on a wide variety of environmental and environmental justice issues.

Texas Public Employees for Environmental Responsibility (PEER) represents public employees who are working to protect, preserve and restore native ecosystems in Texas. Thus, any local, state or federal actions, or inaction, that interferes with recovery of threatened or endangered species and their habitat undermines the work and employment of PEER members. Texas PEER members are particularly concerned about the protection and recovery of the aplomado falcon and is currently working hard to protect and restore those native Texas' ecosystems and all related species.

III. STATUTORY REQUIREMENTS & PREVIOUS ADMINISTRATIVE ACTIONS

Purpose of the Endangered Species Act

In 1973 Congress passed the Endangered Species Act (ESA or Act) to protect species at risk of extinction as a "consequence of economic growth and development untempered by adequate concern and conservation" (16 U.S.C. § 1531(a)(1)). Further, the Act recognized the need to protect ecosystems and proposed listing and providing statutory protection to single species in order to accomplish the goal of ecosystem protection:

> The purposes of this Act are to provide a means whereby ecosystems upon which endangered species and threatened species depend may be conserved [and] to provide a program for the conservation of such endangered species and threatened species.... 16 U.S.C. § 1531(b).

Critical habitat designation for the aplomado falcon provides a means of protecting the ecosystems of the Chihuahuan Desert on which the falcon depends in the southwestern U.S. portion of its range.

Once a species is listed under the ESA, the law intends for that species to be conserved. The term "conserve," along with "conserving" and "conservation," is defined under the Act as,

> ...to use and the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this Act are no longer necessary (16 U.S.C. § 1532(3)).

In other words, the ESA is successful when a species is recovered, i.e., it no longer faces imperilment or extinction. It is the duty of the Secretaries of the Interior and Commerce to implement the ESA pursuant to Department of the Interior (DOI) and Commerce findings and private citizen petitions (16 U.S.C. § 1533(a)). For the northern aplomado falcon, as this petition demonstrates, designation of critical habitat is imperative for obtaining the goal of recovery.

As Petitioners describe below, four sections of the ESA are central for imperiled species protection: listing, critical habitat designation, protection from jeopardy, and recovery planning and implementation.

Listing

Species are not protected under the ESA until they are formally listed under the Act (50 C.F.R.§ 17.11 and 17.12). Species are listed under the ESA when they meet one or more of the following criteria:

> (A) the present or threatened destruction, modification, or curtailment of its habitat or range;
> (B) overutilization for commercial, recreational, scientific, or educational purposes;
> (C) disease or predation;
> (D) the inadequacy of existing regulatory mechanisms;
> (E) other natural or manmade factors affecting its continued existence (16 U.S.C. § 1533(a)(1)).

Species are listed under the ESA as either Endangered or Threatened. Under the Act,

> The term "endangered species" means any species which is in danger of extinction throughout all or a significant portion of its range other than a species of the Class Insecta determined by the Secretary to constitute a pest whose protection under the provisions of this Act would present an overwhelming and overriding risk to man (16 U.S.C. § 1532(6)).

> The term "threatened species" means any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range (16 U.S.C. § 1532(19)).

In 1986 the falcon was listed as an Endangered species pursuant to the Endangered Species Act (See 16 U.S.C. § 1531 et seq.; 50 C.F.R.§ 17.11; 51 Fed. Reg. 6686-90 (February 25, 1986)). The primary threats that provided the basis for FWS's listing decision were continued habitat loss and pesticide contamination (51 Fed. Reg. 6686).

When it listed the falcon the Service did not designate a critical habitat. In its listing summary the Service stated that no such habitat had been proposed. The listing rule reads:

> The Service finds that designation of critical habitat is not prudent for the northern aplomado falcon at this time, because there are no known active nesting areas within the past 25 years in the United States. Critical habitat is not designated in areas outside U.S. jurisdiction (50 C.F.R.424.12(h)) (51 Fed. Reg. 6688, emphasis added).

This subspecies therefore enjoys statutory protections against jeopardy by federal actions and hunting and collecting by any party under the Act but it has not been given the protection of a critical habitat designation. This has likely made it difficult for the bird to reestablish itself in the U.S. given continued degradation of falcon habitat. Moreover, the rationale for this

imprudent finding is no longer valid, given the discovery of known active nesting areas in southwestern New Mexico and the increasing sightings of the falcon within the southwestern U.S. (outside of the reintroduction area in south Texas).

Critical habitat designation

The Secretary of the Interior (Secretary) has purview over terrestrial faunal species, including the aplomado falcon. The Secretary must designate a critical habitat for a species at the time that it is listed as endangered or threatened (16 U.S.C. § 1533(a)(3)(A)). However, the Secretary has the discretion to refrain from designating critical habitat if such designation is deemed not prudent or indeterminable. A finding of "not prudent" indicates that the species is either better off without designation or that designation will do nothing to help the species recover. A finding of "not determinable" simply indicates that, based on the best scientific data available at the time, it is not possible or feasible to designate a certain area as critical habitat (16 U.S.C. § 1533(a)(3)(A), (b)(2), (b)(6)(C)(2)).

Under the ESA,

> The term "critical habitat" for a threatened or endangered species means-
> (i) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 4 of this Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and
> (ii) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 4 of this Act, upon a determination by the Secretary that such areas are essential for the conservation of the species (16 U.S.C. § 1533(5)(A), emphasis added).

As indicated above, at time of listing, FWS declined designation of critical habitat in large part because the falcon had been extirpated from the U.S. However, as the ESA's definition of critical habitat indicates, habitat that is unoccupied by a listed species should still be designated as critical despite the species' absence from it. In fact, the protection of unoccupied habitat under a critical habitat designation is an important example of the value-added of critical habitat protections beyond that provided in simple jeopardy from federal agency actions (discussed in Consultation section below). For the aplomado falcon, critical habitat designation at time of listing would have increased the ability to regulate livestock grazing and pesticide use (especially organophosphates in south Texas) that are a threat to the falcon in the U.S.

The failure of FWS to designate critical habitat for the falcon is not anomalous. In fact, despite Congressional intent in providing critical habitat protection, the DOI has abused the imprudent and not determinable exceptions by regularly finding that designation is not prudent or not determinable. These escape clauses were written into the ESA to provide the Secretary with emergency means of avoiding negative treatment of the Act, but Congress assumed that in most cases designation would be beneficial to a listed species. Thus designation is meant to be

the rule but it has become the exception (New Mexico Cattle Grower's Association v. U.S. Fish and Wildlife Service, 248 F.3d 1277, 1283).

Not prudent findings are more common than not determinable. One prong of the not prudent test is to ask whether designation would provide potential vandals and poachers with easy access to species' habitats, resulting in heightened risk of extinction (50 C.F.R. § 424.12(a)(1)(i)). However, the reality of increased risk is simply not apparent in most cases, but is used as a smokescreen by the DOI to avoid designation.

The second prong of the not prudent test is to determine if critical habitat designation would actually benefit the listed species. FWS sometimes finds that no benefit would accrue to the species beyond the protection provided by the listing process (50 C.F.R. § 424.12(a)(1)(ii)). However, "neither the Act nor the implementing regulations sanctions nondesignation of habitat when designation would be merely less beneficial to the species..." (Natural Resources Defense Council v. United States DOI, 113 F.3d 1121, 1127). For the aplomado falcon, as Petitioners demonstrate below, habitat loss and degradation is a key limiting factor on falcon recovery, and critical habitat designation would therefore clearly be beneficial to this subspecies.

FWS often finds that critical habitat designation would not benefit listed species, as the adverse modification prohibition in section 7 would not provide greater protection than the jeopardy standard, with its consultation requirement. This reasoning flies in the face of the actual construction of the Act (Stanford Environmental Law Society 2000). Critical habitat protection is included in the ESA's mandate precisely because it does provide more protection. While Congress meant for listing protections and critical habitat protections to be determined on their individual merits, FWS often conflates the two and discards critical habitat as a necessary component of recovery. As Petitioners indicate below, consultation has failed to adequately protect falcon habitat from land uses such as oil and gas extraction and livestock grazing. Critical habitat would therefore provide additional conservation value about that of the jeopardy standard.

Indeed, the Fifth Circuit held that the Service's conflation of jeopardy and adverse modification in its regulations was invalid:

> ...the Services' evaluation of the merits of critical habitat designation was premised on the view that jeopardy consultation was "functionally equivalent" to consultation under the destruction/adverse modification standard...This position was based on the fact that 50 C.F.R. § 402.02 defined both standards in terms of survival and recovery...As we have concluded that the regulatory definition of the destruction/adverse modification standard is flawed, this "functional equivalence" argument is untenable (Sierra Club v. U.S. Fish and Wildlife Service, 245 F.3d 434 (2001).).

Because FWS routinely refused to designate critical habitat and relegated critical habitat petitions to the lowest priority category, combined with remands from multiple courts concerned with the Service's neglect of critical habitat decisions and overuse of the "not prudent" determination, there is now a subset of listing funds specifically earmarked for critical habitat

determinations (64 Fed. Reg. 57114-19 (October 22, 1999)).[1] It is important that critical habitat petitions not be neglected out of FWS policy denying the value of critical habitat. While listing is vital for a species to receive ESA protection, some conservation scientists argue that without the protection of a critical habitat the listing process is often nominal at best (New Mexico Cattle Growers Assn. V. USFWS, at 1284). As noted above, in Sierra Club v. U.S. Fish and Wildlife Service, the 5th Circuit found that critical habitat designation does in fact bolster the protection granted to a listed species.

Critical habitat protection is enforced through Section 7 of the ESA, as is the prohibition on jeopardy of listed species. Section 7 prohibits any federal agency actions that are "likely to jeopardize the continued existence of any endangered species..." When a critical habitat has been designated agency actions are not allowed to result in "the destruction or adverse modification of habitat of such species..." (16 U.S.C. §1536(a)(2))

An important justification for this additional protection is that the detrimental effects of development are not always apparent. Section 7 consultation requirements and take prohibitions offer specific protections, but they are limited in scope. Riverside Irrigation District v. Andrews (758 F.2d 508) illustrates this point. In that case developers applied for a permit to deposit dredge materials upstream from the designated critical habitat of the endangered whooping crane. The Army Corps of Engineers, the agency responsible for permitting, found that the proposed action would adversely modify the critical habitat and place the species in jeopardy. The dredging and deposit itself were not found to pose an actual risk to the critical habitat and the developer sued for the permit. However, the Corps had found that the dam itself, which did not require a permit, would have presented a threat to the endangered species. Consequently, the dredge fill permit was not granted. The court found that the ESA required the Corps to investigate all possible effects of development, both direct and indirect (See Id). Critical habitat designation thus makes the ESA a multi-layered and comprehensive protective device.

However, critical habitat designation is not analogous to federally protected lands such as national parks or monuments. The land itself is not given blanket protection. Rather, the sole purpose of designation is to protect endangered species that are endemic to the area.
In fact, there is a high standard for proving adverse habitat modification. "Habitat modification or degradation alone is not enough. There must be some proof of 'the critical link between habitat modification and injury to the species'" for an area to be protected (See Palila v. Hawaii Department of Human Resources, 649 F.Supp. 1070, 1077 (D. Ha. 1996)).

When a petition to designate critical habitat for two fish, the spikedace and the loach minnow, was filed, a similar condemnation of motive was stated. However, the court struck down that reasoning.

> While, as the Intervenor points out, one result of the several cases in this and other jurisdictions filed by the Southwest Center may be to recreate or reconstitute ecosystems

[1]Recent cases where courts have rejected the Service's "not prudent" finding include: Sierra Club v. U.S. Fish and Wildlife Service, 245 F.3d 434 (2001), and Natural Resources Defense Council: Butte Environmental Council v. White, 145 F.Supp.2d 1180 (2001).

and wilderness areas, the injury in fact Plaintiffs plead in this particular case is directed at an identifiable and specific species, is clearly an interest protected by the spirit and the letter of the ESA, and is not so generalized or otherwise does not constitute such a broadly grounded attempt at general ecological health that standing is nullified or placed in jeopardy (Southwest Center for Biological Diversity v. Clark, 90 F.Supp.2d 1300, 1313).

The government may worry about the possibility of a regulatory takings claim stemming from the Endangered Species Act. However, in Christy v. Lujan, 490 U.S. 1114 (1989) (cert. denied) the Supreme Court held that restrictions on property that stem from Section 7 of the ESA do not constitute takings. This is supported by the line of cases from Loretto v. Teleprompter Manhattan CATV Corp., et al., 458 U.S. 419 (1982) to Tahoe-Sierra Preservation Council, Inc. et al. v. Tahoe Regional Planning Agency et al., 122 S. Ct. 1465 (2002), which established that a taking is defined by a permanent physical occupation or a 100 percent diminution in value.

Regulations affecting development can constitute such a taking (See Lucas v. South Carolina Coastal Council, 505 U.S. 1003 (1992)), but only when economic viability has effectively been destroyed. A critical habitat designation is not likely to result in such a dramatic decrease in economic viability (See Good v. US, 39 Fed. Cl. 81).

In fact, Petitioners underscore that critical habitat designation for the aplomado would not be economically destructive. Some foreseeable outcomes include:

- Improved efforts at hunter education, in regards to the use of steel shot;
- Pesticides restrictions;
- Restrictions on predator/rodent/blackbird/raven control;
- Controls on grazing intensities;
- Increased monitoring of existing falcon nests and presence/absence surveys;
- Seasonal restrictions on public access to locate and protect specific nesting areas; and
- Heightened oversight on oil and gas permitting.

These changes in human activities would be in the public interest, in terms of increased species recovery and ecosystem protection and protection of human health. There is also an extensive literature demonstrating that natural ecosystems provide substantial economic benefits, on the order of $300 billion annually in the United States (Pimentel et al. 1997). Most of these services are so intricate and provided on such a massive scale that it would be impossible to replace them (Ehrlich and Wilson 1991). With a safeguarded Chihuahuan Desert, ecosystem services would continue to be furnished. Moreover, with the extensive public land within the falcon's range, federal lands could be a flagship for species and ecosystem recovery, which would be economically prudent.

Consultation

The ESA's consultation requirement is another important aspect of the Act's protective powers. Because human disturbance is recognized as a major cause of species extinction, the

ESA established parameters that limit government activity in areas sensitive to species listed pursuant to the Act. The Act therefore requires each federal agency to:

> insure that any action authorized, funded, or carried out by such agency . . . is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary . . . to be critical (16 U.S.C. § 1536(a)(2)).

If an agency determines that an action it proposes may affect a listed species, it must engage in formal consultation with FWS (50 C.F.R. § 402.14) after which the Service must provide the agency with a biological opinion explaining how the proposed action will affect the species or its habitat. If the Service concludes that the proposed action will jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat, the biological opinion must outline any "reasonable and prudent alternatives" that the Service believes will avoid that consequence (16 U.S.C. § 1536(b)(3)(A)).

Additionally, if the biological opinion concludes that the agency action will not result in jeopardy or adverse habitat modification, or if it offers reasonable and prudent alternatives to avoid that consequence, the Service must provide the agency with a written statement (known as the "Incidental Take Statement") specifying the "impact of such incidental taking on the species," any "reasonable and prudent measures that the [Service] considers necessary or appropriate to minimize such impact," and setting forth "the terms and conditions . . . that must be complied with by the Federal agency . . . to implement [those measures]" (16 U.S.C. § 1536(b)(4); Bennett v. Spear, 520 U.S. 154, 157-8 (1997)).

The consultation requirement is a powerful check on government action. Thomas v. Peterson (589 F.Supp. 1139 (D. Idaho 1984), aff'd in part, rev'd in part, remanded, 753 F.2d 754 (9th Cir. 1985)) held that conservation interests trump most other government wishes. In that case the district court enjoined construction of a road by the Forest Service, which had failed to perform a biological assessment, even though it knew of the immediate presence of the endangered Rocky Mountain Gray Wolf (See Id).

Besides adding protection to listed species, a critical habitat designation gives government and private actors fair warning of a listed species' presence when development is proposed. This is a valuable resource that gives federal agencies, industry, conservation groups, and the interested public confirmation of Section 7 risk. Without critical habitat designations these groups must keep track of listed populations and maintain awareness about possible development. "Critical habitat designation provides informational benefits to the public, state and local governments, and scientific organizations" (Sierra Club v. U.S. Fish and Wildlife Service, 245 F.3d 434, 446 (2001)).

In the case of the aplomado falcon, land use activities continue on federal lands that are degrading the habitat of the falcon and are therefore impeding its recovery in the U.S. Critical habitat designation will help to remedy this condition.

Prohibitions on take

In addition to the habitat protections afforded by the ESA, Congress also included protections for individual members of a listed species. Private citizens are prohibited from any "take" of an endangered species. "Take" means to "harass, harm, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (16 U.S.C. § 1533(18)). The definition of "harm" has evolved since the drafting of the ESA to mean:

> An act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 C.F.R. § 17.3, emphasis added)

While protections for individual aplomado falcons from direct exploitation (e.g., shooting) by humans is important, habitat protection is likely the primary limiting factor on this subspecies' recovery. In particular, FWS named brush encroachment and pesticide use as the leading causes of the subspecies' imperilment when the falcon was listed in 1986 (51 Fed. Reg. 6686-90 (February 25, 1986)). Critical habitat designation would provide a means for the Service to curtail these impacts on aplomado habitat.

Recovery Planning

The fourth component of the ESA's protection mandate is the recovery plan. When a species is listed as endangered the Secretary must develop and implement "plans for the conservation and recovery of [the species]" (16 U.S.C. § 1533(f)(1)).

There is an added complexity with a subspecies such as the falcon. Because the species was presumed to have been extirpated from the U.S. at the time of its listing, reintroduction was included as a means to recover the species. The standard for downlisting to Threatened was for a self-sustaining population of 60 breeding pairs in the U.S., which would be accomplished through reintroduction (USFWS 1990).

However, the Recovery Plan for the Northern Aplomado Falcon also indicates the need for habitat protection throughout the aplomado's range:

> Simultaneous to the reintroduction work, suitable habitat in the U.S. and Mexico should be identified and protected, especially in areas close to reintroduction sites. Particular attention should be directed toward suitable habitat on public lands (USFWS 1990: 24).

> Ultimately, the preservation of this species depends on: (1) regulating the use of any pesticides found to be harmful to the falcon or its prey, and (2) using habitat management techniques that protect and restore healthy grassland ecosystems (USFWS 1990: 29).

The Plan specifies that falcon habitat be identified, maintained, and improved. In particular, habitat management should include control of brush encroachment, protection and maintenance

of appropriate ground cover, increased small bird abundance, and support of nest-building bird populations (USFWS 1990).

Indeed, given the definition of Endangered and Threatened species (See above discussion under Listing), for the aplomado to be fully recovered, it should be recovered throughout its range. The Service acknowledged this responsibility to a degree in 1995, when it wrote that although the emphasis in falcon recovery has been in south Texas reintroduction effort, the FWS "has not forgotten the aplomado falcon in the Chihuahuan desert grasslands" (Mazzoni 1995).

With the continued degradation of potential falcon habitat in the U.S., the recovery plan's stipulation for habitat protections appear to go unheeded. In fact, outside of a critical habitat designation, it is unclear how these habitat protections could be accomplished. Petitioners therefore maintain that critical habitat designation is essential to fulfill the goals of the falcon's recovery plan. Moreover, these goals are simply for a downlisting action and habitat protection therefore becomes more urgent were FWS to develop a recovery plan to accomplish delisting (i.e., recovery).

Exemptions from the take prohibition

The reintroduction facet of falcon recovery leads to additional facets of the Act. Namely, Section 10 of the ESA provides for exemptions from the blanket prohibitions for Endangered species under Section 9. There are two subsections involved for the falcon: 1) Section 10(a)(1), which provides for habitat conservation plans applicable to private lands and allows incidental take of a listed species (16 U.S.C. § 1539(a)(1)(B)); and 2) Section 10(j), which allows for the designated of a released population as an "experimental, non-essential" population that does not enjoy the full protections of the ESA (16 U.S.C. § 1539(j)).

A Habitat Conservation Plan (HCP) has been developed to allow the reintroduction of falcons into west and south Texas on private lands. This is discussed in detail in the section on the Need for Critical Habitat Designation, below. The HCP removes habitat protection for falcons on multiple millions of acres in Texas for a term of 99 years (Peregrine Fund 1996; USFWS 2000).

An "experimental population" is defined as,

> any population (including any offspring arising solely therefrom) authorized by the Secretary for release... [when] the population is wholly separate geographically from nonexperimental populations of the same species (16 U.S.C. § 1540(j)(1)).

The Secretary designates these experimental populations as essential or nonessential to the conservation of the species. Essential experimental populations are considered threatened. Nonessential populations are treated as a species proposed to be listed under the Act and are not given critical habitat designation (16 U.S.C. § 1540(j)(2)). The Recovery Plan recommended that reintroduced falcons be designated 10(j) experimental non-essential populations (USFWS 1990). As discussed in the Need for Critical Habitat Designation section below, the Peregrine Fund has

attempted to secure a 10(j) non-essential designation in New Mexico, which would strip away habitat protections for the falcon.

Recent efforts by conservation groups to reintroduce the falcon into Texas have met with some success. However, the successful recolonization of New Mexico and Arizona by falcons from Chihuahua may be hindered by ongoing habitat destruction. Given the need for habitat protection, a non-essential designation would thwart recovery of the falcon and would therefore contravene the ESA's mandate.

Reintroduction of endangered species should be a last resort to recovery, given high mortality rates of reintroduced individuals. Expected survival rates of individual animals in reintroduction and translocation efforts may be under 50% for some species. In addition, analyses of endangered species reintroduction projects found that they generally fail (Griffith et al. 1989; Reading et al. 1991; Reading 1993). Another important issue is the extent to which confming and manipulating endangered species in a captive breeding context impacts those individuals and species biologically (Miller et al. 1996). Unknown consequences of captivity and technical tools, such as monitoring devices and translocation may degrade the "wildness" of reintroduced animals (Doremus 1999). In the aplomado context, reintroduced falcons may compete with wild individuals, thereby compromising the existing population in New Mexico (Keddy-Hector 2002). Given these problems with reintroduction, this conservation tool should not be a substitute for habitat protection.

IV. SPECIES DESCRIPTION

The aplomado falcon (Falco femoralis) is a medium-sized, colorful raptor, with striking facial markings whose historic range stretched from southern Arizona, New Mexico, and Texas south to Tierra del Fuego. The northern aplomado falcon is a subspecies of the aplomado falcon. The northern subspecies historically inhabited the southwestern United States and parts of Mexico. Active populations still inhabit northern and eastern Mexico but the falcon was considered extirpated from the United States after the last observed breeding pair was sighted in 1952 near Deming, NM.

The northern aplomado falcon inhabits prairies and desert grasslands with scattered yuccas (Yucca spp.) and other woody vegetation. Ideal habitat is likely open savanna or grassland with nearby riparian woodlands or wetlands (Keddy-Hector 1988; 2000; USFWS 1990; Montoya and Zwank 1995). The falcon does not build its own nests, but uses the nests of corvids, such as white-necked ravens (Corvus cryptoleucus), and other raptors, including Swainson's hawks (Buteo swainsoni), crested caracaras (Polyborus plancus), and white-tailed hawks (Buteo albicaudatus) (Hector 1987; Keddy-Hector 1988; 2000; Montoya and Zwank 1995). These nests are typically located in the saddles of branched yuccas, mesquites (Prosopis glandulosa), or on tops of crucifixion bushes (Koeberlinea spp.) (Montoya and Zwank 1995). When the bird is unable to find suitable preexisting nest structures it will roost in the boughs of yuccas, mesquites and similar vegetation. Yuccas appear to be of particular importance to falcons. Meyer (1996) remarked that the range of the aplomado in the U.S. overlapped closely the range of the soaptree yucca (Yucca elata).

Nest availability is an important factor in falcon habitat suitability. The Recovery Plan and subsequent writings indicate that the availability of adequate nest-platforms may be a key limitation on falcon survival in otherwise suitable areas (Keddy-Hector 1988; 2000; USFWS 1990). The number of nests available to falcons is related to the abundance of raptors and corvids (USFWS 1990). Within the Rita study site on the White Sands Missile Range (NM), there were repeated sightings of falcons in 1991 and 1992. In contrast to the WSMR's other study sites, the Rita site contained numerous nest structures suitable for aplomados (Henry and Cathey 1995; Richardson 1996). In addition, nest site availability may be a limiting factor for falcons on Otero Mesa (NM). On Otero Mesa, almost all nests were found in tall, older soaptree yuccas (Meyer 1997). As will be discussed below, both livestock grazing and military operations can impact yucca, thereby indirectly harming falcons.

Alternatively, in Chihuahua, Mexico, researchers suggested that nest availability was not a limiting factor (Montoya and Zwank 1995). Nest platforms in northern Chihuahua, Mexico averaged 2.7 m above ground in yucca and mesquite (Montoya et al. 1997; Keddy-Hector 2000). Meyer (2000b) also noted an abundance of available nests where he sighted a breeding pair of falcons from 2000-2002 in southwestern New Mexico.

The falcon has distinct identifying features. Adults vary in length from 38-43 cm with a mass of 208-500 g. Females are generally half again as heavy as males. In size the falcon most closely resembles the Cooper's Hawk (Accipiter cooperii) or American Crow (Corvus brachyrhynchos). The falcon has a stark striped black and white facial pattern: a blackish cap and nape, contrated by a bold white facial stripe that forms a "V" toward the nape. Its upper body is grey with blue tints, its head is striped vivid black and white and its breast and lower body are white fading to cinnamon. In flight the falcon can be recognized by its black- and white-banded tail, dark axillaries, and white trailing edge on wing (USFWS 1997b; Keddy-Hector 2000).

The falcon's diet consists primarily of insects and small birds but it has been known to feed on bats, small rodents, lizards, and snakes. Insects account for more than 60 percent of the falcon's prey take, but birds account for more than 90 percent of prey biomass (Montoya 1995; Keddy-Hector 2000). Table 1 indicates the aplomado's prey species.

Table 1. Prey species of the Aplomado Falcon. Sources: Hector 1987; USFWS 1990; Montoya 1995; Montoya and Zwank 1995; Keddy-Hector 2000.

Common name	Scientific Name
Birds	
Horned lark	Eremophila alpestris
Brewer's sparrow	Aimophila breweri
Cassin's sparrow	Aimophila cassinii
Lark bunting	Calamospiza melanocorus
Lark sparrow	Chonodestes grammacus
Meadowlarks	Sturnella spp.
Northern mockingbird	Mimus polyglottos
Common nighthawk	Chordeiles minor
Western kingbird	Tyrannus verticalis
Dickcissel	Spiza Americana
Brown-headed cowbird	Molothrus ater
Mourning dove	Zenaida macroura
Cactus wren	Campylorhyncus brunneicapillus
Pyrrhuloxia	Cardinalus sinuatus
Ash-throated flycatcher	Myiarchus cinerascens
Blue grosbeak	Guiraca caerulea
Canyon towhee	Pipilo fuscus
Hummingbirds	Trochilidae Family
Great-tailed grackle	Quiscalus mexicanus
White-winged dove	Zenaida asiatica
Groove-billed anis	Crotophaga sulcirostris
Yellow-billed cuckoo	Coccyzus americanus
Northern bobwhite	Colinus virginianus
Quail	Callipepla spp.
Teal	Anas spp.
Pigeons	Columba spp.
Sandpipers	Scolopacidae Family
Orioles	Icterus spp.
Roadrunner	Geococcyx californianus
Mammals	
Bats	Chiroptera spp.
Kangaroo rats	Dipodomys spp.
Pocket mice	Perognathus spp.
White-footed mice	Peromyscus spp.
Herptiles	
Lizards	
Snakes	
Frogs	
Insects	
Locusts and crickets	Orthoptera spp.
Beetles	Coleoptera spp.
Cicadas	Homoptera spp.
Mayflies	Ephemeroptera spp.
Moths and Butterflies	Lepidoptera spp.
Dragonflies	Odonata spp.
Wasps and bees	Hymenoptera spp.

The abundance of avian prey species may be an important determinant of habitat quality for the falcon (USFWS 1990). In addition, while birds appear to be preferred prey, utilization of

prey species by aplomados appears to vary according to availability. For instance, Hector (1985) suggested that falcons were more likely to prey on rodents and reptiles in drier areas with less ground cover and scarce avian prey. An earlier report by Ligon (1961) suggested that in open yucca grassland in New Mexico aplomado diets almost entirely comprised reptiles, lizards, mice, other rodents, bats, and insects.[2] In eastern Mexico, where avian prey species are abundant, falcons would therefore be less likely to prey on non-avian vertebrates. Montoya and Zwank (1995) also discuss raptor modification of diet with altered availability of various prey species and note that their research methodology may have impeded their ability to detect reptiles or rodents in the falcon's diet. In another study, Perez and Zwank (1995) recorded that above-average precipitation and a consequent irruption of dragonflies resulted in released falcons feeding almost exclusively on dragonflies.

The falcon feeds in midair or on foot, where it is runs after grounded prey. Observers note falcons roosting in trees and then swooping on prey or engaging in short bursts of aerial pursuit. Aplomado falcons are known to hunt in pairs, resulting in more consistent, efficient takes. The aplomado also engages in kleptoparasitism, where they expropriate rodents, fish, crayfish, and other pretty from birds such as white-tailed kites (Elanus leucurus), American kestrels (Falco sparverius), and northern harriers (Circus cyaneus) (Keddy-Hector 2000).

Little is known about aplomado migration and the size of their home ranges. Aplomados are not believed to be migratory (USFWS 1990; Burnham et al. 2002). Home ranges of nesting pairs have been recorded at 2.36-21.4 km^2 (Montoya and Zwank 1995; USFWS 1997a). However, Montoya and Zwank (1995) advise that their documentation of home range sizes underestimates home ranges given that their study only recorded movement during the spring and summer months. If data had been collected for the entire year, the researchers suggest, home range sizes for aplomados in the study area would typically be larger than 16 km^2. In addition, Perez and Zwank (1995) documented range sizes of 36-281 km^2 for falcons released in south Texas. These researchers note that their documented range sizes were larger than those reported from other studies likely because juvenile falcons are more mobile than established breeding adults.

During the breeding season, most hunting occurs within a 1-2 km radius from the nest (Keddy-Hector 2000). After the young have fledged, utilization of areas within the home range and further away from the nest may increase (Montoya and Zwank 1995). Aplomados are fairly territorial, with males sometimes flying great distances to challenge intruding males (Keddy-Hector 2000), and little overlap between home ranges of established pairs (Montoya and Zwank 1995). The aplomado is believed to be a monogamous bird. They are found most often in mated pairs who spend most of their day no more than 100-200 m apart (Keddy-Hector 2000).

Males and females share incubation duties, with females taking over after hatching. Males engage in brooding by procuring food for females and young. Observers of nests in eastern Mexico documented adults spending 85-90% of their time perched within 100m of nest platform during incubation. Adults also spent the majority of their time perched during nesting and post-fledging periods. Clutches likely contain a maximum of three eggs, and eggs are

[2]FWS cited the Ligon report in USFWS (1999), as did Henry (1995) in her assessment of the habitat suitability of the northern Jornada del Muerto.

smooth, with whitish or buffy coloring and brownish spots. Clutch starting dates may occur anytime from February to July, with re-nesting attempts possible. There is some evidence of post-DDT era eggshell thinning, which may be one factor in the aplomado's decreased survival rate (USFWS 1990; Keddy-Hector 2000).

Young aplomados may disperse great distances (Perez and Zwank 1995; Keddy-Hector 2000). One falcon banded while a nestling in northern Chihuahua dispersed approximately 300 km to south-central New Mexico. In south Texas, 28 fledglings were tracked ranging from 35.7-281.2 km from the breeding site (Keddy-Hector 2000).

V. THREATS TO THE NORTHERN APLOMADO FALCON

As discussed above, the ESA stipulates five criteria for determining whether a species qualifies as Endangered or Threatened. In the falcon's Recovery Plan, FWS named the threats of brush encroachment, destruction of riparian areas, overcollection, and pesticides (USFWS 1990). Although the falcon enjoys protection from direct take, the subspecies continues to endure multiple threats. The primary threat is continued habitat loss and degradation. In addition to failing to address land uses, such as livestock grazing and oil and gas activities, which result in habitat degradation and loss, the federal government engages in actions, such as lethal control of keystone species, which likely degrades potential falcon habitat. In all, there are a multitude of threats that are likely impeding the falcon's recolonization of the U.S., and critical habitat designation will help ensure that FWS and federal land managers more vigilantly curtail harms against falcons and their habitat.

The present or threatened destruction, modification, or curtailment of its habitat or range.

There are multiple factors that have resulted in the loss or degradation of falcon habitat. Historically, livestock grazing was suspected as the cause of the falcon's disappearance from the U.S. Current threats to falcon habitat include livestock grazing, oil and gas extraction, military operations, destruction of wetlands and wooded areas, and lethal control of black-tailed prairie dogs and beavers.

Livestock overgrazing

First, livestock overgrazing is suspected as the cause of the falcon's disappearance from the U.S. by the mid-20th century (Hector 1987; Montoya and Zwank 1995). FWS noted that continued long-term livestock grazing may be preventing or impeding habitat from recovering and becoming suitable for falcon use on public lands in Arizona and New Mexico (USFWS 1997b, c). The falcon's Recovery Plan specifically stipulated that, "Grazing programs must be carefully managed so they will not destroy ground cover and cause proliferation of brush" (USFWS 1990: 35).

In the falcon's historic range in the U.S., large-scale desertification has taken place, wherein grasslands dominated by perennial grasses are transformed into desert scrub, dominated by brush and annual forbs and grasses (e.g., Bahre 1995; Whitford 1997; de Soyza et al. 1998). Because of these plant community changes, desert grasslands may be the most endangered

landscape type in North America (Whitford 1997).[3] Consider Bahre's (1995: 230-231) description of the changes that have occurred in the Southwest's desert grasslands:

> In the 1850s and 1860s... the grasslands were open and largely free of brush. Grass was plentiful, the streams and rivers dissecting the grasslands were in parts unchanneled and lined with galleria forests and marshes..., wildfires were common, and antelope (Antilocapra Americana), prairie dog (Cynomys ludovicianus), and Mexican wolf (Canis lupus baileyi) were abundant. Today, the landscape is different. The native grasses have declined, and in many areas nonnative species have replaced them; wildfires are rare; erosion is commonplace; and several grassland predators and herbivores have been eliminated. Probably the two most dramatic changes in the grasslands are the extensive increases in woody shrubs and trees and the landscape fragmentation resulting from localized urban and rural settlements.

Indeed, within the Chihuahuan desert, black grama was the dominant habitat type prior to European settlement, but has since undergone substantial reduction and fragmentation (Pidgeon et al. 2001). This transformation has been brought about largely because of livestock grazing. Bahre (1995) and Bock and Bock (2000) emphasize the importance of the 1891-1893 drought, combined with peak stocking rates of cattle and sheep, in accelerating the degradation of southwestern grasslands. State Bock and Bock (2000: 6), "This one event marked the time when the prehistoric high plains of southern Arizona were lost forever from our view." Other authors (e.g., Frederickson et al. 1998), reference livestock ranching during drought years in 1886, 1891-1894, and 1901-1904 which left rangelands severely overgrazed in parts of New Mexico.

Livestock grazing harms falcon habitat in a number of ways in addition to brush encroachment. Impacts on falcon habitat from livestock grazing include decreased forb and grass abundance, less litter cover, and more exposed soil (Muldavin et al. 2001). Consequently, falcon prey species can be harmed by livestock grazing, with indirect – but significant – harms to the aplomado. Livestock also degrade riparian areas, which are important for falcon prey species. Livestock management has resulted in the widespread removal of keystone species – prairie dogs and beaver – who play a role in sustaining falcon prey species and habitat. Finally, livestock damage yucca, thereby limiting the availability of stable nest sites to the aplomado.

Livestock and brush encroachment

The primary impact associated with livestock grazing that is deleterious to the falcon is excessive brush encroachment (Hector 1987; Richardson 1996; Keddy-Hector 2000). An extensive body of literature documents livestock grazing's causation or facilitation of brush encroachment and consequent desertification of southwestern grasslands (Walker et al. 1981; Brown and Archer 1987; Bahre 1995; McPherson 1995; Le Houérou 1996; Weltzin et al. 1997; Frederickson et al. 1998; Valone and Kelt 1999; Kerley and Whitford 2000; Drewa and Havstad

[3]Authors writing for the U.S. Geological Survey provide a more qualified description of the desert grasslands' imperilment, stating they may be one of the rarest ecosystems in the southwest (Muldavin et al. 1998).

2001; Pidgeon et al. 2001; Whitford et al. 2001).[4] Of particular concern are the degradation and transformation of black grama (Bouteloua eripoda) grasslands, which provide high quality habitat for birds in the Chihuahuan desert and have been substantially reduced over the past century (Henry 1995; 1996; Pidgeon et al. 2001).

Examples of brush-encroached areas within the northern aplomado falcon's range include the San Simon Valley (AZ) and the Jornada del Muerto Basin (NM). The San Simon Valley was once dominated by perennial grasses, but has been overtaken by desert shrubs including mesquite, creosote, and snakeweed (Heske and Campbell 1991). The Jornada contains some of the most populous historic nesting territories that have been documented in the U.S. (Ligon 1961; Henry and Cathey 1995). In 1858, the Jornada Experimental Range south of Engle, NM had 90% perennial grass cover. By 1963, that coverage had fallen to only 25% (Henry and Cathey 1995; Richardson 1996). Truett (forthcoming) notes studies comparing grassland coverage in areas in southern New Mexico between the late 1880s and late 1960s, which found that grass cover had declined on average from 75% to 5%.

On the northern Jornada Plain, Henry (1995) notes that brush encroachment is most apparent where cattle concentrations have been heaviest. Alternatively, in a portion of the Tucson pasture which Henry surveyed where there had never been a watering unit and cattle use of the area was relatively minor,

> The site contained the greatest abundance and diversity of birds through the winter, probably due to an abundance of grass seed, which is the primary food item of most grassland birds in winter. The site had noticeably more seed than other parts of the range and also supported a dense stand of black grama grass with a sufficient availability of perch structures in swales adjacent to the grassy uplands (Henry 1995: 30).

In the area where breeding falcons were sighted in southwestern New Mexico in 2000-2002, Meyer (2000b) described grasslands as severely fragmented by brush encroachment. FWS noted this issue in its instructions to the BLM to reinitiate consultation over grazing in the area of the southwestern NM (Luna County) pair (Nicholopoulos 2000).

Unfortunately, the loss of desert grasslands to shrubland continues. FWS observed in 1999 that heavy grazing and the encroachment of mesquite and increaser species such as snakeweed "may currently affect the habitat suitability of the aplomado in many areas of its former desert grassland range (USFWS 1999: 2, emphasis added). Notes Meyer (2000b: 13), "Current grazing regimes may be contributing to ongoing shrub encrochment in grasslands thereby further reducing potential Aplomado Falcon habitat." On his southwestern New Mexico study site, past or ongoing shrub invasion was a concern on at least nine sites out of twelve.

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[4]Frederickson et al. (1998: 198) note the effects of Don Juan de Onate's expedition up the Camino Real in 1598. They write, "Along the trail cattle ate mesquite (Prosopis glandulosa) beans and left a trail of seed-filled dung. The Camino Real would later become readily visible from a distance, marked by dense stands of mesquite that lined the road." These authors similarly note the establishment of dense mesquite stands around old indigenous campsites, where people fed mesquite to their horses.

Within the area where a breeding falcon pair was detected, Meyer (2000b: 16-17) noted that, "the habitat suitability... may be threatened by grazing and shrub encroachment."

Falcons have tended to abandon nesting territories in Mexico when they are encroached by shrubby vegetation. Falcon intolerance for brushy areas may be attributed to impediments posed by such areas for aerial and ground pursuit of prey (Hector 1987; Keddy-Hector 1988; Meyer 1997). In addition, shrub encroachment has caused declines in other raptors on whom falcons depend for nest sites (Hector 1987).

Alongside the loss of falcon suitable habitat to brush encroachment, woody invasion also fragments the suitable habitat that remains. The resulting small and isolated patches are less likely to be occupied by falcons and other grassland obligates than large, contiguous parcels (See Exhibit 1: Raymond Meyer Correspondence).

In addition, livestock grazing causes brush encroachment through diminishing fine fuels and facilitating the spread of some noxious weeds, which disrupts southwestern fire ecology. U.S. southwestern desert grasslands were once characterized by frequent fires (every 7-10 years) that typically ignited in late June-early July, just prior to the summer rainy season from July-September (Drewa and Havstad 2001). With reduced fine fuels due to livestock grazing, fire's role in maintaining grasslands by reducing brush has consequently been compromised (Bahre 1991; 1995; McPherson 1995; Muldavin et al. 1998; Valone and Kelt 1999; Bock and Bock 2000; Drewa and Havstad 2001). Further, the direct or indirect suppression of fires by human action may have particular harm on falcons, given observations that aplomados opportunistically feed on prey species fleeing from fires.[5]

Brush encroachment should not categorically be indicted as a limiting factor on falcon recovery. Keddy-Hector (2002) points out that, in the south Texas and northern Chihuahua portion of the falcon's range, excessive brush removal and deforestation has serious impacts on biodiversity. In addition, some degree of shrubs on the landscape in the Chihuahuan Desert boasts high densities of avian prey. However, as Pidgeon et al. (2001) point out, intact black grama grasslands are much less common than shrub-encroached areas and the former must therefore be safeguarded.

While acknowledging that brush encroachment may hinder falcon recolonization of its former U.S. range, recent research by Joe Truett (forthcoming) indicates that brush encroachment may not have led to the original extirpation of the falcon from the U.S. Rather, Truett suggests that a decline in prey biomass in the early decades of the 20th century led to the falcon's disappearance from this region.

Livestock grazing and declining prey species

Livestock grazing and consequent impacts such as shrub encroachment can negatively impacts avian prey species. Meyer describes the importance of avian prey during nesting of the falcon in Chihuahua. Many bird species upon which the falcon preys are negatively impacted by

[5] See Fire Management Plan Matagorda Island National Wildlife Refuge 2001. However, fire can have a deleterious impact on yucca (Meyer 1997).

shrub invasion and grassland degradation caused by livestock grazing (Meyer 1999b). On Otero Mesa (NM), the avian community is dominated by species that respond well to grazing and/or are associated with shrub lands. Examples include black-throated sparrows and horned larks. While these birds are potential prey for falcons, they do not provide as much prey biomass as other species such as meadowlarks. Meadowlarks were less common on the Mesa than in Chihuahua, likely due to their negative correlation to heavy livestock grazing (Meyer 1997).

In addition, avian prey species who winter in or migrate through the falcon's historical range have continued to decline in recent decades (Meyer 1997; 1999b). Meyer (1999b: 2) notes that,

> ...almost 70% of 29 grassland bird species continued to have declining population trends during the period of 1966-1993 (Peterjohn et al. 1995). It is not difficult to imagine that the sharp decline of potential avian prey species wintering in and migrating through desert grasslands in the southwestern U.S. would influence aplomado falcon persistence in the northern periphery of its range (Meyer 1999b: 2).

In a subsequent writing, Meyer described populations of many grassland birds in North America as having been reduced by 90% in the past 200 years as a result of human actions. More specifically,

> ...intensive grazing has occurred over most grasslands in [the] western U.S. since the late 1800's affecting the resident grassland bird populations. It follows that the sharp decline of potential avian prey species in southwestern grasslands would influence Aplomado persistence in the northern periphery of its range (See Exhibit 1: Raymond Meyer Correspondence).

Grassland bird species who have suffered declines include Cassin's sparrow, Baird's sparrow (Ammodramus baridii), lark sparrow, vesper sparrow (Pooecetes gramineus), lark bunting, mountain plover (Charadrius montanus), eastern and western meadowlark, common nighthawk, northern mockingbird, mourning dove, Sprague's pipit (Anthus spragueii), ferruginous hawk (Buteo regalis), and burrowing owl (Athene cunicularia) (Knopf 1996; Henry 1995; See Exhibit 2: BLM Review of Grazing Management, Migratory Birds, and Aplomado Falcon Habitat). Several of these species are part of the aplomado's avian diet (See Table 1).

A BLM biologist found that, of six species that comprised 46% of the falcon's diet in Chihuahua – eastern and western meadowlark, common nighthawk, northern mockingbird, mourning dove, lark bunting, all had declining population trends. Further, decreasing populations of preferred prey species could be traced to livestock grazing. The relationship between avian prey, vegetation, and falcons was summarized as follows:

1. Small birds are declining in the region [Otero Mesa].
2. Grazing affects the composition and cover of vegetation.
3. Composition and cover of vegetation affects the composition and biomass of small birds.

4. Grazing therefore affects small bird communities.
5. Meadowlarks and other dense grassland species are apparently lacking in the Otero Mesa area possibly due to low basal cover of grass attributed to grazing pressure.
6. The aplomado falcon has apparent prey preferences for at least some bird species sensitive to vegetation conditions, such as meadowlarks (See Exhibit 2: BLM Review of Grazing Management, Migratory Birds, and Aplomado Falcon Habitat).

In environmental analysis of its grazing program, BLM has acknowledged that livestock grazing can deplete herbaceous cover and consequently impair the habitat of the falcon and its prey (BLM 2000). Hector (1987) describes the same dynamic. Specifically, on Otero Mesa (NM), Meyer (1997) notes evidence of overgrazing such as low herbaceous cover (compared to Chihuahua falcon sites); pedestaled bunch grasses; low diversity of herbaceous species; proliferation of disturbance flora such as Russian thistle (Salsola iberica) and snakeweed (Gutierrezia sarothrae).

Moreover, black grama grasslands are important for horned larks, common nighthawks, Cassin's sparrow, and eastern meadowlarks – all falcon prey species (Table 1) – and these species are thereby impacted by continued degradation of this habitat type (Pidgeon et al. 2001). Black grama is vulnerable to livestock grazing impacts (Henry 1995; McClaran 1995).

The Peregrine Fund also notes decreasing numbers of grassland birds at falcon breeding sites in Mexico (Burnham et al. 2002) and BLM describes a decline in migratory birds in New Mexico and the Chihuahuan Desert (BLM 1999). Indeed, grassland birds are considered to be the most rapidly declining group of species in North America (Knopf 1996). These declines are linked to both land conversion (discussed below) and habitat degradation via uniform livestock grazing and land conversion (Knopf 1996; USFWS 1997a). Meyer (2000b: 14) consequently underscores that "habitat protection with respect to improving the status of residential and migratory birds is essential in providing sufficient avian prey levels for the Aplomado Falcon."

Other falcon prey species – invertebrates, small mammals, and herptiles – have also been depreciated on areas in the falcon's historic range, likely because of livestock grazing (Meyer 1997 reporting on Otero Mesa (NM)). In southeastern Arizona, rodent species (Dipodomys and Onychomys spp) have been documented as negatively impacted by cattle grazing. Impacts to rodents from cattle grazing include direct trampling of burrows, soil compaction, and removal of forage (Heske and Campbell 1991).

As petitioners discuss below, the decline of falcon prey biomass in the NM, AZ, and west TX portion of the falcon's range may be linked, in part, to prairie dog eradication programs in the first half of the 20th century. More generally, livestock degradation of falcon prey habitat should be considered a limiting factor on falcon recovery and must therefore be redressed.

Livestock grazing and potentially irreversible desertification

Black grama grasslands may be a particularly important component of falcon habitat in the northern Chihuahua Desert and this grass is associated with yucca (Campbell and Keller 1932; Henry 1995; BLM 2001). Black grama is a preferred grass of cattle in winter (Herbel and

Nelson 1966), and it is less resilient to livestock grazing than blue grama. Moreover, black grama may increase water capture that may facilitate yucca growth. Degraded black grama may therefore impede yucca growth (Henry 1995). With the transformation of desert grasslands to scrub, the falcon's prime habitat in the Chihuahuan Desert of black grama grasslands with scattered yucca is lost.

Overall, the reduction of perennial plant cover, simplification of the vegetation structure, and transition to shrubland caused by livestock grazing results in:

- reduction in soil organic content with decreased litter;
- increased fragility and vulnerability of soils;
- soil compaction, lower permeability, and lower water storage;
- soil surface crusting, leading to increased runoff;
- lowered biological activity in microflora and fauna;
- water logging, increased salinity, and encrusting salinity resulting from increased runoff;
- increased evaporation with reduced shading of soil surface; and
- higher wind speeds at soil surface, with consequently higher rates of evapo-transpiration and increased aridity (Le Houérou 1996).

Moreover, there is a greater likelihood of irreversibility with drier environments with more shallow soils (Le Houérou 1996) and many researchers have indicated that the transformation of U.S. southwestern grasslands to desert scrub may, indeed, be irreversible (Bahre 1995; Muldavin et al. 1998; Bock and Bock 2000; Pidgeon et al. 2001). This is due to shrubs being able to conduct water from lower depths than grasses, thus providing them with the ability to achieve dominance over grasses (Burgess 1995; Hutchinson 1996; Gibbens and Lenz 2001).[6] In addition, there is increased infiltration beneath shrubs, with lower temperatures and more soil biota. In contrast, barren areas between shrubs experience greater runoff and erosion, higher temperatures and lowered soil nutrients (Hutchinson 1996).

Shrubland therefore perpetuates the dominance of shrubs over grasses and impedes restoration to a grassland state (Heske and Campbell 1991; Whitford et al. 2001). Shrub densities continue to increase in the southwest (Muldavin et al. 1998; Gibbens and Lenz 2001). However, shrubs such as creosotebush have a more difficult time becoming established in ungrazed grassland with substantial perennial grass cover (Whitford et al. 2001). Consequently, there is a particular need for FWS to protect falcon habitat from continued desertification. In particular, FWS must adequately protect black grama desert grasslands that have not yet been transformed to desert scrub (Pidgeon et al. 2001).

[6]Gibbens and Lenz (2001) provide an exhaustive description of the root systems of desert plants. In creosotebush (Larrea tridentata) dominated areas, creosotebush root systems extended as much as five (5) meters below the soil surface and extend laterally several meters. This can be contrasted with perennial grasses such as tobosa (Pleuraphis mutica) or black grama (Bouteloua eripoda) in the same areas, whose roots extended less than 0.5 meters below the soil surface and laterally less than one (1) meter.

Livestock degradation of riparian areas

Livestock grazing degrades riparian areas (e.g., Fleischner 1994; Muldavin et al. 1998; Belsky et al. 1999; Bock and Bock 2000), thereby impacting riparian flora and fauna. Riparian areas are highly valuable for southwestern wildlife – they represent less than 1% of the region's area, yet 75-80% of vertebrates in the region depend on these areas for food, water, cover, and migration routes (Fleischner 1994; Muldavin et al. 1998). The primary method by which livestock cause this damage is through destruction of riparian soils and vegetation, which leads to the erosion of streambanks, which leads to lowering of the water table, conversion of stable, gently-flowing perennial streams to ephemeral streams characterized by flash flooding, and transformation of ephemeral streams to dry washes (Muldavin et al. 1998; Bock and Bock 2000).

As early as 1875, observers indicated the importance of southwestern riparian areas to aplomado prey species (Corman 1992). FWS also recognized that riparian areas are important breeding areas for the falcon's avian prey (USFWS 1990). Given the importance of riparian areas to falcon prey species, their degradation is deleterious to aplomados (Keddy-Hector 2000). FWS biologists have noted the role of channelization and agricultural diversion of once-perennial desert streams, which has also resulted in degradation of breeding areas for falcon prey species (King et al. 1995). In addition, in a 1997 biological opinion on grazing on BLM lands in southeastern Arizona, FWS acknowledged that, "Wetland and riparian areas can be important breeding areas for avian prey species of the aplomado falcon...Thus, maintenance of the quality avian breeding habitat is important for establishing a prey base for aplomado falcon" (USFWS 1997b: 283).

In addition to the general role riparian areas play in sustaining falcon prey, beavers perform a keystone role in shaping rich riparian habitat. The historic and continued removal of beavers should be considered an additional limiting factor on the falcon's riparian prey base. The link between falcons and beavers is largely speculative, given the lack of empirical work substantiating their relationship. However, the speculative nature of this argument is on account of the extirpation of both falcons and beavers before scientific research on these species took place.

Beaver play an important role in creating and maintaining riparian areas (Muldavin et al. 1998) and are described as a keystone species that creates habitat for native flora and fauna by modifying local hydrology, stream geomorphology, and habitat conditions.[7] Among the consequences of beaver activities are. the creation and expansion of wetlands, elevated water tables in riparian areas, enhanced forage and cover for wildlife, improved watershed stability, reduction in high flows and downstream flooding, more constant summer flows, the retention of sediment and organic matter, increased aquatic invertebrate production, and increased total aquatic productivity. In particular, an elevated water table in areas adjacent to ponds and canals enhances riparian plant growth and stabilizes banks (Olson and Hubert 1994). All of these beaver-induced effects on riparian areas are vital for sustaining wildlife upon which falcons prey.

Beaver trapping in the 1600-1840s in North America resulted in the reduction of beavers from an estimated 60-400 million individuals to approximately 6-12 million beavers today

[7]See Southwestern Willow Flycatcher Recovery Plan. Draft of April 2001. Appendix K.

(Naiman et al. 1988; Olson and Hubert 1994). With that massive reduction, there has been a concomitant decline in the pond, meadow, and riparian habitats created through beaver dam-building and foraging activities. One estimate is that, "since 1834, approximately 195,000-260,000 km^2 of US wetlands have been converted to dry land... undoubtedly, a large proportion of these wetlands were beaver habitat"(Naiman et al. 1988: 753). Others corroborate the view that there has been a substantial loss in wetlands with the eradication of beaver (Outwater 1996).

The impacts of beaver extermination may be especially significant within the falcon's range, as Taos and Santa Fe were regional fur centers in the 1820s and 1830s. In addition, given that beaver had been depleted throughout the U.S. by the 1840s, the consequent loss of beaver-created habitat may not have been detected in ecological surveys of wildlife habitat, which occurred much later.[8] Put differently, scientific assessment of the habitat present in the falcon's range occurred long after beaver had been trapped out and beaver-created habitat was altered (Naiman et al. 1988). While the peak of beaver reduction in the southwest greatly preceded the falcon's decline, beaver shooting and trapping continues to the present. As will be described in the Inadequacy of Regulatory Mechanisms section, the federal government is in fact involved in beaver reduction which may harm falcon habitat.

Livestock harms to yucca

Another significant impact of livestock grazing on desert grassland is the impairment of falcon nesting sites, specifically, degradation of soaptree yucca. Soaptree yucca (Yucca elata var. elata) is the dominant perennial arborescent monocot in the northern Chihuahuan Desert. Its range matches that of the Chihuahuan Desert (Smith and Ludwig 1978b; Sisson 1983). Its present distribution mirrors that of 10,000-40,000 years ago (Smith and Ludwig 1978b). The soaptree yucca is considered "one of the most important plant species of the northern Chihuahuan desert," given the habitat it provides for many faunal species, as well as its large biomass (Smith and Ludwig 1978a). Montoya and Zwank (1995) found that aplomados consistently used yucca for perching, feeding, and roosting. Recent research has found that falcons in the Chihuahuan desert primarily nest in yucca and that cattle may harm yucca caudices via herbivory, rubbing, and trampling effects (BLM 2001; Young et al. 2001). While rodents and lagomorphs may be damaging to seedlings (Smith and Ludwig 1978b), cattle harm larger plants with the most potential for falcon nests.

First, recent studies have found that 75-98% of yucca flower stalks are consumed in areas grazed by cattle, versus 15% grazed by native ungulates such as pronghorn (Antilocapra americana) (Kerley et al. 1993; BLM 2001). On one study site in the Jornada del Muerto, a single bull entered the area and consumed 75% of the flower stalks (Smith and Ludwig 1976). The voracity with which cattle consume yucca leaves and flowers was underscored by Herbel and Nelson (1966: 181):

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[8]On the lengthy duration of impacts on southwestern grasslands in generally, Bahre (1995: 250) writes, "Probably no single land use has had a greater effect on southeastern Arizona's grasslands than livestock grazing and range management programs. The rangelands have been managed for cattle for so long that we are uncertain about their pregrazing condition."

> Soaptree yucca was eaten primarily in the winter and spring, when the faces of the cattle that eat the leaves often become green. Increased use of it was made in the dry winter-spring of 1964 when it sometimes made up 70% of the grazed plants. In late spring and summer, if the plants bloom, the cattle particularly relish the flowers and flower stalks. They will fight for them and, if necessary, stand on their hind legs to reach them.

While flowers on taller yucca may escape cattle browsing (Kerley et al. 1993), they are still vulnerable to cattle damage to the trunk, or caudex, via trampling (see below).

Cattle consumption of yucca flowers and stalks may have long-term impacts on yucca and grassland health. A desert survival adaptation of the yucca is to greatly increase flower production after a wet monsoon and to flower, at most, every two years (Smith and Ludwig 1976, Sisson 1983; Gilstrap Laslei and Ludwig 1985). Grazing during periods of active growth and photosynthesis may reduce energy required for flower production (Kerley et al. 1993; BLM 2001). Therefore, grazing prior to, and during flowering, will lead to a reduction in yucca flowers. This may lead to local extirpations of yucca moths (Tegeticula yuccasella), given its status as an obligatory parasite on yucca seeds (Kerley et al. 1993; BLM 2001). The reduction in moths would, in turn, negatively impact yuccas, as yucca moths are the exclusive pollinators of soaptree yuccas (James et al. 1993; Kerley et al. 1993; Johnson 2000; BLM 2001). Consequently,

> Local yucca populations may therefore be rendered permanently unfertile and incapable of producing recruits by sexual reproduction, with the associated long term disadvantages of genetic inflexibility (Kerley et al. 1993:16).

In short, harms to yucca negatively impact yucca moths, whose reduction, in turn, limits yucca reproduction.

Harms to yucca also translate to negative impacts on other fauna associated with this plant. On the Jornada del Muerto, cactus wrens have demonstrated a preference for areas with large, mature yuccas that provide feeding and nesting places. In addition, there is a positive correlation between the number of yucca inflorescences per clump and densities of Scott's orioles. This oriole species feeds on soaptree yucca flowers and usually nests in yucca (Naranjo and Raitt 1993). Other fauna associated with the yucca included members of the insect orders Homoptera, Heteroptera, Lepidoptera, Diptera, Coleoptera, and Hymenoptera; multiple reptile species; and the white-throated woodrat (Neotoma albigula), jackrabbit (Lepus californicus texianus), and desert cottontail (Sylvilagus audubonii) (Campbell and Keller 1932). James et al. (1993) recorded an additional three orders of invertebrates using yuccas: Hemiptera, Thysandoptera, Neuroptera, Araneida, and Orthoptera, for a total of 56 species using yucca during the day and 37 species during the night. Kerley et al. (1993) reported a total of 70 arthropod species associated with yucca flowers, along with birds who use yucca as perches: the loggerhead shrike, northern mockingbird, Swainson's hawk, and western kingbirds. All of these species may provide prey to falcon (Table 1), with the exception of Swainson's

hawks, who provide falcons with nests. The reduction of these yucca-associated fauna is therefore an additional limiting factor on falcon recovery.

Second, cattle cause breakage of, and damage to, yucca branches and caudices by rubbing against this plant. This is important given the slow-growing nature of yucca, and the role of tall yuccas in providing potential aplomado nests. In New Mexico, yuccas tend to vary from 1-9m in height, and some individuals as high as 10.9 m have been reported (Campbell and Keller 1932; Smith and Ludwig 1976; 1978b; BLM 2001). Yuccas grow in height from 0.5 to 1.5 inches per year, with an average annual growth rate of 0.96 inches. Growth rates are lower in drier years (Campbell and Keller 1932; Sisson 1983). Given annual growth rates of only one inch per year, individuals reported at 26-feet-high would be nearly 300 years old (Henry 1995).

Physical trampling by cattle causes yucca trunks to trail along the ground (become procumbent) (Kerley et al. 1993; BLM 2001), which hinders their ability to attain heights sufficient to provide nesting substrates for falcons. Further, the BLM notes that,

> As rubbed plants succumb to damage and break off, other plants will be rubbed (perhaps with increased frequency), reducing their life span. At a growth rate of 1in per year (Campbell and Keller 1932), replacement of a nestable YUEL [Yucca elata] lost due to cattle rubbing would take at least 100 years (2001: 10, emphasis added).

Third, cattle trample and degrade soils and vegetation at the base of yucca plants. Yucca provides shade for livestock (Campbell and Keller 1932). As a result, cattle congregate around yucca. According to the BLM (2001), cattle around yucca can impact the health and persistence of yucca plants. Effects include loss of surface roots, altered ability to absorb nutrients and water, and reduction in plant vigor.

Livestock impacts to yucca and consequent harm to aplomado falcons are not an esoteric concern. In 2001, Raymond Meyer, an environmental consultant conducting aplomado surveys, monitored the pair of aplomado falcons who attempted to nest near Deming, New Mexico. Meyer expressed concern when he witnessed multiple cattle rubbing against the yucca plant where the falcons were attempted to nest, causing the plant to sway significantly (See Exhibit 1: Raymond Meyer Correspondence) and, as discussed below, the BLM consequently required the grazing permittee to remove his cattle from the area around the nest.

In sum, there are a variety of direct and indirect harms to yucca from livestock grazing which, in turn, impact the aplomado falcon who benefits from nesting substrate on taller yucca and from the variety of avian and invertebrate prey associated with yuccas in the Chihuahuan Desert. As will be discussed in the Inadequacy of Regulatory Mechanisms section below, these harms are not being adequately addressed by the BLM. Given these multiple harms accruing from livestock grazing, it appears that yucca is, at best, enduring the hardship of grazing, rather than benefiting from it.[9] As will be discussed throughout this petition, the same may be said of the aplomado falcon.

[9]Smith and Ludwig (1978b: 202) describe soaptree yucca as "possibly being a relic of past grassland vegetation" in the Chihuahuan Desert.

Livestock management impacts

The management of rangeland for livestock has also degraded falcon habitat. In particular, livestock ranchers have often persecuted rodents, which are the dominant mammals in many desert grasslands (Parmenter and Van Devender 1995) and often play keystone roles in the ecosystems where they exist (e.g., Whitford 1997; Kotliar et al. 1999; Sherrod 1999; Kotliar 2000; Miller et al. 2000; Sherrod and Seastedt 2001).

Livestock ranchers, often assisted by government agencies, have persecuted prairie dogs for over a century. As a consequence, the black-tailed prairie dog has been extirpated from southeastern Arizona, has suffered range reductions in Kansas, Nebraska, New Mexico, Oklahoma, Texas, Canada, and Mexico, and has been reduced by 98-99% throughout its range (65 Federal Register 5476-5488 (February 4, 2000)). The extirpation of black-tailed prairie dogs from much of the American Southwest has been implicated in the spread of mesquite, as the absence of prairie dogs has taken away an important natural control of shrub encroachment (Weltzin et al. 1997), thereby compounding the process of desertification discussed above.

The historic range of the Arizona black-tailed prairie dog (Cynomys ludovicianus arizonensis) closely matched the falcon's (with the exception of south Texas), and the prairie dog's extirpation from southeastern Arizona and southwestern New Mexico and decimation in southeastern New Mexico and west Texas occurred simultaneously with the falcon's disappearance from the U.S. by the 1950s. Former prairie dog habitat, now overtaken by mesquite and other shrub previously limited by prairie dogs, may therefore have been rendered uninhabitable to falcons. In addition, prairie dogs' role in sustaining complex habitats that can sustain a wide diversity and high abundance of falcon prey is important (Keddy-Hector 2000; Truett, forthcoming). As is the case with falcons and beavers, the link between falcons and prairie dogs is largely speculative, given the lack of empirical work substantiating their relationship. However, the speculative nature of this argument is on account of the extirpation of both falcons and prairie dogs before scientific research on these species took place.

Moreover, this lack of prairie dogs is likely a continued limiting factor on falcon re-establishment in the southwestern U.S. (except for south Texas, which historically did not contain prairie dogs). Prairie dogs are a keystone species that benefits a wide variety of wildlife, possibly including the aplomado falcon. The role of prairie dogs as a keystone species is now well-established scientifically (Kotliar et al. 1999; Kotliar 2000; Miller et al. 2000). Indeed, prairie dogs qualify under multiple categories of keystone species – as prey and for their modification of habitat (Mills et al. 1993).[10]

More studies are regularly coming forth reporting strong relationships between prairie dogs and other wildlife. Barko et al. (1999) report greater avian abundance on prairie dog colonies than on uncolonized areas and Manzano-Fischer et al. (1999) urge the protection of prairie dogs in order to mitigate against further decline of many grassland birds. These findings

[10]Mills et al. (1993) enumerate these different categories of keystone species, but they question the utility of the keystone concept in species conservation.

are particularly important for falcon, given the importance of an abundant avian prey base for falcons. Miller et al. (2000) report more studies along these lines.

As Kotliar et al. (1999) noted, over 200 species have been observed on or near prairie dog colonies. Not all of those species are dependent upon prairie dogs and the habitat they create. However, Kotliar et al. found that nine species can be considered to be dependent on prairie dogs and their colonies: black-footed ferret, burrowing owl, mountain plover, ferruginous hawk, golden eagle, swift fox, horned lark, deer mouse, grasshopper mouse. The horned lark is a falcon prey species (Table I). Horned lark abundance has been reported as one to two orders of magnitude greater on prairie dog colonies than uncolonized areas (Agnew et al. 1986).

In addition, these researchers noted that five species were slightly higher on colonies compared to uncolonized grasslands. One of these species was the mourning dove, another falcon prey species (Table 1). Moreover, 117 have life history characteristics indicating that they benefit from prairie dogs and their colonies, but there is insufficient data about those species (Kotliar et al. 1999). Indeed, it may be that scientific research will never be able to determine all historic prairie dog associates, as research in this area has largely been post-1960. By 1960, an estimated 98% of prairie dog acreage had already been destroyed. In the face of scarcity of prairie dog acreage, associated wildlife may have altered their behavior in order to survive.

Researchers investigating high avian abundance and diversity in northwestern Chihuahua. concluded that there was an urgent need to preserve prairie dog colonies and protect them from threats such as poisoning. They wrote:

> Preserving the prairie-dog ecosystem will benefit and protect declining bird species as well as other grassland birds and vertebrates that use prairie-dog towns (Manzano-Fischer et al. 1999: 268).

In another study on avian abundance on prairie dog towns, the five most abundant species observed on colonies were the horned lark, western meadowlark, mourning dove, burrowing owl, and cliff swallow. During normal vegetation, avifaunal abundance was significantly higher on prairie dog towns, contrasted with non-colonized areas. Horned larks and mourning doves were significantly more abundant on prairie dog towns. Prairie dog colonies were especially used by avian species during breeding months (Barko et al. 1999). An abundant prey base to falcons during breeding season is especially important, as falcons require more food at that time to successfully recruit young (Truett, forthcoming).

Non-avian prey species, as noted by Manzano-Fischer et al. (1999), also benefit from prairie dog towns in Mexico. Another study in northern Chihuahua indicated that small mammal richness, diversity, and density are significantly higher on prairie dog towns (Ceballos et al. 1999). Truett (forthcoming) calculates that young prairie dogs alone might provide 144,000g/40 ha of prey biomass, which is several times greater than the rodent biomass likely to be found in uncolonized areas. In addition, small mammals such as grasshopper and deer mice rely on prairie dog towns (Kotliar et al. 1999) and could serve as falcon prey. Further, the 117 species Kotliar et al. (1999) list who potentially benefit from prairie dog colonies given their life history characteristics include 22 herptiles upon which the falcon could prey; and sandpipers, quail,

sparrows, eastern meadowlark, dicksissel and other falcon prey species (Table 1; See Exhibit 3: Species Associated with Prairie Dog Towns).

As noted in the Species Description section above, with lower rates of precipitation in the falcon's historic range in AZ, NM, and west TX, contrasted with more mesic areas in south TX and Chihuahua,[11] an abundant prey base of reptiles and rodents may be of particular importance for falcon habitat suitability. Moreover, as Truett (forthcoming) points out, prey is not only likely to be more abundant on prairie dog towns, it would also generally be easier prey for falcons, given short-cropped and less brushy vegetation. Prairie dog towns may therefore serve a crucial role in creating and maintaining habitat that provides an abundant, varied, and catchable prey base for falcons. On the Fort Bliss Military Reservation, within El Paso Draw, Meyer suggests that prey abundance may be a limiting factor hindering recolonization of the area by falcons and notes the importance of this draw and other productive areas to black-tailed prairie dogs. El Paso Draw was the location of a September 1999 aplomado sighting (Meyer 1999c).

Historic prairie dog extirpation and ongoing rangeland management involving control of prairie dogs may be an important limiting factor on the potential for falcons to recolonize areas in the southwestern U.S. While restoration and protection of prairie dogs in the desert grasslands may require some vegetation management, the harms of livestock grazing to accomplish this management causes excessive harm. Unlike the Great Plains, the desert grasslands did not have large herds of native ungulates historically (Bock and Bock 2000), and prairie dogs in the desert grasslands therefore did not evolve with heavy ungulate grazing.

Livestock impacts overall

As Petitioners have described, there are multiple impacts on falcon grazing from livestock grazing – shrub encroachment, degradation of black grama and yucca grasslands, and declines in avian and non-avian prey bases. Further, as demonstrated in the Inadequacy of Regulatory Mechanisms section below, livestock grazing continues throughout the falcon's range and potential habitat in the U.S. FWS recognizes the livestock grazing threat, as evidenced by its recommendation to remove feral and non-native ungulates on Department of Defense (DOD) land to prevent further deterioration of desert grassland habitat and promote its recovery: "Decreasing grazing pressure may allow impacted desert grasslands to recover to some degree and historic grassland habitat to be reestablished" (Richardson 1996: 35). Yet, grazing permits on federal land are continually renewed, ushering in further decline of falcon habitat.

Oil and gas impacts

Oil and gas development is a high-magnitude threat to aplomado habitat. In particular, proposed oil and gas leases in Sierra and Otero Counties (NM), if allowed to proceed, may prevent the return of the falcon to that part of the state. This is discussed in the Inadequacy of Regulatory Mechanisms section, below. Exploration for and extraction of oil and gas causes habitat degradation that may impede the falcon's recolonization of its range within the U.S. In southeastern New Mexico, Meyer notes that oil and gas developments "have made extensive

[11] Truett (forthcoming) estimates that the falcon's range in south Texas receives three times the average annual precipitation and has 15-20 times the avian prey base as does west Texas.

tracts unsuitable habitat for species that require large areas of habitat or are sensitive to human disturbance" (See Exhibit 1. Raymond Meyer Correspondence) such as the aplomado falcon.

Federal agencies have recognized this threat. In 1997 biological opinions for the BLM's Caballo and Socorro Resource Areas in NM, FWS noted oil and gas extraction's potential to fragment habitat, cause the loss of grassland habitat, and disturb falcons through operation and maintenance activities (USFWS 1997a, b, c). Further, the Service acknowledged that, "All of the potential aplomado falcon habitat is open to oil and gas leasing" (USFWS 1997a: 46). In addition, the BLM's biological assessment noted unmitigated impacts from oil and gas leasing, including: increased habitat fragmentation and modification; increased proliferation of low seral plants and animals; and increased disturbance of wildlife, including human-caused wildlife mortalities (cited in USFWS 1997a).

The primary effect of oil and gas exploration and extraction on native species is habitat fragmentation. Wildlife migration routes may be disrupted, feeding and nesting sites may be isolated into parcels too small to use, and the general effect of widespread activity creates noise, emits pollutants, and generally disturbs animal behavior. Specifically, mineral extraction development causes habitat fragmentation that perpetuates and exacerbates degradation that drove the aplomado out of the U.S. decades ago. According to a U.S. Forest Service technical report,

> The potential effects of petroleum development on wildlife in wildland environments are numerous and varied... The major wildlife groups affected... are ungulates, carnivores, water birds, upland birds and raptors (Bromley 1985: introductory page, emphasis added).

Possible environmental disruption includes, but is not limited to: noise pollution, human intrusion, alteration of vegetation and land and introduction of harmful substances. Habitat alteration, one of the greater threats to aplomado, is caused by seismic trail clearing, clearing and grading of right of ways, site development, excavation of storage and mud pits, borrow pit excavation, construction of process, treatment and storage facilities, installation of flow lines, erection of power lines, communication systems development, trenching and pipe installation, pipe burial and backfill, effluent accidents and development of ancillary industry (ie boomtowns associated with labor forces) (Bromley 1985: 2). Bromley (1985: 8) states,

> Wildlife habitat alteration or destruction can be considerable due to the increased surface disturbance and vegetation clearing needed for (1) construction activities and (2) placement of permanent operational facilities, well sites, roads, worker accommodations, etc.... The presence of human-associated structures and facilities (buildings, roads, pipelines, transmission lines) will increase.... Effects from secondary activities may be greater in the long term than those from development itself.... It is possible that disrupted ecosystems may never be totally rehabilitated, as human settlement occurring during development and production may persist. Moreover, impacts will have been cumulative over many years during the life of the oil field.

The affected areas can range from several square feet to multiple acre plots, and road and pipeline construction, while only occupying narrow physical spaces, have farther-reaching adverse effects. Mineral developers often claim that their projects are actually relegated to a minimum acreage. For instance, developing one mineral deposit may only require a one to ten acre drill pad. However, what this use of statistics fails to acknowledge is that the vast network of access roads and pipelines impacts surrounding wildland (Bromley 1985).

In addition to habitat fragmentation, human activity related to oil and gas exploration and extraction can negatively impact raptors (USFWS 1997a, b, c). One study of bald eagles described dispersal resulting from human activity:

> Eagles were displaced to areas of lower human activity, preventing effective use of all feeding sites and forcing more birds to use marginal habitat and a smaller area. Feeding birds were disturbed by the mere presence of humans and generally did not return to the site of disturbance for several hours (Bromley 1985: 38).

In reaction to other human activities such as aircraft disturbance, birds (including raptors) in Alaska had less nesting success and decreased production of young, abandoned nests, and lost more eggs. With the addition of on-the-ground disturbance by humans, impacts will likely be more severe (Bromley 1985). In a controlled raptor experiment consisting of frequent walking and driving to nests and placing noisemakers near nests, researchers found that,

> Several nests were deserted and not reoccupied during the following year. Little nest failure was evident, but treatment nests fledged significantly fewer young than control nests (Bromley 1985: 42).

Another study reported ground-nesting osprey destroying eggs when they flushed in response to rapid approach by motorized vehicles:

> Birds apparently attempt to escape discovery by remaining on the nest as long as possible, then flushing directly from the incubation position, which increases the chance of eggs being crushed or pushed from the nest (Bromley 1985: 25)

In addition to habitat fragmentation caused by human disturbance, the physical materials associated with mineral extraction can be harmful to raptors and other animals. For example, saltwater spills from various pipelines can be more harmful than oil spills and they are relatively unpublicized (Bromley 1985).

There are also reports from several state governments of avian deaths in extraction pits. These were caused when birds 1) were coated with oil from the pit and their flight was thereby impeded; 2) ingested toxic substances when drinking in the pits; and 3) drowned in the pits (Bromley 1985).

Avian species are also susceptible to moderate mortality rates from collisions with overhead power lines associated with increased oil and gas and other human activities (Bromley 1985).

On account of these types of concerns in regard to the aplomado falcon, FWS indicated to the BLM that "no further mineral leasing activities" should occur on BLM land in Sierra and Otero Counties (NM) (Fowler-Propst 1999b). Petitioners maintain that critical habitat designation would heighten the BLM's obligation to prevent degradation of falcon habitat from oil and gas activities.

Military operations

A substantial amount of potential aplomado habitat in New Mexico is located on DOD lands. The U.S. military continues to engage in projects which compromise potential falcon habitat. On the west Otero Mesa portion of the McGregor Range on the Holloman Air Force Base, the Air Force proposed a new target complex that would disturb 1,024 acres. The New Mexico Department of Game and Fish opposed the project, on the grounds that the new bombing range would adversely impact falcon desert grassland habitat on Otero Mesa (Sandoval 1998). As indicated above, aircraft can cause significant disturbance of raptors, resulting in compromised recruitment of young (Bromley 1985). An aplomado falcon was sighted within the buffer area of the proposed target complex in September 1999, resulting in potential impacts on the bird from low-level training flights and military activities (Meyer 1999b, c).

In addition, Bivings (1995) indicated the potential for the annual Roving Sands military exercise to increase vehicular activity on Otero Mesa, with resulting increases in noise and airborne dust. In the Tularosa basin, frequent fires resulting from military operations may be hindering the vertical stature of yucca, thereby reducing the availability of nest sites in the Basin (Meyer 1997). Overall, military activities on falcon habitat will further fragment that habitat, causing decreased opportunity for falcon recolonization and persistence on military lands.

Habitat loss through land conversion

Clearing riparian woodlands in desert grasslands and conversion of falcon habitat to croplands has resulted in the permanent loss of habitat (Keddy-Hector 1988; USFWS 1990; 2000; Meyer 2000b). Wholescale brush clearing in riparian areas by ranchers to increase forage for livestock eliminates areas of high avian prey biomass for the falcon. Logging of cottonwood galleries and mesquite bosques has occurred, also eliminating important riparian habitat for falcon prey (Keddy-Hector 2002). Land conversion of falcon habitat continues through the present. For example, in southwestern New Mexico, where a breeding pair was sighted in 2000-2002, there has a been a loss of open grasslands to crop agriculture and residential development around Deming and in Animas, Hachita, and Playas valleys, which may be important falcon dispersal corridors (Meyer 2000b). In addition, loss of open grasslands to residential and agricultural land use has occurred in productive flood plains and basins in southeastern New Mexico (See Exhibit 1: Raymond Meyer Correspondence).

Land conversion to municipal development is especially apparent in the southeastern Arizona portion of the aplomado's range. Four counties within the aplomado's historic range in Arizona are growing rapidly in human populations. Census bureau statistics for Cochise County indicate an increase of 20.6% since 1990, 26.5% for Pima County, 26.1% for Graham County,

and 29.3% for Santa Cruz County. These growth rates are substantially higher than the national increase of 13.1% since 1990.[12] In addition, to loss of habitat, Ward and Ingraldi (1994) note that "[h]uman disturbance can effect [sic] raptor distribution, nest attentiveness, productivity and foraging behavior."

The loss of desert grasslands to crops and urban sprawl harms falcon habitat in several ways. First, it destroys the savannas with large expanses of native herbaceous ground cover that the falcon prefers. Second, with increased crop agriculture and the consequent use of pesticides, there is a heightened potential for falcons to capture prey with elevated pesticide levels increases (Keddy-Hector 2000). Third, land conversion has led to the rapid and continued decline of avian species upon which the falcon preys (Knopf 1996; USFWS 1997a; Meyer 1999b; 2000b).

Overutilization for commercial, recreational, scientific or educational purposes.

Human take of falcons, via shooting and losses of eggs or nestlings due to scientific research, has been documented. Aplomado falcons are relatively tame, making them vulnerable to shooting. In addition, shooting may be a serious concern around gamebird and waterfowl hunting areas (USFWS 1990). Given the importance of gamebirds in their diet, falcons are vulnerable to shooting-related mortality such as lead poisoning. Indeed, lead concentrations exceeding 3 parts per million have been documented in mourning doves, northern bobwhite, and scaled quail in southeastern New Mexico (Keddy-Hector 2000). Historical overcollection of falcons has been documented (Hector 1987). The Peregrine Fund notes that the relative tameness of the falcon, given its tolerance for human approach, makes it vulnerable to take by humans (Burnham et al. 2002).

Disease or predation.

Predation

Predators can destroy falcon eggs and kill fledglings (USFWS 1990), and fire ants (Solenopsis wagneri) have been documented in the loss of at least one nest in Texas. In addition, great-horned owls (Bubo virginianus), coyotes (Canis latrans), and bobcats (Lynx rufus) can take adult aplomados (Keddy-Hector 2000). In 1985, two of four falcons released by the Peregrine Fund were killed by great-horned owls, and the owls are still considered a significant cause of falcon mortalities. Raccoons (Procyon lotor) and coyotes have also affected nest productivity in south Texas (Burnham et al. 2002). The 2001 nesting attempt by falcons near Deming, NM is thought to have failed due to raven predation (See Exhibit 1: Raymond Meyer Correspondence).

Further, the presence of predators such as great-horned owls can render nearby nests unavailable for falcon use (Meyer 1997). Meyer (1997) also notes that, on Otero Mesa (NM), raptor and corvid nests were found in marginal situations such as yuccas and tree chollas (Opuntia imbricata) that were short enough to be affected by predators such as coyotes. In Mexico, nestlings in the lowest nests were thought to have been preyed upon by coyotes (Montoya 1995).

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[12]Census information obtained from U.S. Bureau of the Census website at http://quickfacts.census.gov/. Visited October 1, 2001.

Disease

Nestlings may be infested with botfly larvae (Philornis). Other birds have been killed by severe botfly infestation, and nestling falcons might also be killed by the larvae. Trichomonas infestation may also kill aplomados (USFWS 1990; Keddy-Hector 2000).

The inadequacy of existing regulatory mechanisms.

In addition to its Endangered status under the ESA, the aplomado falcon is also protected under the Migratory Bird Treaty Act (MBTA) (50 C.F.R. § 10.13), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES),[13] and Arizona (AGFD 1988), Texas,[14] and New Mexico (NMDGF 2000) state statutes. While the MBTA prohibits destruction of nests (16 U.S.C. § 703), no additional protection of the aplomado's habitat is afforded by this federal law, CITES, or any of the state statutes.

Only the ESA can provide protection to the aplomado's habitat. Yet, adequate habitat protection has not been conferred upon the falcon's potential habitat in the U.S. under the ESA. Moreover, federal agency implementation of the ESA has not led to adequate protection of falcon habitat outside of a critical habitat designation. First, the Recovery Plan's habitat protection provisions have not been adequately enforced. Second, the major federal land managers within the falcon's range have failed to sufficiently consider falcon habitat needs in regulating ongoing land use activities. Third, federal wildlife extermination programs continued, at the expense of species that sustain the falcon's prey base and build nests that falcons use.

Falcon Recovery Plan

The recovery plan for the northern aplomado falcon (hereinafter "Recovery Plan" or "Plan") was promulgated in 1990 (USFWS 1990). The standard for downlisting to Threatened was the establishment of 60 breeding pairs. The Plan does not provide guidance for full recovery of the species. The Plan stipulated that no pesticides such as DDT be used in areas occupied by falcons or their prey and that falcon habitat be protected. Overall, the Plan required the evaluation, monitoring, and minimization of all threats to existing falcon populations in the U.S. Habitat protection was also emphasized in the falcon's listing rule:

> ...The species is sensitive to habitat degradation and chemical contamination, and needs the type of active management and protective measures provided for in the Endangered Species Act (51 Fed. Reg. 6688 (February 25, 1986)).

Yet, in implementation of the Recovery Plan, there has been an emphasis on falcon reintroduction and neglect of falcon habitat. As will be discussed in a subsequent section on Reintroduction efforts, the focus in falcon recovery has been on reintroducing falcons without habitat protections.

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[13]The full aplomado falcon species is listed on Appendix II of CITES.
[14](31 T.A.C. § 65.175).

Federal land management and consultation

The Bureau of Land Management, DOD, and U.S. Fish and Wildlife Service manage lands suitable for falcons and within the falcon's historic range. Petitioners demonstrate that inadequate habitat protection is occurring on federal lands. Specifically, oil and gas extraction, military activities, livestock grazing, and pesticide use has not been sufficiently curtailed on federal land. Federal land management may be hindering the subspecies' ability to recolonize its former U.S. range in numbers sufficient for long-term persistence.

BLM lands

Grazing impacts. Livestock grazing is the primary use of BLM lands within the falcon's historic range. BLM has inadequately protected falcon habitat from degradation via cattle grazing. In 1997, FWS issued three biological opinions for the Caballo, Socorro, and Mimbres resource areas in NM identifying the lack of knowledge about potential falcon habitat as a key problem for the BLM (USFWS 1997a,c; BLM 1999). In the Caballo BO, the FWS wrote that it "believes that the CRA [Caballo Resource Area[15]] manages areas critical to the recovery of the aplomado falcon in the desert southwest" (USFWS 1997a: 45). Further, FWS wrote that, "the Service does believe that the BLM's current livestock management compounded by historic livestock management may be hindering recovery of the aplomado falcon in the desert grasslands of New Mexico" (USFWS 1997a: 48) and consequently required the BLM to undertake a five-year study of habitat conditions and rangeland management at Chihuahua falcon sites. The results of this study would then be applied to grazing management on BLM lands in southern New Mexico (USFWS 1997a: 51).

FWS additionally noted the potential for continued livestock management to impede falcon habitat recovery in the Socorro Resource Area, which included parts of Catron and Socorro Counties (NM). While not seen as the historic stronghold that the Caballo Resource Area is, FWS noted that, "this area is important due to its proximity to the historic stronghold for aplomado falcon near the Village of Engle, New Mexico" (USFWS 1997c: 24).

Also in 1997, FWS issued a biological opinion on the renewal of grazing permits in the range of the falcon in southeastern Arizona (USFWS 1997b). The agency underscored that its conclusion that continued livestock grazing may affect, but was not likely to adversely affect the aplomado falcon, was based on three conditions: 1) grasslands would not be overgrazed; 2) wetland areas would not be destroyed; and 3) BLM would reinitiate consultation if falcons were confirmed in any of the allotments during the term of the permits (USFWS 1997b).

The BLM has failed to protect falcon habitat from degradation via livestock grazing. Most of the study sites surveyed by Meyer in 2000 included BLM land and almost all of those sites showed signs of being badly overgrazed (Meyer 2000b). For instance, in the East Seventy-six Draw, located in Luna County, which is described as primarily BLM and state land, Meyer (2000b) describes range condition as poor with signs of desertification.

[15] This BLM unit includes lands in Sierra and Otero Counties (NM).

More specifically, BLM failed to act promptly to protect the Deming pair when they were informed that cattle impacting the yucca in which the falcons attempted to nest. Raymond Meyer, who was monitoring the pair, first noted potential impacts to the nest site from cattle on February 20, 2001. On March 1, 2001, Meyer observed cattle rubbing against, and causing to shake, the yucca where the falcons were nesting. On March 8, there were still cattle in the area. On March 16, there were cattle in the pasture, although not near the nest (Howard 2001). By March 26, 2001 – more than a month after the cattle impacts were noted – cattle had been removed from the area (Exhibit 1: Raymond Meyer Correspondence).

In southern Otero County, Meyer (1999a: 8) noted the poor condition of the range on BLM lands. He stated,

> Of concern is the condition of the grasslands. Much of the grass is comprised of less palatable increaser species such as burro grass. Utilization of available forage appeared high over most of the area. Grazing, trampling, and lack of vegetation cover (basal and canopy) has resulted in the breakdown of soil regeneration processes and vulnerability of soil to erosion. This is especially apparent on the east side of the yucca and mesquite grassland where dune formation processes are occurring. Shrub invasion has occurred reducing the areal extent and quality of the remaining grassland and may continue.

These conditions, noted Meyer, result in the loss of falcon habitat. Meyer and Tafanelli (1999) noted similar conditions and consequent degradation of falcon habitat in another survey area in southcentral Otero County.

Also in Otero County, when conducting a falcon survey 15 miles northeast of Dell City on BLM land, Meyer remarked that the condition of the grasslands was again a concern,

> Utilization of available forage appeared high over most of the area. Dead livestock, including cattle, goats, and horses, were observed during the aplomado falcon survey. Long-term heavy grazing by domestic livestock has had negative impacts on this area including shrub encroachment and soil erosion. Pumping water from the basin for agricultural purposes may also have detrimental effects. For wildlife including potential prey for the aplomado falcon, these effects result in loss of habitat. Without proper management of these grasslands for prey, the potential for reestablishment of the aplomado falcon may not be possible regardless of other habitat conditions (Meyer 2000a).

Allotment-level grazing degradation. Based on GIS information on potential habitat areas for aplomado falcon there are 252,602 acres in Arizona and 7,064,509 in New Mexico for a total of 7,317,111 acres (796 allotments) of potential Aplomado habitat on public lands grazing allotments administered by the Bureau of Land Management. This acreage is found within 796 allotments – seven in Arizona and 789 in New Mexico (See Exhibit 4: BLM Grazing Allotment Data).

Despite the fact that over seven million acres of allotments with potential habitat for aplomados exist on lands it administers, the BLM does not seem to take seriously the potential for aplomados to occupy these areas. Of the grazing allotments mentioned, the BLM claims that "the majority of the allotment is potential habitat for Aplomado" for only two allotments (totaling 25,863 acres) of the 796 allotments (See allotments: 01041, 03056).

The presence of yucca is one indicator that aplomado nesting could potentially occur. The falcons favor nesting in already established nests in yuccas of sufficient height. Based on information from BLM Environmental Assessments, 1,604,371 acres of the 7,317,111 acres contain some yucca habitat (22%). In total, 136 of the 796 allotments contain yucca (2 of the 7 allotments in AZ, and 134 of the 789 allotments in NM) (See Exhibit 4: BLM Grazing Allotment Data).

Further, even though the EA documents specifically mention the presence of yucca on 136 allotments, and the allotments fall within the GIS mapping for potential aplomado habitat, the BLM claims that livestock grazing is not likely to adversely affect aplomado falcons because they believe that the nesting component is not present (28 allotments, 156,181 acres, see for example allotments #: 02021, 02501, 04518, 06029). On another 5 allotments totaling 15,388 acres, the BLM states that the "allotment does not contain Aplomado habitat" despite the presence of yucca on the allotment (see for example: # 01523, 01533, 01527, 03059).

On several of the above-mentioned allotments the BLM argues that the yuccas that occur "would not provide nesting habitat nor would they reach size adequate for nests or branching" (See, for example, allotments 16040, 16098, 01056). If cattle grazing were eliminated, the yucca could recover from abuses of cattle eating the blooms and rubbing up against the trees which would then allow them to grow to adequate height and develop more branching thereby providing suitable nesting substrate.

On eight grazing allotments the BLM states that although both cattle and yucca are present, the "livestock are not impacting the yucca to the extent that raptor nest substrate would be unavailable" (See, for example, allotments 03039, 02054, 09031). This is a highly questionable conclusion, as cattle are known to rub against yucca and stand under taller yucca trees for shade thereby making the area less available for nesting.

In the EA documents for another 20 allotments (454,871 acres), the excuse is used that "Aplomado nesting during the permit is not likely to occur" simply because no recent sighting have been made in the vicinity of these allotments (See, for example, Allotment # 01346, 01252, 02040). Indeed, the BLM states that, "While the frequency of sightings in New Mexico has increased in recent years, the sightings have been of individuals. A nesting pair has yet to be reported since the last pair was documented [in 1952]..." (BLM 2000: 22). In fact, the BLM allowed grazing permits to be renewed within potential falcon habitat in 2000 with the rationale that aplomado nesting would not likely occur within the ten-year term of the permits (BLM 2000). FWS agreed with this rationale and concurred with the BLM's finding that the grazing permit renewal may affect, but is not likely to adversely affect, the aplomado falcon (Nicholopoulos 2001b).

With documented breeding attempts by falcons on BLM lands in southwestern New Mexico from 2000-2002 (See Exhibit 1: Raymond Meyer Correspondence), it is clear that the BLM must more responsibly address the impacts of its grazing program on falcons. Were the potential habitat for the falcon more adequately safeguarded by the BLM, sightings might increase. As discussed in this petition, increased survey efforts may lead to increased sightings. Recently detected breeding pairs in southwestern NM may have been in the state for a while, but have gone undetected until survey efforts were heightened.

One impact from over-grazing that was mentioned in several EA documents is the conversion of grasslands to shrubs, which impedes falcon hunting activities. This is mentioned by the BLM as a concern in Allotment # 01055, 02014, 02019. Yet, livestock grazing was not reduced in response to this concern. Were grazing reduced or eliminated on these allotments, grassland recovery could be possible.

In addition, there are fifty allotments that contain Arizona black-tailed prairie dog occupied, potential or suitable habitat, amounting to 518,773 acres of the 7,317,111 total acres (See Exhibit 4: BLM Grazing Allotment Data, Table 2). Some 236 of the 789 allotments contain potential habitat for Arizona black-tailed prairie dog and prairie dog-associated wildlife (See Exhibit 4: BLM Grazing Allotment Data, Table 3). While speculative, petitioners have described in the Threats section above how prairie dogs historically created habitat that sustained higher falcon prey biomass. Where black-tailed prairie dog habitat is found on BLM lands within the falcon's historical range, the agency has a heightened obligation to consider how rangeland management impacts are affecting prairie dogs and thus, perhaps, impacting falcons.

Finally, as discussed below, stock tanks used for watering cattle can lead to death by drowning for aplomado as well as other prey species of the aplomado. At least one EA mentioned the presence of watering troughs without escape devices and stated that "burrowing owls may be adversely affected," but made no mention of potential harm to aplomado falcons (See Allotment #03003).

Oil and gas exploration and extraction. There is extensive existing and potential oil and gas activity within the falcon's range in New Mexico. BLM indicates that areas of oil and gas extraction and mining activity include the bootheel of NM and Otero Mesa (BLM 2000). Based on the potential habitat model outlined by the BLM (See Exhibit 5: BLM Guidance Criteria on Grazing Effects), the number of existing oil and gas well pads within potential aplomado habitat is 2,070.[16] This includes both active and abandoned well pads. Further oil and gas development is proposed on 521 sections in NM.[17] Map B indicates that Otero Mesa and southeastern New Mexico are or will be especially impacted by existing and potential oil and gas activities.

[16]Data on existing oil and gas well pads was obtained through Freedom of Information Act request from BLM.

[17]Sections are 640-acre units. The figure of 521 sections is approximate and not exact because 1) some proposed leases may occupy more than one section, 2) lease proposals are constantly changing, with some areas added and others removed from consideration; and 3) Global Information Systems mapping approximates the number of sections by determining the overlap with the non-regular polygon that defines the potential habitat model, so there may be a few areas where an overlap was indicated but where there was actually only a common edge. Data was obtained from Directorate of Environment and Safety, White Sands Missile Range.

FWS and BLM have engaged in consultation on several oil and gas projects in NM in the 1990s. Yet, consultation has not resulted in significant modification of project designs for the purpose of reducing impacts on aplomado falcons. This light application of Section 7 consultation increases the urgency for a critical habitat designation.

First, a January 1992 Environmental Assessment for Oil and Gas Lease Sale Parcels for the Caballo Resource Area of the Las Cruces District of the Bureau of Land Management addresses 16 oil and gas parcels totaling 14,600 acres. The EA was signed on January 20, 1993 with a Finding of No Significant Impact Decision.[18] The EA is flawed in several ways. The BLM states, "The aplomado falcon has not been sighted on the Otero Mesa" (BLM 1993: 3). Yet, as of the date the EA was issued there had been in fact two sightings of falcons on Otero Mesa – in 1991 and 1992 – made by credible observers (Table 5). In addition, BLM made a "no effect" determination in its biological assessment, rather than a may affect/not likely to adversely affect decision, when oil and gas leasing clearly has at least some impact on falcons (BLM 1993). This is an especially objectionable finding given that "much of the area" was described to be good falcon habitat, with "the birds appear[ing] to be moving back into surrounding areas" (See Exhibit 6. Otero Mesa O & G Lease Parcels Record of Conversation).

In 1999, a project involving seismic exploration was given a may affect/not likely to adversely affect determination by the BLM, with concurrence from FWS. The Apache 2D/3D Seismic project would affect 38,287 acres within Crow Flats in Otero County, 78% of which is BLM land.[19] Seismic exploration involves the collection of subsurface geological information for use in oil and gas extraction. It entails the establishment of a dense grid of cable ("receiver lines") which are driven along by heavy thumper trucks which lower a 3x5 foot metal pad to the ground and vibrates the surface along each cable line. Underground explosive charges are also used during the course of this activity (Hanson 1999).

The decision to allow this project to proceed was based on marginality of the habitat for falcons. The habitat was described as marginal due to the predominance on bare ground within the affected area. In fact, a step-point transect indicated a staggering 79% of bare ground within the project area. The bare ground and early seral stage vegetation on the Crow Flats sites indicates heavy disturbance from land use. Indeed, the BLM's biological evaluation describes "... 70% of the desert grasslands occurring on BLM grazing allotments in Sierra and Otero Counties, NM maybe [sic] affected by disturbance factors (edge effect). Fragmentation effects to the habitat are increasing" (Howard 1999: 9).[20] With the degraded state of this public land, in addition to BLM acknowledgment of increasing fragmentation, the agency's decision to allow more degradation and fragmentation to occur is unacceptable from a biological standpoint.

A proposal by the Harvey E. Yates Company (HEYCO) called the Bennett Ranch 3D Seismic Project in southcentral Otero County would impact a 4 mile by 6 mile area containing

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[18]The project area was located in: T24S, R11E Sections 27, 28, 33, 34; T24S, R12E Sections 19, 28, 29, 30, 31, 33, 34, and T25S, R12E Sections 1, 3, 4, 5, 6, 7, 10, 11, 12, 14, 15, 20, 21, 22 (BLM 1993).

[19]The project's northeast corner was T24S, R18E, S11 and its southwest corner was T25S, R17E, S1 (Howard 1999).

[20]The biological evaluation also notes that, "no recent nesting has been confirmed in New Mexico" (Howard 1999: 9). This condition has changed, given the documented nesting of falcons in southwestern New Mexico from 2000-2002.

approximately 14,800 acres.[21] In its biological evaluation, the BLM acknowledged impacts from the oil and gas exploration project that would negatively impact aplomado habitat, including disruption of nesting activities, loss of large multi-stem yuccas, loss of ground cover with concomitant impacts on avian prey species, and soil compaction (Howard 1999). However, the agency concluded that the action may affect, but is not likely to adversely affect, the falcon.

In response to the BLM's evaluation, FWS commented that additional mitigations on the project include: thumper trucks only passing over an area once; clear marking of raptor nest sites and reporting of any aplomado sightings within three working days; post-monitoring analysis of the impacts of seismic exploration; and the development of a conservation program for listed species on Otero Mesa. With these further mitigations, FWS concurred with the BLM's not likely to adversely affect finding (Fowler-Propst 1999a). Given the impacts of increased vehicular and other activities related to oil and gas development, it is not readily apparent to Petitioners why the Bennett Ranch 3D Seismic Project would not be considered an adverse impact on aplomados.

In fact, consultations on impacts to falcons are resulting in few restrictions on highly degrading land uses on federal land. Another HEYCO project involving four applications for permits to drill was evaluated by BLM, with FWS concurrence, as being not likely to adversely impact the aplomado falcon (Fowler-Propst 1998; Hanson 1998).[22] More recently, FWS issued a no-jeopardy biological opinion on a proposal for the construction of a 3.3 mile buried natural gas pipeline by HEYCO,[23] although it would reduce habitat quality on an estimated 12,000 acres. FWS explained that the project would only impact about 0.9% of falcon habitat in New Mexico are therefore is unlikely to jeopardize the falcon's continued existence or reduce the likelihood of its recovery (Nicholopoulos 2001a). In addition, a HEYCO proposal to drill an exploratory well[24] was given a may affect, not likely to adverse affect finding by BLM with FWS concurrence, in part, on the basis that the project is "fairly limited in size." The project entailed the construction of a 0.7-mile access road and the drill pad measured 400-600 feet by 400-600 feet (Nicholopoulos 2000). The action area comprised 27,257.5 acres, 82.5% of which was considered to be moderate, good, or best quality aplomado falcon habitat (Howard 2000).

While FWS has repeatedly expressed concern over impacts from oil and gas development on crucial falcon habitat on Otero Mesa (e.g., Fowler-Propst 1999a), the agency has not taken the step of a jeopardy opinion to curtail these land uses. Without a critical habitat designation, land uses that degrade the falcon's habitat and therefore impede recovery continue to occur on federal land.

Independent researchers have noted deficiencies in habitat protection by the BLM from oil and gas impacts. Meyer states,

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[21] According to the BLM's biological evaluation, the project is located within a rectangle the northwest corner of which is T25S, R12E, S33 S1/2; and the southeast corner of which is T26S, R13E, S36 N1/2 (Howard 1999).

[22] The project area for four applications for permits to drill was T26S, R12E, S3, 10, 11, and 24 (Hanson 1998). The permits were issued but expired without any of the wells being drilled (Nicholopoulos 2001a).

[23] According to the FWS biological opinion, the project originated in T26S, R12E, S14 and terminated in S26S, R13E, S36 (Nicholopoulos 2001a).

[24] The project was located at T26S, R12E, S25 NW1/4 (Nicholopoulos 2000).

> It is the opinion of this author that, based on experience with the Aplomado falcon's habitat requirements, current BLM regulations and guidelines regarding the density of oil and gas developments are insufficient. Oil and gas developments, as they exist in much of the Carlsbad district, in otherwise suitable habitat would preclude the presence of breeding Aplomado falcons (See Exhibit 1: Raymond Meyer Correspondence).

This observation sums up the problem with BLM land management vis-à-vis the aplomado falcon: the falcons generally will not breed in the U.S. because their habitat has been, and continues to be, made inhospitable. The only way to effect long-term recovery and persistence of the falcon is to remove the significant threats against its habitat.

Cumulative impacts to falcons on BLM lands. The BLM has failed to consider cumulative impacts on the falcon and its habitat from land uses such as livestock grazing and oil and gas exploration and extraction. For instance, in its 2000 analysis of the renewal of 19 grazing permits comprising 185,235 acres in the Las Cruces Field Office (NM), BLM identified other potential impacts to the falcon – including urban sprawl, land conversion to crops, water diversion and pumping, and oil and gas extraction – yet the grazing permits were renewed (BLM 2000). Additional sources of habitat degradation were also identified in biological evaluations for oil and gas development (Howard 2000). Despite these cumulative impacts, the oil and gas activities, as described above, were allowed to proceed.

Department of Defense lands

As noted in the Threats section above, impacts from military activities within the falcon's U.S. range include increased habitat fragmentation. The Army, for its part, has not shown particular concern for these impacts. In 1996, for instance, in a letter to FWS requesting the cessation of aplomado surveys on Fort Bliss and the White Sands Missile Range, Colonel Lee P. Gibson, Jr., indicated that Drs. Albert Bivings and Robert Tafanelli concluded in their studies that,

> ... it is highly unlikely that Aplomado Falcons would establish a territory on Otero Mesa. There does not appear to be a sufficient prey base on the mesa to support a resident population of these birds likely due to intensive cattle grazing and, possibly, some other factors (Gibson 1996).

However, Bivings and Tafanelli, as is noted in the Historical Sightings section below, have underscored the difficulties in making complete surveys of falcon habitat and therefore the problems with discerning whether a given study area is not occupied by falcons. As Tafanelli (2000b: 4) put it in a survey for the Roving Sands military exercise: "Aplomado falcons were not observed during these surveys however observers can only conclude that an aplomado falcon was not detected during the survey period along the routes followed."

In addition, Gibson's recognition that intensive cattle grazing is eroding the ability of Otero Mesa to support aplomado falcons is an admission of the refusal of federal land managers

to curb land uses (i.e., cattle grazing) which are preventing the recolonization and persistence of aplomado falcons on federal land.

Moreover, the Department of Defense has recently attempted legislative amendment of the ESA so that its lands would be exempted from endangered species protection. Although this attempt was unsuccessful, it suggests that the military is less than receptive to land use limitations to protect falcon habitat.

National Wildlife Refuges

The Laguna Atascosa and Matagorda Island National Wildlife Refuges, administered by FWS, have been a vital part of the falcon reintroduction effort in south Texas. As of Spring 2001, 33 breeding pairs were located in south Texas. Ten of the pairs were on Matagorda Island and the other 23 pairs were around the Laguna Atascosa NWR (Burnham et al. 2002).

However, protection of falcons from pesticide use has been compromised on account of political pressure near reintroduction areas. Cotton farmers in Cameron County, in which Laguna Atascosa is located, mobilized against pesticide restrictions in regard to the falcon. Their effort was successful. Criticizing a previous biological opinion restricting pesticide use within 20 miles of the NWR, FWS wrote,

> The agricultural representatives...contended that the reasonable and prudent alternatives in the Opinion would put large numbers of farmers within the 20-mile zone out of business. As a result of this and the conflicting boundary recommendations, the Committee requested that the buffer zone recommended in the Opinion be re-examined (USFWS 1991).

In response to the farmers' concerns, the director of FWS Region 2 recommended to the FWS Director in Washington, D.C., that the reasonable and prudent alternative be changed from the previous 20-mile buffer zone around Laguna Atascosa to a 0.5-mile buffer around falcon habitat (Young 1990). Such disregard indicates that the reintroduction effort in south Texas has not been coupled with adequate regulatory mechanisms to safeguard falcon habitat from pesticide contaminants.

Federal wildlife extermination

Activities of the "Wildlife Services," formerly called Animal Damage Control (ADC), a division within the Animal Plant Health Inspection Service in the U.S. Department of Agriculture, further harm the falcon's potential habitat in the U.S. FWS indicates that Wildlife Services operations were evaluated in a biological opinion dated July 28, 1992. That biological opinion found no adverse effects from predator control activities and found that the overall Wildlife Services program was not likely to jeopardize the falcon's continued existence and would not result in any falcon take (USFWS 1992).

The analysis contained in that opinion reads as follows,

> Although the ADC program could affect the northern aplomado falcon prey base by reducing the number of available blackbirds and small rodents through the use of avicides and rodenticides, the possibility is considered remote because the species feeds on such a variety of prey. The rodenticides used do not pose secondary poisoning hazards (USFWS 1992: 38).

This analysis fails to consider the effects on the falcon from lethal control of wildlife species that sustain falcon habitat. Specifically, as discussed above, prairie dogs maintain grasslands and their colonies provide important habitat to falcon prey species. In addition, beavers create and sustain rich riparian habitat that provides important habitat to falcon prey.

Prairie dog control

First, as discussed in the Species Description section above, black-tailed prairie dogs are important in maintaining quality falcon habitat in the southwestern U.S. However, prairie dogs have been extirpated from a significant portion of the aplomado's range (Findley et al. 1975; Oakes 2000; Truett, forthcoming), and have greatly declined in other areas within the falcon's historic range in west Texas and southeastern New Mexico (65 Federal Register 5476-5488 (February 4, 2000)).

Furthermore, prairie dog elimination is ongoing. Most conspicuous is USDA's Wildlife Services's control and dispensation of poisons for control of black-tailed prairie dogs. FWS's assessment of Wildlife Services' impact on falcon habitat was based on 1988 data. Yet, in 1988, killed an estimated 124,179 prairie dogs (including Gunnison's and black-tailed prairie dogs) in the U.S. of those, 28,473 were killed in New Mexico and Texas, both of which are states within the falcon's range (USDA 1997).

More recent evidence of Wildlife Services' impact on prairie dogs in the falcon's range is presented in Table 2. This table indicates that, from 1998-2000, at least 5,900 acres have been poisoned in the past three years in New Mexico with the use of toxicants provided by this federal agency.

Table 2. Prairie dog toxicants distributed by Wildlife Services to New Mexico applicators, 1998-2000. Source: http://www.aphis.usda.gov/ws/tables/, visited 16 August 2002.

Rodenticide	EPA #	Rodenticide amount	Application rate[a]	Acres poisoned
Fumitoxm (2000)	5857-1	16,800	.03	504
Zinc phosphide oats (2000)	56228-14	980 lb	1.09	1068.2
Fumitoxin (1999)	5857-1	38,300	.03	1149
Gas cartridge (1999)	56228-2	401	.017	6.8
Zinc phosphide oats (1999)	56228-14	1,160 lb	1.09	1264.4
Fumitoxin	5857-1	43,100	.03	1293

(1998)				
Gas cartridge (1998)	56228-2	230	.017	3.9
Zinc phosphide oats (1998)	56228-14	560 lb	1.09	610.4
Total				5899.7

[a]Wildlife Services does not consistently describe in its reports of rodenticide dissemination how many acres of BTPDs were poisoned with the chemical toxicants the agency supplies to applicators. Where WS does not disclose acreage poisoned, Petitioners provide an approximation of acres poisoned based on poison application rates reported in APHIS (1990). In that document, 16,922 lbs of zinc phosphide were used to control 18,370 acres in Nebraska in 1990. This translates into an application rate of 1 lb. zinc phosphide per 1.09 acres. Likewise, 15,080 tablets of aluminum phosphide were used to control 493 acres (application rate of 1 tablet of aluminum phosphide per .03 acres) and 347 gas cartridges were used to poison 6 acres (application rate of .02) in Nebraska in 1990.

In Texas, the figures in Table 3 indicate substantial control of prairie dogs and show that the amount of zinc phosphide distributed in the state more than doubled between fiscal year 1999 and 2000.

Table 3. Prairie dog toxicants supplied by Wildlife Services to Texas applicators, 1999-2000. Source: http://www.aphis.usda.gov/ws/tables/, visited 16 August 2002.

Toxicant	FY 2000 amount	FY 1999 amount
Zinc phosphide oats	402 lbs.	200 lbs.
Rodent gas cartridges	537 each	730 each
Phostoxin fumigant	184 tablets	460 each
Phostoxin fumigant	92 5H	159 5H

There is consequently evidence of long-term, continued, significant, and, in some places, accelerated poisoning of prairie dogs. The impact of this federal activity has not been adequately addressed by either Wildlife Services or FWS and is therefore an additional example of inadequate regulatory mechanisms to protect the falcon and its habitat.

Beaver control

As discussed in the Species Description section above, beaver are instrumental in creating and sustaining riparian habitat, which benefits falcon prey. Wildlife Services lethally controls beavers within the falcon's range in the U.S. The 1988 data on which FWS's 1992 biological opinion was based indicated that Wildlife Services had taken a total of 2,866 beavers in NM, AZ, and Texas. Furthermore, within those three states, a total of 9,073 beavers were taken by Wildlife Services and other parties in 1988. FWS did not assess the impact of Wildlife Services's beaver take on falcon habitat, nor did it consider the cumulative impacts of this federal agency's action, alongside the actions of private parties (USFWS 1992; USDA 1997).

More recent evidence shows that Wildlife Services continues to kill beaver within the falcon's range (Table 4). The consequent impact on falcon habitat continues to go unaddressed by Wildlife Services or FWS.

Table 4. Beaver control by Wildlife Services in Arizona, New Mexico, and Texas. Source: http://www.aphis.usda.gov/ws/tables/, visited 16 August 2002.

Year	Beavers killed			
	AZ	NM	TX	Total
1996	34	238	3,867	4,139
1997	54	104	3,835	3,993
1998	7	15	4,119	4,141
1999	44	63	4,328	4,435
2000	13	47	4,386	4,446

As the above numbers indicate, Wildlife Services has killed some 21,154 beavers in the states within the range of the falcon, with great potential to negatively impact and destroy crucial falcon habitat. Despite the widespread scope of these activities and the large numbers of beavers taken, Wildlife Services has failed to consult with FWS on its impacts on the falcon subsequent to the 1992 biological opinion. This represents another example of an inadequate regulatory mechanism for falcon protection.

Other natural or manmade factors affecting its continued existence.

Additional threats to falcons include pesticide use, drowning, and electrocution from power lines.

Pesticide contamination

Pesticide use was considered to be the most significant threat to the falcon when it was listed and remains an important threat to falcon habitat (USFWS 1986; Hector 1987; Keddy-Hector 2000). In the falcon's listing rule, FWS noted,

> The most important threat to the present survival of the northern aplomado falcon is the continued use of persistent organochlorine pesticide within the range of this falcon and some of its prey species...The aplomado falcon has undergone severe losses in range and numbers in the past, and remaining populations are threatened by reproductive failure due to pesticide contamination (USFWS 1986: 6688).

High levels of DDT and DDE cause eggshell thinning, leading to increased mortality rates in falcon young (USFWS 1986). More recently, FWS indicated that pesticide use may be a continued threat in areas with crop agriculture (USFWS 1997a). Pesticide use can be controlled through habitat protection measures.

There are additional pesticides that are a threat to falcons. According to Keddy-Hector (2000: 2):

> Evidence of continued contamination of potential falcon prey by organochlorine pesticides, mercury, selenium, and lead, plus heightened risks of organophosphate poisoning, favors intensified efforts to eliminate such environmental contamination from United States and Mexico ecosystems. This, coupled with restoration of desert and coastal grassland and tropical savanna, must become top priorities for long-term conservation of this species.

The potential for organophosphate insecticides to imperil falcons is especially acute near agricultural areas given the Aplomado's preference for insects and insectivorous birds. Release sites in south Texas have been near agricultural areas. While blood samples from released aplomados have indicated low contamination levels, one egg collected in 1996 contained PCB and mercury residue three times higher than an egg collected the previous year (Jenny 1996). Organophosphate application has killed thousands of songbirds, waterfowl, and hawks in the U.S. so its threat to falcons is significant (Keddy-Hector 2000).

It may be that the falcon's diet varies in different regions of its U.S. range with consequent variability in the impact of pesticide contamination. For example, historically falcons may have taken substantial numbers of bats near the Rio Grande in southwestern New Mexico (Ligon 1961; Henry 1995; USFWS 1999). Falcons recolonizing that region would be vulnerable to pesticide contamination where those bats are feeding on insects in agricultural fields (Henry 1995).

Drowning and electrocution

Another potential threat is accidental drownings of falcons. Six aplomado falcons were documented in northern Chihuahua as having drowned in stocktanks. Two of these falcons were an adult breeding pair (BLM 2000). FWS has described falcon mortalities in stock tanks without escape ramps as a limiting factor on aplomado recovery (Nicholopoulos 2000).

In addition, power lines can electrocute aplomado falcons (Williams 1999; Keddy-Hector 2000). Indeed, FWS suggests raptor proofing of live power and transmission poles to prevent electrocution of aplomados (Richardson 1996). Uninsulated poles at Laguna Atascosa National Wildlife Refuge have been modified in light of this threat (Keddy-Hector 2000).

VI. THE NEED FOR A REVISED CRITICAL HABITAT DETERMINATION

The initial conclusion of "not prudent" was flawed. The ESA is designed to address threats against imperiled species and effect species recovery. The listing process is a first response measure designed to arrest that decline. However, critical habitat designation is crucial for a subspecies such as the aplomado, for whom habitat degradation and loss, and land use activities impacting the falcon's prey base are severely limiting factors.

As Petitioners have noted, the ESA calls for critical habitat designation in "specific areas outside the geographical area occupied by the species at the time it is listed" (16 U.S.C. § 1533(5)(A)(ii)). This measure could protect presently unoccupied falcon habitat, thus facilitating aplomado re-establishment to its former range. These areas are deemed "essential for the conservation of the species" See Id, emphasis added). The definition of conservation, as Petitioners have pointed out, equates to species recovery. Indeed, courts have recognized that the mandate of the ESA is to ensure both survival and recovery (See Sierra Club).

When the aplomado was initially listed under the ESA the Secretary should have designated critical habitat. Even though there were no known active nesting areas, designation

of potential falcon habitat as critical habitat would have provided the falcon with needed protection. These areas outside of the geographical area occupied by the species were necessary for its recovery within the United States. This is especially true because habitat degradation is believed to be the primary cause of the falcon's extirpation from its historical range in the US.

The decision not to designate critical habitat for the falcon was never challenged in court and the statute of limitations has run out on such an action. Petitioner now seeks a revision of the final determination, subsequent to this petition, which is submitted pursuant to 16 U.S.C. § 1533(b)(3)(D) and 50 C.F.R. § 424.14. Petitioner primarily relies on a shift in material facts that warrants such a revision.

The sole reason that FWS made a determination of not prudent when the northern aplomado was listed was because of a lack of species occupation in the US. However, concerted efforts to reintroduce the falcon into Texas have met with some success in recent years and a naturally immigrated breeding pair was documented in New Mexico has been documented for every year from 2000-2001. Since there are now aplomado falcons breeding in areas of the United States a critical habitat designation is both possible and necessary.

Reintroduction Efforts

The falcon's recovery plan calls for reintroduction into the U.S., given the falcon's extirpation from the U.S. portion of its range. The release of aplomado falcons in the U.S. was considered essential for their restoration in an area relatively free from pesticide contamination (USFWS 1990). However, Keddy-Hector, the author of the Recovery Plan, later questions this justification given unclear records of historical abundance, ongoing dispersal from Mexico to the U.S, and evidence that the southwestern U.S. is contaminated with pesticides. He also points out that habitat protection is vital to the success of recovery efforts. In particular, he recommends: 1) the removal or reduction of livestock grazing on public land sites within the falcon's southwestern U.S. historical range; 2) protection of riparian areas, woodlands, playas, and desert grasslands within the same area; 3) elimination of pesticides and lead shot which pose a danger to the falcon; and 4) protection of corvids and raptors whose nests can provide falcon nesting sites (Keddy-Hector 2000).

Reintroduction can be an important tool in species recovery. Indeed, the ESA's definition of the conservation of imperiled species, which is a primary purpose of the Act (See 16 U.S.C. § 1531(b)), reads:

> The terms "conserve," "conserving," and "conservation" mean to use and the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this Act are no longer necessary. Such methods and procedures include, but are not limited to, all activities associated with scientific resources management such as research, census, law enforcement, habitat acquisition and maintenance, propagation, live trapping, and transplantation, and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, may include regulated taking (See 16 U.S.C. § 1532(3), emphasis

added).

However, as discussed above, reintroduction must not be pursued at the expense of habitat protection. There are at least two pitfalls to be considered: the substitution of reintroduction for habitat protection, and the compromise of habitat protection through the structure of reintroduction programs. Both pitfalls are a reality in south Texas, and a strong possibility in west Texas and New Mexico.

Falcon reintroduction into Texas

The Peregrine Fund (Fund), an NGO based in Boise, ID, began reintroducing the falcon into Texas in 1985 and was conducted as a pilot project from 1985-1989. In 1985, four young falcons were released on King Ranch. All four prematurely dispersed. Of these, two were killed by great-horned owls but at least one survived for several years. From 1986-1989, the Fund released 20 young falcons on the Laguna Atascosa National Wildlife Refuge and the Buena Vista Ranch. Of these, 16 survived to independence (Burnham et al. 2002).

Large-scale reintroduction began in 1993. In 1995, a breeding pair of falcons was documented in southeastern Cameron County, Texas. This pair had leg bands on and therefore was thought to be one of those released by the Peregrine Fund at the Laguna Atascosa National Wildlife Refuge (USFWS 1995). Releases have taken place on private lands, and the Laguna Atascosa, Aransas, and Matagorda Island National Wildlife Refuges. After the release of 702 birds over the previous sixteen years, more than 33 pairs were documented in Spring 2001. These breeding pairs successfully fledged at least 59 young. Ten of the pairs located in 2001 were on Matagorda Island and the other 23 pairs were around the Laguna Atascosa NWR. In addition, some productive pairs remain undetected (Burnham et al. 2002).

Since 1996, falcon releases in south Texas have taken place under the terms of a Habitat Conservation Plan (HCP). This HCP is predicated on the FWS Safe Harbor policy. Safe harbor policy provides landowners with assurances that, by engaging in conservation-oriented land management, the landowner will not suffer regulatory burdens should as a result of listed species using their land (USFWS 1996; Stanford Environmental Law Society 2000). For the falcon, the Safe Harbor HCP provides that landowners are obligated to maintain certain baseline conditions. If those conditions are met, landowners can engage in habitat modification that results in the incidental take of falcons.[25] The baseline condition for south and west Texas private lands enrolled in the program is zero (0) falcons. Landowners are required to maintain this baseline population for the term of the HCP: 99 years. With a baseline of extirpation and a term of nearly a century, landowners enrolled in the program therefore are not restricted from any habitat destruction that would harm falcons. They are restricted from intentional falcon take. Landowner responsibilities will not be altered even if unforeseen circumstances such as a hurricane or a drought drastically reduce the falcon in numbers (Peregrine Fund 1996).

[25]"Incidental take" refers to the inadvertent harm of an endangered species. The Secretary may issue a permit for "any taking otherwise prohibited by section 9(a)(1)(B) if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity" (16 U.S.C. § 1539(a)(1)(B)).

Some 1.2 million acres are enrolled under the falcon Safe Harbor program in south Texas (Burnham et al. 2002). Moreover, not only are signatories to the HCP protected from habitat modification restrictions, so too are all neighboring private lands within a 30-mile radius of their property (Peregrine Fund 1996). The Safe Harbor program was recently expanded to include 42 counties comprising nearly 48 million acres in west Texas (USFWS 2000). The only reasonable and prudent measures affixed to the HCP by FWS were for private cooperators to sign cooperative agreements with the Peregrine Fund and to allow the Fund to enter property to release and manage the falcons (USFWS 2000). The Peregrine Fund's HCP and Incidental Take Permit for south and west Texas therefore categorically remove protections for the falcon from habitat destruction until 2095.

In the Peregrine Fund's assessment of reintroduction success, the organization appears to rely on a standard of the released young reaching independence. NMDGF questioned the appropriateness of this measure of success, and suggested the alternative of the standard of establishing a breeding population in the wild (Bailey 1998). In a March 2002 report the Fund documented the release of 702 falcons bred in captivity. These falcons were released along the Texas Gulf Coast and monitored by the Fund. The March report claimed,

> ...an estimated 65% success rate, i.e., falcons observed 21 days or longer after their release are counted as successfully reaching independence. Food is still provided, however, for all falcons at a release site for six weeks after release (Burnham et al. 2002).

While these statistics can be met with some hope for the reestablished viability of the aplomado in Texas, they should be scrutinized. At the age of 30 days, young falcons are brought to the release site and "hacked." This process involves keeping the falcons in confinement for one week after their arrival and feeding them frozen quail until they reach independence at the age of six to eight weeks. Food continues to be provided for all falcons at a release site for six weeks after release (Peregrine Fund 1999; Burnham et al. 2002). This 65% success rate therefore depends upon a 21-day observation period during which falcons are supplementally fed. Given the linkage of prey availability and related habitat condition as one cause of the aplomado's decline (See discussion in Threats section), the "hacking" process does not fairly represent the potential for long-term persistence of falcons in the wild.

The Texas reintroductions are being implemented without any requirements or assurances of habitat protection and restoration. Without long-term modifications in land-use practices there is no concrete indication that released falcons are able to propagate without the aide of human-supplied food. Success under the ESA must be measured in terms of long-term persistence. While there is optimism for the falcon pairs that inhabit federal lands in south Texas, the lack of habitat protections on private lands means that private land falcons cannot be counted toward the recovery goal. In fact, the HCP acknowledges this (Peregrine Fund 1996).[26] Further,

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[26] According to the HCP, cooperating landowners have "no existing responsibility to provide either nesting or foraging habitat on the property" (Peregrine Fund 1996: 3); and "the Service will count toward the recovery goal any active falcon nests on land enrolled in this program where (1) all necessary foraging and nesting habitat is protected on such land through a permanent agreement" (Peregrine Fund 1996: 8). With the lack of habitat protection through a permanent agreement, Petitioners interpret this as meaning that pairs on private lands cannot be counted toward the recovery goal.

as discussed above, falcons on public lands may suffer from continued threats such as pesticide contamination and destructive land uses that have not been curtailed by the Section 7 consultation process.

It is worthy to note that wild aplomados were observed at Laguna Atascosa 1-2 years before the first successful nesting attempt of reintroduced falcons was recorded. A falcon was also observed in the mid-1980s with previous sightings before that (Keddy-Hector 2002). The non-reintroduced falcons in south Texas were, in effect, denied habitat protection given the safe harbor design of falcon reintroductions. As sightings of wild falcons increase in other parts of the aplomado's range, this denial of habitat protection to wild falcons already present in NM, and, potentially, AZ, must not be repeated.

Plans for falcon reintroduction into New Mexico

In New Mexico, the Peregrine Fund has suggested the use of safe harbor agreements on private lands and a 10(j) nonessential experimental population designation for the aplomado falcon (Burnham et al. 2002). The Fund insists, as it did in Texas, that land use restrictions – i.e., habitat protection – need not and, in fact, should not, be a component of the reintroduction program (Peregrine Fund 1999; Burnham et al. 2002). Rather than engaging in potential habitat analysis and restoration, the Fund maintains that, "the ultimate judge of habitat suitability will be the birds themselves" (Peregrine Fund 1999: 6).

The application of a non-essential experimental designation to reintroduced falcons is problematic for several reasons. First, ample evidence suggests that aplomados reached their imperiled status in the early half of the 20th century due to habitat degradation and the sacrifice of habitat protection with the use of 10(j) experimental, non-essential designation disregards the causes of the falcon's imperilment. Second, the 10(j) designation would fly in the face of Congressional intent to protect ecosystems through the ESA. Third, naturally recolonizing individuals would be stripped of habitat protections due to the experimental non-essential designation for reintroduced individuals of a listed species.

On this latter point, unlike most other reintroductions, there is clear evidence that aplomado falcons are nesting in New Mexico. Should FWS proceed with a 10(j) non-essential reintroduction, it would be knowingly introducing competitors to an already existing falcon population (Keddy-Hector 2002).

The New Mexico Ecological Services office within FWS has itself opposed a 10(j) nonessential designation for the falcon in the context of reintroduction within NM. According to a briefing statement to the FWS Region 2 director, staff wrote,

> The long term solution to aplomado recovery is not simply to release falcons but to identify, protect, and manage for healthy grassland ecosystems that can sustain viable populations of falcons over time (USFWS 1998).

This position is well-founded, as it corresponds with both the ecosystem protection component of the ESA and the Act's linkage of imperiled species and their habitat needs. Again in 2000, an

agency briefing paper indicated that FWS Region 2 believed that 10(j) was not applicable to aplomados given the reports of naturally occurring falcons in the U.S. (Arroyo 2000).

In addition, FWS in Arizona has underscored the importance of habitat quality and prey abundance in designing the reintroduction effort in that state (King et al. 1995). Alternatively, the Peregrine Fund proposes releasing the birds without changes in land use practices and by letting the falcons, by their movements and survival, determine whether habitat is suitable (Burnham et al. 2002).

Another concern regarding reintroduction of falcons into New Mexico is that the Peregrine Fund's captive aplomados come from breeding stock taken from nesting sites in southeast Mexico (Veracruz, Chiapas, Tabasco, Campeche) (Peregrine Fund 1999). USFWS (1998) recommended that, if reintroduction to NM were to proceed, breeding stock should come from Chihuahua. NMDGF also voiced concerns about genetic issues given that breeding stock did not come from nearby Chihuahua (Bailey 1997a, b, c; 1998). The potential for genetic issues to "compromise future natural recolonization" was among the matters raised by the state agency (Bailey 1998).

Indeed, the Peregrine Fund's genetic analysis was surrounded by disagreement among scientists on whether valid conclusions could be drawn on the genetic consequences of reintroducing the Fund's captive falcons into New Mexico. Of the three scientists who reviewed the NM reintroduction proposal, one scientist suggested that there was insufficient evidence to make a sound judgment on genetic differences between Chihuahuan and southeast Mexican falcons, and another scientist recommended that the "best birds to move to NM are from Chihuahua" (Bailey 1998).

However, the Peregrine Fund has brushed aside genetic issues, stating that, "Analysis revealed no genetic divergence... that would recommend against reintroduction of Chiapas and Veracruz birds in northern Mexico and the United States" (Burnham et al. 2002: 3). The Fund maintains that NMDGF's concerns are not relevant because falcons in Chihuahua are likely not isolated from populations further south; there is a great variability in dispersal distance from falcons released in Texas; and that the falcon tolerates a great variety of habitats (Peregrine Fund 1999). This response by the Peregrine Fund fails to consider the Sierra Madre Occidental Mountains as a physical barrier between Chihuahuan and more southern populations, and its justification that the falcon tolerates a great variety of habitats, while perhaps true of the full species, is not valid for the northern subspecies.

The Peregrine Fund is explicit about its opposition to formal habitat protection, asserting that designation raises ire among private citizens and impedes recovery efforts. The Fund's report cites private citizens referring to the aplomado as a "Spotted Owl for the short grass prairie" (Burnham et al. 2002: 19). In other words, the Fund fears that the aplomado would be used as a tool in a broader campaign to preserve wild lands. Alternatively, Petitioners emphasize the need to safeguard potential and occupied falcon habitat given the role of habitat loss and modification in past, current, and (likely) future imperilment of this species.

The Peregrine Fund emphasizes coexistence between falcons and cattle grazing. Indeed, within the Fund's proposal for falcon reintroduction into New Mexico includes the following sentiment, "The apparent ability to coexist with cattle ranching activities was an important consideration for The Peregrine Fund in deciding to embark on this species recovery effort" (Burnham et al. 2002: 4).

The Fund demonstrated its concern about any restriction on livestock grazing when it stated in the proposal for reintroduction of falcons into NM, "That the appearance of a single pair of falcons precipitated the immediate removal of cattle is both disturbing and unnecessary" (Burnham et al. 2002: 19). When one considers that shrub encroachment and degraded rangeland via livestock was repeatedly described as a concern by the biologist observing the breeding pair, and that cattle were rubbing against, and destabilizing, the very yucca upon which the pair was attempting to breed (See Exhibit 1: Raymond Meyer Correspondence; Meyer 2000b), what is disturbing is that these impacts from cattle would not be of concern to the Fund. Indeed, as was discussed extensively in the Threats section above, there are a multitude of ways in which livestock grazing – even on public lands – degrades important components of falcon habitat (e.g., black grama grassland, tall and branched yucca, abundant avian prey. It is also becoming clear that falcons select for less intensively grazed habitat in desert grasslands. This is discussed in the review of habitat conditions at existing falcon sites, below.

The potential for natural recolonization of falcons from Chihuahua

The lifting of restrictions on land use in falcon habitat is particularly disconcerting given evidence of aplomado natural recolonization to their former U.S. range.

Sightings in the U.S.

The need to protect falcon habitat is heightened by a history of falcon sightings since the bird was considered extirpated from the U.S. in 1952. Hector (1987) cites well over a dozen records of sightings in Texas during this time period; several sightings in New Mexico, including a breeding pair; and several sightings in Arizona. The numerous recent sightings have included verified sightings and observations by experienced birders and biologists (Table 5). Young et al. (2001) note that reliable sightings began to recur in New Mexico in 1990 and estimates nine reliable falcons sightings in six counties in the state from 1990-1999.

Table 5. Northern Aplomado Falcon Sightings in the U.S., 1991-2002 (includes verified sightings and unverified sighting made by experienced birder or biologist).[27]

Date	Location	Source	Comment
January 1991	Lochiel (AZ)	Lewis 1991	Unverified sighting made by experienced raptor observer.
January 1991	Hidalgo County (NM)	Lewis 1991	Unverified sighting made by biologist Ann Henry
May/June 1991	WSMR (NM)	MEVATEC Corporation 1997; Richardson 1996	APFA verified sighting within WSMR's Rita site.
January 1992/March 1992	Valentine, Presidio County (TX)	Henry 1992; American Birds 1992	APFA Verified sighting; hundreds of observers.
April/August 1992	WSMR (NM)	Richardson 1996	Two APFA verified sightings 1) within WSMR's Rita site; and 2) 28 km northeast of Stallion site, just north of WSMR [28]
September 1993	WSMR (NM)	Ladd 1994	Unverified sighting made by New Mexico State University biologists.
June/July 1994	WSMR (NM)	Cathey 1994a,c; Ladd 1994	Verified sightings made by biologists Doug Burkett and Larry Kamees.
1994	Gray Ranch, Hildalgo County (NM)	USFWS 1997	Reported as reliable sighting in 1997 USFWS Biological Opinion.
July 1996	Dona Ana County, Isaack's Lake (NM)	Williams 1997	APFA verified sighting.
1996	Near Van Horn, Culberson County (TX)	USFWS 1999	FWS describes the sighting as a reliable account.
January 1997	Grant County, north of Hachita (NM)	Williams 1997	APFA verified sighting.
May 1997	Fort Bliss/McGregor Range (NM)	Locke 1997	Unverified APFA sighting by Katherine Strickler.[29]
September 1999	Fort Bliss/McGregor Range (NM)	Meyer 1999	Unverified APFA sighting by biologist Raymond Meyer.
October 2000	Northeast of Hermanas, Luna County (NM)	Meyer 2000b	APFA verified sighting of breeding pair
February – June 2001	Northeast of Hermanas, Luna County (NM)	Exhibit 1: Raymond Meyer Correspondence	APFA verified sighting.
2002	Northeast of Hermanas, Luna County (NM)	USFWS	APFA verified sighting.

[27]Petitioners omitted sightings made by different observers that appeared to be observations of the same bird(s), in order to conservatively present sightings of aplomados.
[28]See Exhibit 7: Map of WSMR Study Sites.
[29]According to the New Mexico Ornithological Society Bird Record Committee Report Forms, Katherine Strickler had four years peregrine survey experience and had observed captive aplomados daily at The Peregrine Fund's Boise, ID office for three years (Locke 1997).

FWS biologists note that large contiguous parcels of grassland correspond to where there have been aplomados sighted in the last decade: northern Chihuahua; the boot heel of NM; around Carlsbad, NM, the Tularosa and Jornada del Muerto basins in NM; and parts of west Texas (Henry and Cathey 1995; Richardson 1996).

Some of these observations in the U.S. have been of falcons banded in Mexico. In particular, a falcon observed on Otero Mesa in New Mexico was wearing leg bands that corresponded to nests in Chihuahua (Meyer 1999b). This strongly suggests that falcons are beginning to disperse from Mexico to the U.S. portion of their range. Meyer (1999b: 3; 2000: 2), for instance, writes that there is a "high potential for recolonization by Aplomado Falcons in southern New Mexico."

Similar sentiments come from NMDGF. In New Mexico, the state agency noted in 1998 an increase in verified reports in the historical range of the falcon in the state and considered natural colonization of the falcon's habitat in the New Mexico to be likely (Williams 1997; Bailey 1998; Sandoval 1998). For the time frame from 1987-1998, total sightings (verified and unverified) totaled at least 18 reports of 25 falcons in New Mexico (Williams 1997; USFWS 1998). This was a considerable increased from 1950-1986, where there were only eight reports of 9-11 birds (Williams 1997).

Indeed, firm evidence of aplomado recolonization of New Mexico was produced when a breeding pair was located near Deming, NM from 2000-2002 (See Exhibit 1: Raymond Meyer Correspondence). Further, Meyer commented that,

> It seems more likely that the birds are a pair and have been there or in the general area for some time rather than the scenario that two adult birds recently dispersed and showed up at the same location (See Exhibit 1: Raymond Meyer Correspondence).

In addition, Meyer suggested that other aplomado falcons, beside the breeding pair, may be present in the general area. He noted that,

> A single bird was noticed during the fall of 2000 about 6 miles from the location where two Aplomado falcons were seen the night before at dusk. Other sightings of Aplomado falcons in the vicinity have been reported by BLM employees in 2000 and 2001 (See Exhibit 1: Raymond Meyer Correspondence).

It may be that the breeding pair documented near Deming is the tip of the iceberg and that a larger southwestern New Mexico population of these raptors may exist. Given the difficulty of nest and falcon detection (discussed below), falcons may have simply gone undiscovered (or at least undocumented) until survey efforts were substantially increased. Indeed, Henry (1995: 36) notes that the increase in recent sightings of falcons in the Animas Valley (NM) is "likely to be a function of increased survey effort" and that "This increased survey effort may be the reason we now regard the species as rare rather than extirpated."

In Arizona, there were 13 reports of aplomado sightings from the mid-1970s-1991, and at least three of those were made by experienced observers. All sightings were within southeastern Arizona, which comprises the falcon's historical habitat in the state (Lewis 1991). In a biological opinion on the impact of livestock grazing permit renewals on falcon habitat, FWS recognized the potential for natural falcon restoration to Arizona in the near future, stating, "The Service believes the aplomado falcon may recolonize suitable habitat in southeastern Arizona within the life of the project [by 2006[30]]. Although unconfirmed, the species may occur at present as a rare transient" (USFWS 1997b: 282). The Arizona Game and Fish Department wrote that, if falcons are coming into the U.S. from Mexico, "aplomado falcons may be spending some portion of their time in the grassland habitats of southeastern Arizona and may eventually breed here" (Ward and Ingraldi 1994: 3).

In west Texas, there were three reports of aplomados from 1977-1991 (Lewis 1991). There was an additional falcon sighted near Valentine, TX in 1992 by raptor biologists (Henry 1992), which was viewed and photographed by hundreds of observers. The 1992 falcon was suspected to be a wild, naturally occurring individual (American Birds 2002). Ongoing reintroduction efforts in south Texas make it difficult to discern whether sightings are of reintroduced birds that have bred in the wild or progeny of non-reintroduced birds.

The large number of sightings is especially compelling given the difficulties in spotting aplomado falcons, as they often use the inner branches of trees such as mesquite (Hector 1980; Montoya and Zwank 1995). Moreover, the importance of these sightings is further underscored considering the remoteness of historical nesting areas in the southwestern U.S., which hinder comprehensive surveys (Keddy-Hector 2000). It may be that the falcon's population has simply fallen below a detectable level in the U.S. (Keddy-Hector, cited in American Birds 2002). FWS has indeed pointed out in multiple documents "how easily this species can be overlooked at low densities in the vast expanses of the southwestern deserts" (USFWS 1997b: 276; 1999: 2).

For instance, on the White Sands Missile Range, a firm contracted to conduct aplomado presence/absence surveys in summer 1996 observed,

> Large yucca grasslands are found in the northern portion of the White Sands Missile Range (WSMR). The 6 survey routes cover a relatively small percentage of this grassland, yet there are thousands of individual yuccas (*Yucca elata*) along the survey routes. Due to the difficulty in detecting nests in yuccas, a nest site is typically not observed until a bird is tending, or sitting on the nest. These nests typically sit very low in the leaves, surrounded by the upper structure of the plant, and from 3-4m up. As a result of the difficulty in observing nest sites in yuccas, and the immensity of yucca grasslands, fewer nests are know to observers than are likely present in the areas surveyed along the north range routes (Cortez III Environmental Services 1996: 19).

[30]The grazing permits were set to be renewed until December 31, 2006 (USFWS 1997b), which petitioners have interpreted as the "life of the project".

In contrast, a report on presence/absence surveys for the fall of the same year (1996) indicated that surveyors would likely have detected an aplomado falcon if one were present. The report's authors state,

> Observers note that habitat variables including forage area availability, nest availability and open grassland with perching structures, all occur within the study area. The only thing missing during the survey effort was an aplomado falcon (Burkett and Dawson 1996: 7).

While they maintain that the falcons, if present, likely would have been detected through survey efforts, Burkett and Dawson (1996) qualified their statement by acknowledging that aplomado falcons may be located in vast yucca grasslands situated in roadless areas within the WSMR (Burkett and Dawson 1996). Richardson of FWS (1996) also stated that nest structures may have been missed on the WSMR. The numerous confirmed and unconfirmed sightings caused WSMR staff to conclude that "aplomado falcons do, indeed, inhabit the Three Rivers area along the eastern WSMR boundary, at least seasonally" (Ladd 1994: 2). USFWS also considers the falcon as likely to occur in the same area (Cathey 1994b).

Bivings (1995) and Meyer (1999b) additionally note the potential for missing nests during surveys. States Meyer, "nests can be difficult to identify, even at close distances, in yuccas, while they are obvious in deciduous trees such as mesquite and desert willow" (1999b: 10). Tafanelli (2000b) has made similar observations. Bivings (1995) describes a related difficulty in falcon surveys:

> Aplomado falcons may also be more difficult to detect than soaring raptors because they spend most of their time perched.

Given the association of falcons with nests in yuccas in the desert grasslands and the falcon's sedentary ways, the potential for failing to detect nests may be significant.

On the McGregor Range of the Fort Bliss Military Reservation, within El Paso Draw, an aplomado falcon was sighted on September 11 and 18, 1999 (Meyer 1999b, c). Due to the falcon's leg bands, it was concluded the s/he was banded as a nestling several months prior in Chihuahua, 180 miles due south of the Fort Bliss sighting. Meyer points out that, while the falcon may be assumed to be a dispersing juvenile, it is possible that this individual will remain or return to the area. He notes that a falcon was observed in the same general area on White Sands Missile Range in two consecutive years (1991 and 1992) and that a falcon was observed at Isaac's Lake near Las Cruces in the same area in 1996 and 1999. Further, Meyer predicts that breeding aplomados will occur in El Paso Draw in future years (Meyer 1999c).

In southwestern New Mexico, where there have been verified aplomado sightings from 2000-2002, Raymond Meyer, commented that on that survey site much of the area cannot be viewed or accessed from roads. This may explain why the birds were not detected previous to 2000 (Exhibit 1: Raymond Meyer Correspondence; See also Meyer 2000b).

It is significant to note that the Peregrine Fund acknowledges that aplomado recolonization of its U.S. historical range might conceivably occur in the future. However, the Fund adds, "considering the small number of birds observed and their current reproductive output, the process will likely be slow and subject to the difficulties of chance events characteristic of very small populations" (Burnham et al. 2002: 18). In part, the Fund is correct in that peripheral populations are more vulnerable to extirpation from stochastic events (See, e.g., Brussard and Gilpin 1989).

However, in terms of the speed with which aplomados are restoring themselves to the U.S., it is unclear whether pursuing a reintroduction effort that entails the legal preclusion of falcon habitat protection is a prudent action. Indeed, Petitioners believe that, while reintroduction may be an important part of falcon recovery, it must not come at the expense of habitat protection vital for the long-term persistence of the aplomado. This belief is sustained by the emphasis on habitat and ecosystem protections in the ESA and the Listing Rule's and Recovery Plan's emphasis on habitat destruction as a cause of decline for this subspecies, and the consequent need to address habitat loss and degradation (See above discussion in Statutory Requirements).

Habitat conditions at existing or recent falcon sites

Habitat features at areas where aplomados have been recently sighted in the U.S. and are breeding in Chihuahua should be a guide to the falcon's habitat requirements. As previously mentioned, despite the mystery surrounding the aplomado's disappearance from the U.S. after 1952, there is consensus that, in the southwestern U.S. desert grasslands, aplomados prefer open areas with herbaceous ground cover and scattered yuccas and mesquite. In the effort to re-establish aplomados to New Mexico through reintroduction of captive-bred falcons, the Peregrine Fund has repeatedly maintained that the birds' post-release behavior will inform scientists and land managers on bird habitat preferences (Burnham et al. 2002). However, the releases may only tell us how released birds will react to habitat conditions, contrasted with the response of established wild birds to the same conditions. Petitioners prefer to assess the falcon's conservation and recovery needs based on where those falcons already present in the U.S. are appearing and data from falcon sites in Mexico. Moreover, steps toward enhancing habitat suitability for the falcon must be followed, and this is unlikely to occur without a critical habitat designation.

U.S. falcon sites

In southcentral New Mexico, within McGregor Range on the Fort Bliss Military Reservation (NM), the juvenile falcon sighted in September 1999 was found in a broad swale characterized by predominately open desert grasslands, with blue (Bouteloua gracilis) and black (B. eriopoda) grama as the dominant grasses on slopes; tobosagrass (Hilaria mutica) and burrograss (Scleropogon breviflorus) as dominant grasses on the bottom of the swale; low woody plant density; and raptor and raven nests, primarily located in soaptree yucca (Meyer 1999c). On the route where the falcon was detected (Route 10), there were three prairie dog towns in the area. On the ten routes surveyed in the area, there were at least ten prairie dog towns (Meyer

1999b). Otero Mesa, in particular, has been described as having similar habitat structure as in Chihuahua (Meyer 1997).

In the region where a breeding pair was documented in 2000-2002 in southwestern New Mexico, Meyer described the area as open grasslands, dominated by tobosa grass and annuals in swale bottoms with large yuccas and trees, some with corvid and raptor nests. He considered the general structure of the rangeland to be similar to sites occupied by falcons in Chihuahua (Meyer 2000b).

Regarding falcon sites in south Texas, Perez and Zwank (1995) conducted a monitoring study of habitat use by released falcons. They found that most forage sites had yuccas and small mesquites at higher elevations, overlooking wet marshy areas in depressions. Cattle-grazed areas with low grasses (< 60 cm) were less frequently used. Roost sites for falcons were consistently in mesquite stands at the edge of open herbaceous areas.[31]

Mexico (Chihuahua) falcon sites

Habitat conditions in Chihuahua at occupied falcon sites, and consequent elements of potential habitat in the U.S., have been investigated by Young et al. (2001). In a multi-year study which began in 1998, those researchers found that active falcon sites have a significantly greater percent of herbaceous ground cover, less bare ground, taller grasses, and less woody plant density than areas not occupied by falcons. While the authors cautioned against basing management recommendations on their study, they did find that approximately 61% of falcon sites were located in rangelands with light grazing intensity, versus much lower use of moderate, heavy, and severely grazed areas. Land use on the study site was primarily livestock grazing (Young et al. 2001). Indeed, given the almost ubiquitous use of land for livestock ranching in the desert grasslands, falcons would be hard-pressed to find extensive tracks of ungrazed habitat.

In addition, they found that falcons primarily nest in soaptree yuccas with a single trunk, or caudex, and multiple branches (a mean of 4.3 branches per yucca). Yuccas used as nest sites had a mean crown height of approximately 5.5m, and the average nest height was approximately 3.1m. Because tall yuccas are often the only areas of shade and structures for cattle scratching posts, cattle congregate around and rub up against them. Young et al. (2001) note that there may consequently be detrimental effects on yucca from cattle. These include cattle trampling of vegetation around the yuccas, which reduces water availability to the plant; and cattle rubbing against the caudices, which removes the protective leaf cover around the base of the yucca. In addition, as discussed above, other authors (Kerley et al. 1993; BLM 2001) have described the potential for cattle to break off yucca branches and cause yucca plants to grow in a procumbent manner rather than upward, which would likely reduce their usability by falcons.

Young et al. (2001) also describe the low availability of soaptree yucca at random sites, versus occupied falcon sites, and suggest that this lack of nest availability may limit the value of those sites during the breeding seasons. This underscores the value of yucca for falcons: "the

[31]These researchers qualify their finding with the proviso that their study identified habitat use by post-fleding aplomado falcons, which may differ from optimal nesting habitat (Perez and Zwank 1995).

conservation of yucca species may be an important management consideration for aplomado falcons" (Young et al. 2001: 12).

Overall, Meyer describes Chihuahuan falcon habitat as "large tracts of late seral stage grasslands... in mostly large patches of habitat with relatively low levels of human activity and few developments" (See Exhibit 1: Raymond Meyer Correspondence).

Status of Chihuahua population

The ability of aplomados to recolonize the U.S. portion of their range depends on the status of the falcons in Chihuahua and a faltering status of falcons in Chihuahua increases the urgency of designating critical habitat for the subspecies in the U.S. portion of its range. The Chihuahua population is located just 160 miles south of the New Mexico state line and is the likely source of recently sighted falcons. In 1998, Andrew Sandoval of the New Mexico Department of Game and Fish suggested that recolonization of U.S. habitat was likely, given the increasing population of aplomados in Chihuahua (Sandoval 1998). Juvenile falcons can travel as much as 136 km in two days (Perez and Zwank 1995) and reproductive success in Mexico is therefore related to the ability of falcons to recolonize the U.S.

In 1992, Montoya documented more than 25 breeding pairs of aplomados in an area within Chihuahua 80 miles south and 50 miles west of the U.S. border (Bivings 1995; USFWS 1997b; Burnham et al. 2002). By 1995, he hypothesized that his study site might be saturated with aplomado falcons, thereby adding impetus for dispersal by falcons, including juveniles, from the site (Montoya 1995). Consequently, Meyer (2000b) noted that reproductive rates in Chihuahua have declined in the past five years, with no fledglings recorded at one of the study sites. In 2001, 26 occupied falcon territories were found in Chihuahua, a decline from 31 falcon territories in 2000.[32] There was also a decrease in average young per occupied territory at one of the two sites (El Sueco) from 1.25 young in 1996 to 0.81 in 2001. Moreover, while nest failure only occurred during incubation in 1996 and 1997, loss of young was first observed in 1998, and losses reached almost 50% in 2000 (Burnham et al. 2002). Young et al. (2000) recorded populations of 61 falcons in 1998 and 66 falcons in 1999 in Chihuahua.

It may well be that the Chihuahuan aplomado falcon population is declining, possibly due to livestock grazing limitation of nesting substrates and other land use impacts in Mexico. The productivity rates of 0.57-0.67[33] young per nesting attempt described by Montoya and Zwank (1995) are well below the rate of 1.8 fledglings per nest recorded as the average in eastern Mexico (USFWS 1990). There is consequently no firm evidence that the Chihuahuan population is a self-sustaining one (Keddy-Hector 2002). A declining Chihuahua, Mexico falcon population hints at two possibilities: Mexican birds may migrate to the U.S. in search of suitable habitat, and the falcon pair presently breeding in southwestern New Mexico may have come from a larger New Mexico breeding population, as may have other non-leg-banded birds observed in the 1990s through to the present.

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[32]The Peregrine Fund added the proviso that the change from 2000 to 2001 "may have been partly due to the difficulty of locating non-breeding pairs," (Burnham et al. 2002: 16) but does not explain why that difficulty would not have deflated counts in 2000 to the same degree as in 2001.

[33]This estimate was adjusted to account for researcher impacts on nesting success (Montoya and Zwank 1995).

The extensive and numerous sightings of the aplomado falcon may therefore be indicative of natural recolonization of the subspecies from northern Mexico or it may be a product of increased survey effort in the U.S. and the consequent "discovery" of an existing population in New Mexico. In either case, critical habitat designation is vital to recovery of this falcon subspecies.

VII. THE NEED FOR CRITICAL HABITAT IS IMMEDIATE

The northern aplomado falcon needs critical habitat designation immediately. In March 2002, a nesting pair successfully fledged young near Deming, NM, on BLM land. This was the third year of falcon breeding attempts in that area (See Exhibit 1: Raymond Meyer Correspondence). The reasoning FWS used in 1986 when it refused to designate critical habitat for the falcon is no longer valid, as non-reintroduced northern aplomado falcons are breeding in the United States.

As this petition has shown, the attempts by falcons to recolonize the U.S. portion of their range without human intervention are met with a slew of threats that will prevent the birds from recovering. Rampant livestock overgrazing, oil and gas extraction, pesticide use, and extermination of keystone species are preventing falcon habitat from recovering from the abuses that led up to the need to list the subspecies as Endangered in 1986. The refusal of federal land managers and the FWS to provide adequate habitat protections through Section 7 and the stripping away of habitat protections through the south and west Texas HCP make this petition to revise the falcon's critical habitat designation urgent.

VIII. RECOMMENDED CRITICAL HABITAT

We hereby petition for a revised critical habitat designation for the aplomado falcon. We review specific areas within each of the three states within the falcon's historical range in the U.S. that should be part of a proposal for critical habitat designation by FWS. This list is not comprehensive and all habitat historically within the falcon's range which is suitable for falcons should be considered for this designation.

Several million acres of suitable land can be found in southeastern Arizona, in Pima, Cochise, Santa Cruz, Greenlee, and Graham Counties; western and southern Texas; and in New Mexico suitable areas cover large portions of Bernalillo, Chaves, Dona Ana, Eddy, Grant, Hidalgo, Lea, Lincoln, Luna, Otero, Sandoval, Sierra, Socorro, Torrance and Valencia Counties.

New Mexico

We have mapped potential habitat in New Mexico using Global Information Systems analysis based on the BLM's Grazing Guidance Criteria standards for defining falcon habitat (BLM 1999; See Exhibit 5: BLM Guidance Criteria on Grazing Effects). There are several key areas for falcons in New Mexico, including the Otero Mesa, Jornada del Muerto Basin, and the Tularosa Basin. We describe these areas in detail because they are frequently mentioned in the

scientific literature as particularly valuable for falcons, but FWS should consider all areas identified on Map A, attached.

Otero Mesa

The Otero Mesa is located in southcentral New Mexico and western Texas. The mesa extends southward from the foothills of the Sacramento Mountains and its western edge drops approximately 200-300 m to the Tularosa Basin. It is characterized by open yucca grasslands with relatively low levels of shrub cover and is described as Plains-Mesa Grassland. Woody plants include soaptree and banana yucca (Y. baccata), tree cholla (Opuntia imbricata), and creosotebush (Larrea tridentata) (Meyer 1996; 1997; 1999b, c).

Montoya and Tafanelli (1994) identified a large portion of grasslands within Otero Mesa as likely having the structural characteristics of suitable falcon habitat. Meyer also noted the structural similarity between extensive portions of Otero Mesa and occupied falcon habitat in Chihuahua. More than half of the sites on the mesa had woody plant densities similar to falcon sites in Chihuahua. However, the Mesa had some characteristics, such as grass cover and avian prey biomass, which were significantly lower than in Chihuahua (Meyer 1997; 1999b). Indeed, while avian biomass in Chihuahua was calculated at 695 grams/falcon site, it was only 395 grams/falcon site on Otero Mesa (See Exhibit 2: BLM Review of Grazing Management, Migratory Birds, and Aplomado Falcon Habitat; See also Meyer 1997; 1999b). This may in part be due to greater rainfall in Chihuahua, and different topography and soils in the two areas, but it also appears linked to greater impacts from cattle grazing on Otero Mesa versus falcon sites in Chihuahua, with consequent depreciations in two preferred prey species – meadowlarks and lark buntings (Meyer 1997; Exhibit 2: BLM Review of Grazing Management, Migratory Birds, and Aplomado Falcon Habitat). Additional livestock grazing impacts on falcon habitat are discussed in the Threats section above.

FWS has underscored the importance of the Otero Mesa for falcons. In correspondence to the BLM regarding the impacts of oil and gas extraction on falcons, the agency wrote,

> [T]he Service is primarily concerned with the existing effects from ongoing livestock razing combined with habitat loss and fragmentation associated with extensive oil and gas leasing. This concern applies to... the federally-endangered northern aplomado falcon.... [T]he aplomado falcon depends on the desert grassland ecosystem and wherever it remains, is essential habitat for the falcon. Therefore, Otera Mesa... is a high priority recovery area for the falcon because of the combination of its overall size, relatively unfragmented natural condition, and its proximity to breeding aplomado populations in nearby Mexico. The falcon has historically (1917) and recently (1991, 1993, 1997, and 1999) been reported within Otero County. The 1999 sighting was confirmed on Otero Mesa by a qualified ornithologist (Fowler-Propst 1999b, emphasis added).

Given Otero Mesa's structural characteristics, it should be a high priority for falcon critical habitat designation.

Tularosa Basin

This area is also located in southcentral New Mexico and west Texas. The Tularosa Valley is bordered on its west side by the San Andres Mountains in eastern Sierra and Dona Ana Counties and western Otero County in New Mexico and El Paso County in Texas. Its eastern border is Otero Mesa and on the south by the Otero escarpment. While the area provides potential falcon habitat, it suffers from shrub encroachment of grassland more pronounced than on the Mesa and is described as Chihuahuan Desert Scrub. The most common grasses are bush muhley (Muhlenbergia porteri), black grama, and tobosagrass. Woody vegetation inclused mesquite and sand sagebrush (Artemesia filifolia) (Meyer 1997). Inclusion of portions or all of the Tularosa Basin in the falcon's critical habitat designation will help prevent further loss of aplomado habitat.

Jornada del Muerto

The Jornada del Muerto grasslands are located in southwestern New Mexico. The Jornada is a closed basin in the northern Chihuahua desert. Because it has no outlet, the Jornada comprises piedmont slopes and basin floor. Vegetation includes black grama as a dominant on upland sites in good condition, and tobosa and burro grass on flood plains. Typical shrubs are yucca, prickly pear (Opuntia spp.), mesquite, and Acacia spp. The area receives less than 25 cm of precipitation in the basins and 25-40 cm in the foothills (Henry 1995).

Habitat assessment and aplomado surveys have been conducted in and adjacent to this area (Henry 1995; Tafanelli 2000a, b; Meyer 2000b). Some of the habitat within the Jornada appears similar to active falcon sites in Chihuahua (Henry 1995; Tafanelli 2000b). Henry (1995) described the northern Jornada del Muerto as an especially important area for falcons, describing the composition and structure of the Jornada as closely resembling the occupied falcon site in northern Chihuahua. In addition, Henry noted that the condition of this grassland seems to be in better condition than the majority of BLM land and other parts of the falcon's southwestern U.S. range. Moreover, the availability of tall yucca plants (from 6-15 feet high) makes the northern Jornada "an important site for recolonization of the species in the United States" (Henry 1995: 4). Overall, Henry (1995) regarded two key elements for falcons on the Jornada as tall, branched yucca for nesting and dense black grama stands for hunting. In addition, Truett (forthcoming) indicated that substantial prairie dog populations were in the Jornada del Muerto in the early 1900s, and efforts to restore prairie dogs to these areas may greatly enhance the falcon's prey base. Portions or all of the Jornada del Muerto should be considered by FWS for the falcon's critical habitat designation.

Southwestern and southeastern New Mexico

While southcentral New Mexico, in the areas described above, appears to contain particularly valuable aplomado habitat, the areas west and south of the Jornada, Otero Mesa, and Tularosa Basin, are also valuable for falcons.

In southwestern New Mexico, Meyer (2000b) identified the following area as potential habitat:

> Specific habitat identified as potential habitat for the Aplomado Falcon included the Hachita Valley, southern Playas valley, Wamels Draw, the basin between the Tres Hermanas Mountains and the Cedar Mountain Range, Seventy-six Draw and associated drainages, and the grassland in the vicinity of Separ (Meyer 2000b: 23).

He further noted that, "These areas are basin or swale open grasslands still relatively free of, but still threatened by, shrub encroachment. Priority should be given to managing these areas to improve Aplomado Falcon habitat suitability" (Meyer 2000b: 23, emphasis added). In general, Meyer underscores the need to protect Chihuahuan desert grasslands from range degradation and further shrub encroachment (Meyer 1996; 2000b). One component of that protection is to optimize range conditions for the falcon's potential avian prey (Meyer 2000b). In an earlier article on falcon conservation, Hector (1988) also advocated measures to promote small bird abundance. In addition, Truett (forthcoming) indicated that substantial prairie dog populations were in the Animas, Playas, and Hachita valleys in the early 1900s, and efforts to restore prairie dog colonies to these areas may greatly enhance the falcon's prey base.[34]

In southeastern New Mexico, protected habitat could serve as key corridors and dispersal areas for falcons recolonizing from Chihuahua. Overall, the southern and southeastern counties of New Mexico are important to aplomado recovery because they can allow for migration north from those parts of Mexico where the falcon can now be found (See Exhibit 1: Raymond Meyer Correspondence). While a reintroduction program may play a valuable role in reestablishing aplomado populations in the United States, the key to full recovery and long-term persistence of the falcon will be in critical habitat designation and protection for this subspecies.

Arizona

Although the falcon historically occupied southeastern Arizona (USFWS 1990; King et al. 1995), this area has been neglected in falcon recovery efforts. For example, according to the BLM, because the Arizona Game and Fish Department (AGFD) considers the aplomado to be extirpated from the state, recovery efforts have been directed toward Texas and New Mexico (Meridith 2001).

However, as noted above, there have been numerous historical and recent sightings in the state. In addition, the Recovery Plan notes the potential for restoration of falcons to seven areas in Arizona (USFWS 1990). In subsequent studies, the AGFD identified and evaluated ten potential reintroduction sites, based on habitat characteristics, land ownership, and accessibility for monitoring purposes (Corman 1992) and FWS analyzed prey species in five potential sites (King et al. 1995). In general, AGFD reported that falcons were historically found in two types of habitats in the state: open grassland with scattered yucca and riparian woodlands (Corman

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[34]In an early 20th-Century account, Vernon Bailey writes: "In August, 1908, on a trip from Deming to Hachita and through the Playas and Animas Valleys the writer found the prairie dogs numerous in many localities, especially along the elevated and more open margins of the valleys, but extensive colonies were also seen in the bottoms of these great desert valleys. Animas Valley was an almost continuous prairie-dog town for its whole length and breadth" (Bailey 1931: 123-124).

1992). Both should be considered in evaluating areas for inclusion under a critical habitat designation.

Sites identified in AGFD report

The locations identified as key falcon potential habitat are indicated in Exhibit 8: Map of Falcon Reintroduction Areas in Arizona. AGFD priority ranked these sites in terms of density and diversity of potential prey species; habitat characteristics resembling historical falcon sites; and vegetation structure. The list of sites, in order of ranking (starting with highest potential) is as follows (bolding corresponds with labeling on map in Exhibit 8):

Site 1. **Empire/Cienega** Ranch. BLM land (Safford District) in Pima County. An 18,200 ha (45,000 ac) semidesert sacaton and tobosa grassland with scattered mesquite and soaptree yucca, and Sonoran riparian woodlands (Corman 1992; King et al. 1995). "Excellent, expansive, varied habitat in public ownership" (Corman 1992: 42).

Site 2. Upper San Pedro River, near **Hereford**. BLM land (San Pedro Riparian National Conservation Area) in Cochise County, near Arizona/Mexico border. A 20,000 ha (50,000 ac) parcel that is primarily semidesert grassland and Sonoran riparian woodlands. Includes large areas of sacaton and tobosagrass. Corvids and Swainson's hawks nest in cottonwoods, yucca, and mesquite. Best falcon habitat is on the southern one-half of area (USFWS 1990; Corman 1992; King et al. 1995).

Site 3. West of **Duncan**. BLM lands (Safford District) located in Greenlee County, near Arizona/New Mexico border. Upper Sonoran semidesert grassland with rolling hills of mixed grasses and scattered mesquite, creosote, and yucca. Extensive grassland in the surrounding area, especially to the south, with nesting Chihuahuan ravens and Swainson's hawks in riparian areas (Corman 1992).

Site 4. Western **Dragoon Mountains**. USFS land (Coronado National Forest; Douglas Ranger District) in Cochise County. Semidesert grassland with oak, willow, and other deciduous trees in wetter riparian areas. Riparian area trees large enough for raptor and corvid nests (Corman 1992).

Site 5. North of Douglas, near **Leslie Canyon** Road. State land in Cochise County, near Arizona/Mexico border. Semidesert grassland with mesquite, creosote, and scattered soaptree yucca (Corman 1992).

Site 6. Elgin **Research Ranch**. Land owned by National Audubon Society, south of Elgin in Santa Cruz County. A 3,160ha (7,900ac) parcel that is lush semidesert grassland and scattered madrean evergreen woodlands (USFWS 1990; Corman 1992).

Site 7. Southern Chiricahua Mountains, near **Price Canyon** Road. USFS lands (Coronado National Forest; Douglas Ranger District) in Cochise County, near Arizona/New Mexico border. Semidesert grassland and madrean oak woodland with scattered mesquite in the open grassland and larger oaks and yucca in riparian areas and foothills (Corman 1992).

Site 8. **Canelo Hills** Cienega area. USFS land (Coronado National Forest) and land owned by The Nature Conservancy, Santa Cruz County. Semidesert grassland, madrean evergreen woodland, and Sonoran riparian woodlands (Corman 1992).

Site 9. Eastern Santa Rita Mountains, near **Gardner Canyon** Road. USFS land (Coronado National Forest; Nogales Ranger District) in Santa Cruz and Pima Counties. Semidesert grassland with scattered agave, pinyon, and juniper and madrean evergreen woodland (Corman 1992).

Site 10. Eastern Santa Rita Mountains, near **Box Canyon** Road. USFS land (Coronado National Forest; Nogales Ranger District) in Pima County. Semidesert grassland with scattered pinyon, juniper, manzanita, and agave and madrean evergreen woodland (Corman 1992).

Sites identified in Recovery plan

While the AGFD report more thoroughly assesses the potential for identified reintroduction sites, it omits five areas enumerated in the Recovery Plan. Those sites are as follows:

Site 1. Buenos Aires National Wildlife Refuge. USFWS land in Altar Valley, in Santa Cruz County, near Arizona/Mexico border. A 44,400ha (111,000 acres) area that, according to the Recovery Plan, is "excellent mesquite grassland" (USFWS 1990: 56).

Site 2. Fort Huachuca Military Reservation. Department of Army land in Cochise County, near Arizona/Mexico border. A 31,400 ha (78,500 ac) parcel with sacaton grasslands and scatterings of mesquite and oak. Best potential for release is along open draws on northern half of reservation (USFWS 1990; King et al. 1995).

Site 3. San Simon Valley. Includes BLM lands in Graham and Cochise Counties, near Arizona/New Mexico border. A 308,000 ha (760,000 ac) semidesert yucca grassland located north of Chiricahua Mountains (King et al. 1995). In the Recovery Plan, FWS considered it an "ideal release area in terms of habitat quality" (USFWS 1990: 56).

Site 4. Santa Rita Experimental Range. State land in Pima County. A 21,200 ha (52,500 ac) parcel located 40 km south of Tucson. Semidesert and Sonoran desert grassland, with only approximately 10% open grassland, with additional acreage partly opened with scattered shrubs (USFWS 1990; McClaran 1995).

Site 5. Willcox Playa Wildlife Area. State land in Cochise County. A 400 ha (1,000 ac) site with little suitable habitat, but adjacent to extensive yucca grassland (USFWS 1990).

All fifteen sites identified above should be evaluated as critical habitat for the northern aplomado falcon.

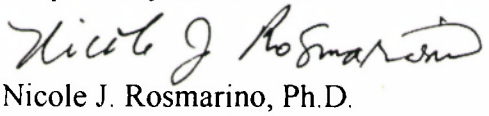
Texas

There are two areas in Texas where falcons have historically been sighted: South Texas and West Texas. These areas significantly differ in vegetation, climate, topography, and native communities. In addition, while there are several National Wildlife Refuges in South Texas, federal lands in West Texas are limited to U.S. Forest Service-administered National Grasslands. In general, the vast majority of Texas is privately owned, in contrast to AZ and NM. Given that critical habitat protections are primarily enforced through Section 7, the inclusion of private lands in Texas would ensure that federal agency actions on private lands not result in adverse modification of the aplomado's habitat. This would help guard against actions such as the south and west Texas HCP, which has stripped away habitat protections for the falcon nearly up to the 22nd Century. FWS should meaningfully consider all potential falcon habitat in Texas in its critical habitat determination for the aplomado.

IX. CONCLUSION

For the reasons set forth above, Petitioners request that FWS revise its determination that designation of critical habitat for the northern aplomado falcon is not prudent and issue a proposed rule designating northern aplomado falcon critical habitat. Petitioners expect timely processing of this petition for a revised critical habitat determination for the aplomado falcon. Critical habitat is warranted due to the recurrence of falcons in the U.S. portion of their historic range. Continued threats, including habitat loss and degradation, pesticide use, and suppression of the falcon's prey base, underscore the need for this critical habitat designation. The falcon stands as a symbol of the "consequences of economic growth and development untempered by adequate concern and conservation" (ESA Section 2; 16 U.S.C. § 1531(a)(1)). The protection and restoration of the Chihuahuan Desert and coastal plain ecosystems this regal subspecies historically inhabited is therefore mandated under the Endangered Species Act.

Respectfully submitted,



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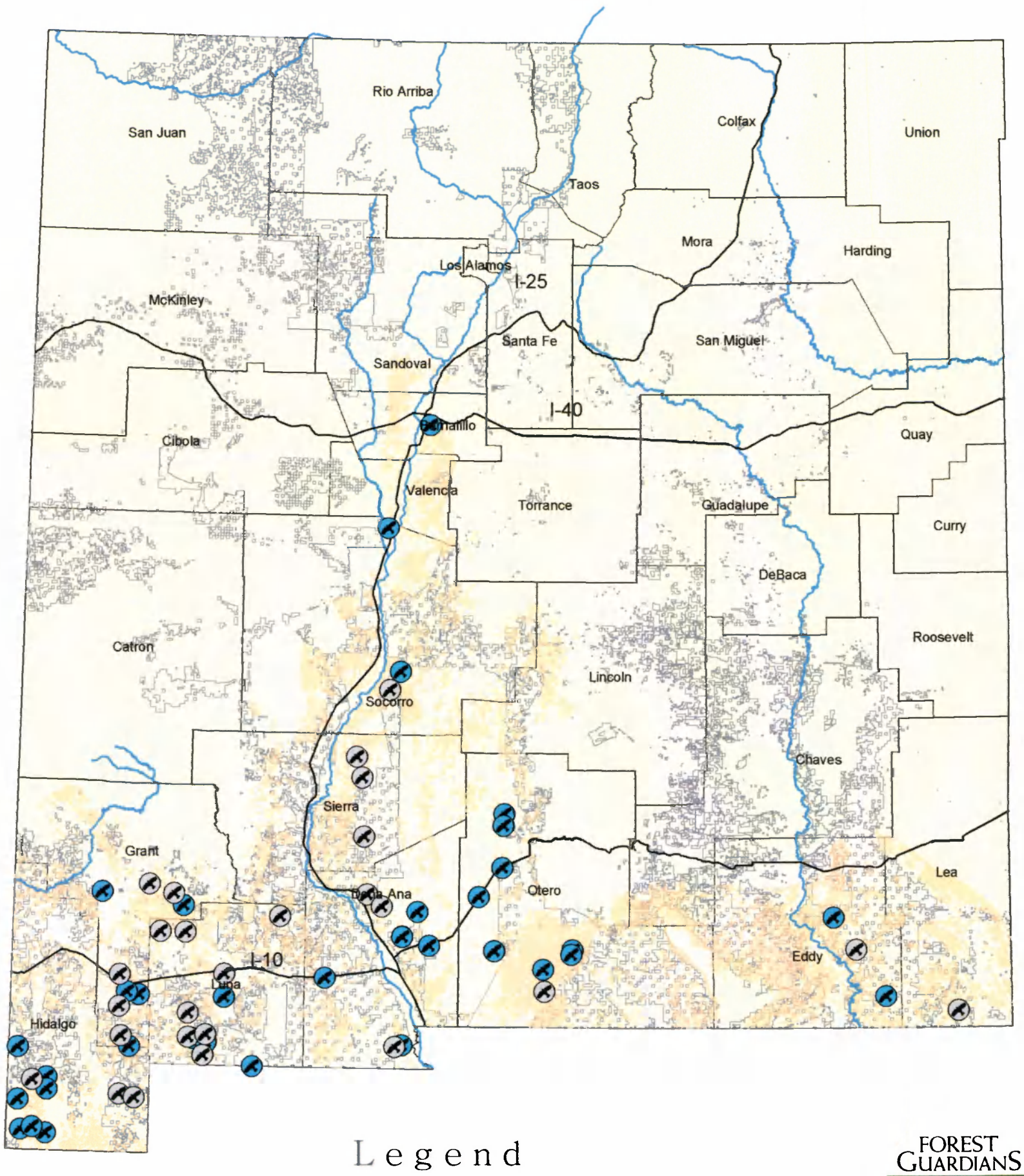
Young, Kendal E., Quinn H. Hodgson, Dawn M. Browning, Julie L. Lanser, Bruce C. Thompson, Raul Valdez. 2001. "Determination of habitat suitability for aplomado falcons on public lands in southern New Mexico." Project Progress Report March 2000-May 2001.

Note: GIS modeling for potential habitat was based on the U.S. Bureau of Land Management's Guidance Criteria on Grazing Effects regarding the northern aplomado falcon (Exhibit 5 in the Petition). Forest Guardians was unable to ground check the vegetation areas and the presence of yucca and other nesting raptors. Otherwise this habitat model conforms to the criteria set forth in the BLM's guidance document for vegetation type, elevation, watershed, and other parameters. See Exhibit 5 of the Petition for a detailed explanation of how the areas were modeled.

MAP A

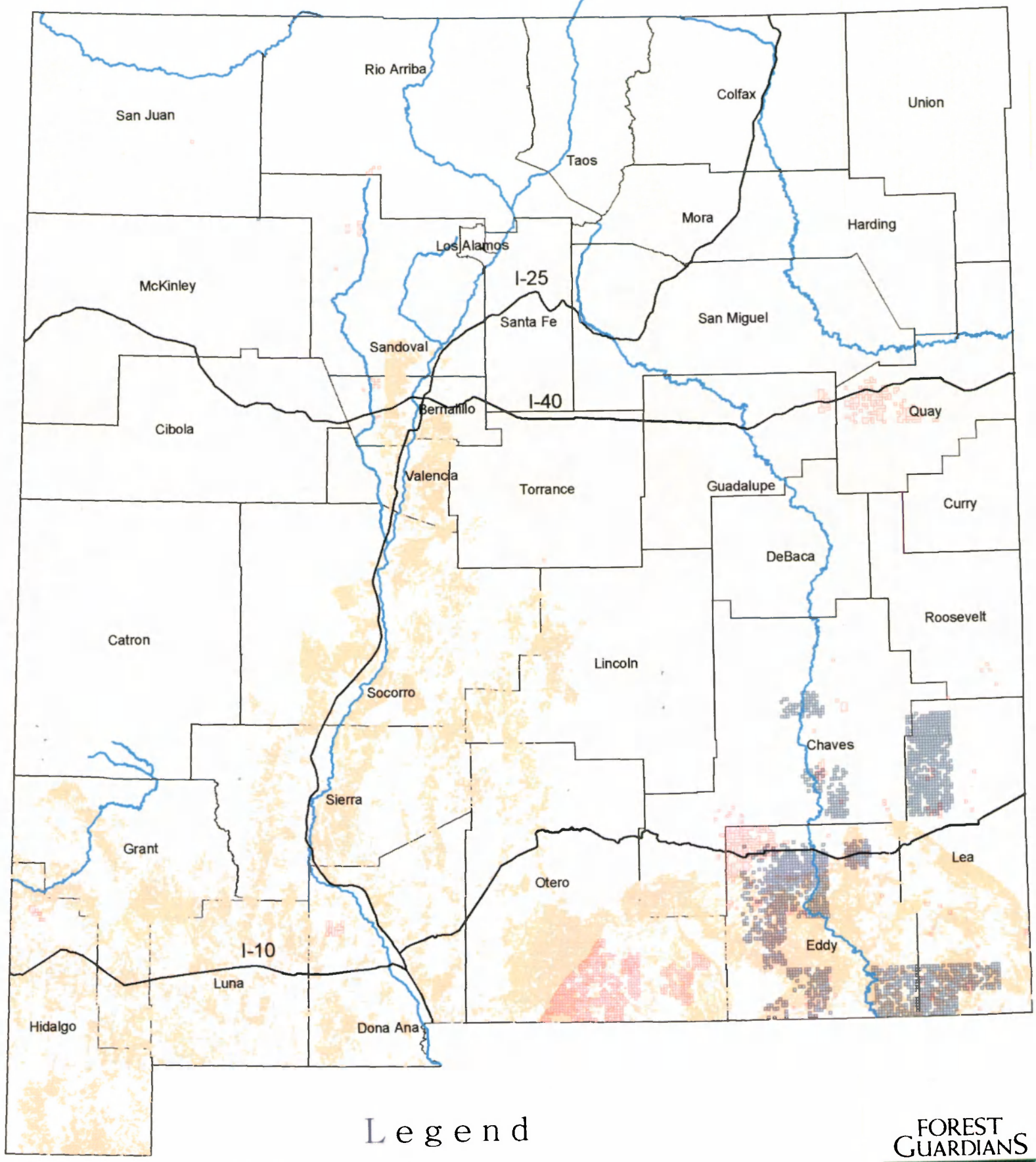
Aplomado Falcon Potential Habitat and Historical Sightings



Note: GIS modeling for potential habitat was based on the U.S. Bureau of Land Management's Guidance Criteria on Grazing Effects regarding the northern aplomado falcon (Exhibit 5 in the Petition). Forest Guardians was unable to ground check the vegetation areas and the presence of yucca and other nesting raptors. Otherwise this habitat model conforms to the criteria set forth in the BLM's guidance document for vegetation type, elevation, watershed, and other parameters. See Exhibit 5 of the Petition for a detailed explanation of how the areas were modeled. Oil and gas developments, both proposed and existing, are generalized to the section level (1 sq. mile).

MAP B

Aplomado Falcon Potential Habitat and Oil and Gas Development



Legend

- Potential Habitat
- Existing Oil and Gas Wellpads
- Proposed Oil and Gas Development

FOREST GUARDIANS

Exhibit 1: Raymond Meyer Correspondence

"Raymond Meyer" <latierra@qwest.net>

09/28/01 12:51 PM
Please respond to "Raymond Meyer"

To: "Barnitz, Jack" <jack_barnitz@nm.blm.gov>, "Hernandez, Carrie" <Carrie_Hernandez@fws.gov>, "Howard, Mike" <Mike_Howard@nm.blm.gov>, "Howe, Bill" <Bill_Howe@fws.gov>, "Lewis, Lyle" <Lyle_Lewis@fws.gov>, "Williams, Sandy" <SOWilliams@state.nm.us>
cc:
Subject: apfas

Hello, everyone.

I just wanted to let you know that I am continuing to monitor the pair of apfas on a regular basis (about once every two weeks).
I checked on them this past Wednesday and saw both birds at one of their commonly used perch sites.

Ray Meyer
La Tierra Environmental Consulting
226 W. Willoughby
Las Cruces, NM 88005
(505) 541-5853
latierra@qwest.net

"Raymond Meyer"
<latierra@qwest.net>

06/28/01 11:03 AM
Please respond to
"Raymond Meyer"

To: "Williams, Sandy" <SOWilliams@state.nm.us>, "Lewis, Lyle" <Lyle_Lewis@fws.gov>, "Howe, Bill" <Bill_Howe@fws.gov>, "Howard, Mike" <Mike_Howard@nm.blm.gov>, "Hernandez, Carrie" <Carrie_Hernandez@fws.gov>, "Barnitz, Jack" <jack_barnitz@nm.blm.gov>
cc:
Subject: apfa monitoring

APLOMADO FALCON PAIR MONITORING IN NEW MEXICO

06/26/01 1745-1930

I checked again on the second nest and there were no apfas present. I checked the nest contents - the nest was empty, there were no broken egg shells.

I searched the vicinity of both nest sites, along Hermanas Grade and in Simpson Draw for any sign of the birds and did not see anything. I guess that is it for this season.

06/18/01 1830-1930

It appears that the second apfa nest has been abandoned. I observed the nest for about one-half hour and did not see Aplomado falcons on or near the nest. I searched the surrounding area also but did not see any apfas. I returned to observe the nest and again, did not see any apfas. Assuming that the nest is abandoned, I approached the nest and, with a mirror pole apparatus, checked the contents. There were three apfa eggs. They may be collected if anyone is interested?????????? I will be out of town for the next two days but am planning to triple check that the nest is indeed abandoned soon after I return.

It is interesting to note that the eggs remain in the nest unattended with relatively large nos of ravens in the area - there are at least two active raven nests in the immediate vicinity of the apfa nest (within 800m).

Two wtki nests have fledged young. One nest failed and the pair is renesting. Another wtki nest had three eggs initially, but on the last check there was one young (about 1-2 days old) and one egg. In the same shrub about 2 ft away is a weki nest.

06/09/01 0810-1335

I did not observe any Aplomado falcons during this monitoring trip. There was no bird on the nest or anywhere in the vicinity during about 40 minutes that I spent there. I then searched further from the nest (in Simpson Draw and west across Hermanas Grade) and still did not see either of the pair. At 1310 I returned to the nest site and did not see the birds. I will be checking the nest again this week to see if anything is happening. As far as I know, the male has not been seen since early May.

06/01/01 0700- 0750

I briefly checked on the replacement nest - the female was at nest incubating. I did not see the male.

I stopped briefly on the road running east from Hermanas Grade. The nest is about 150-200 m from that road. The female left the nest so I moved further away - about 500 m. The female returned to the nest shortly thereafter. She did not appear agitated, however, I think that it is a good idea to keep well away from the nest and not stop along that road. I observed the nest for about 30 more minutes during which time the female remained on the nest. Later in the morning I saw her at the corral in the bottom of Simpson Draw to the east of the nest. She was perched on a fence post for several minutes.

05/25/01 0655-0800

It appears that the apfa pair is making another go of it - the female is incubating a replacement nest. She remained on the nest except for a few minutes during the hour of observation. The nest is in the location described in the previous update. I did not see the male at all.

Two wtki nests have fledged young.

05/09/01 0645-1000

BAD NEWS. The aplomado falcon nest has failed. Observing no apfas at the nest and seeing a raven in the process of building a nest in a yucca about 40 m from the apfa nest site was not a good sign. I therefore checked the nest and found it empty. There was a good deal of fresh whitewash in the nest suggesting that young had been present. I searched the area and found an area with alot of down and pin feathers of a young apfa (I am quite sure) on the ground about 3.5m from the nest. It appears that the nestling had been partially plucked. Some of the pin feathers were "chewed up" at the base. It seems that the nest was depredated by an avian predator. Comparing the pin feathers with that of a photographic age key for young apfas the nestling was probably about 20 days old when it died.

The apfa pair was seen copulating and hanging around a yuccu near the Hermanas Grade in the pasture to the west of the nest site. They may make a second attempt at it. Apfas in Chihuahua have not been known to successfully fledge young from a replacement nest. I will continue to monitor the pair.

Currently monitoring 6 pairs (4 nests) of wtki

04/28/01 0700-1030, 1600-1700

The aplomado falcon pair is present in the nest area. The nest yucca survived the strong winds of late and remains erect. The nest should have young if it is still active, I estimated that the eggs hatched during the second or third week in April. I was hoping to confirm nestlings in the apfa nest by observing prey transfer but was unable - the adults were not cooperative. When I first arrived the adults were not visible. However, after a few minutes the male appeared and then a few minutes later the female. They have a habit of "appearing" probably because they fly very low and are difficult to see. I am not sure if one or both were at the nest. Both birds engaged in cleaning and preening which may indicate that they were feeding or attending eggs or young. The nest is only about 7 ft above ground but it is nestled in the yucca leaves making it difficult to see any activity in the nest. I am assuming that the nest is still active and will soon make another trip out there to observe some indication of young in the nest.

Regarding wtki - I am monitoring 5 pairs, three of which are nesting now. One nest contains young about 20 days old and another nest contains 4 eggs (both checked on 04/28/01), one nest contains one egg (checked on 03/26/01). The other two pairs do not have active nests, as far as I could tell.

04/10/01 0800-1010

Based on a couple of hours of nest monitoring this morning, the apfa pair is present and the nest active. When I arrived, the male was on the nest and the female perched nearby. The female soon replaced the male at the nest and remained there through the monitoring period (> 1.5 hrs). She did briefly leave the nest for about 65 seconds at one point. The male flew off to the south, I assume to hunt. At one point when a gang of ravens approached the nest, the male apfa returned and stooped on a few of the ravens before heading south again. The ravens did not appear to be a real threat to the nest.

The recent winds may be more of a threat. The apfa nesting endured the winds of Friday April 6 when gusts were up to 60 mph. Today is supposed to be bad as well. During the observation period, winds were about 20-30 mph already. The yucca was swaying but it seems fairly sturdy. It leans into the wind. Hope it lasts through the season.

03/26/01 1450-1600

Just checked on the pair briefly, the female was at the nest most of the time, she left briefly and copulated with the male on one occasion.

There were no cattle in the area.

03/15/01 1520-1817

The pair may not be as far along as I thought based on previous observations. The female entered and left the nest frequently during the observation period. The pair copulated briefly during the observation. The male also was on the nest briefly. At dusk, the female replaced the male at the nest.

03/08/01 1530 - 1800

It appears that the pair is incubating a nest in yucca A - the small, leaning yucca. The male incubated for about one hour, then the female replaced him at about 1750.

The cattle issue is still a concern, especially because the apfas are nesting in that particular yucca. I met one of the Johnsons out there. He was transporting cattle when I arrived. They are taking their time, there were still 7 cows in the pasture when I left at 1800.

By the way, I checked a nest of a WTKI pair that I observed transfer prey in February. At that time there appeared to be a rudimentary nest. The nest contained one egg. There are several other pairs of WTKI that I can also monitor in the area.

03/01/01 1500-1800

The pair of aplomado falcons were present at the same locale as previously observed. I did not see any indication that they had initiated nesting yet. The pair did not focus on the potential nest site A as in the observations on 02/20.

First observed only the male perched on a preferred yucca. Shortly after I began observing, the male flew northwest and returned after a few minutes with prey. He brought it to A and briefly perched in the nest, he then flew to a nearby yucca stump (seems to be a favorite pluck site) and was promptly displaced by the female who ate the prey. I did not see her perched on the yucca, B, from which she flew so she may have been in a nest in that yucca. This yucca is taller and appears more sturdy than A which is maybe 30 m to the south. During a good portion of the survey she remained near this nest perched on a yucca flower stalk but she did not enter the nest again.

On two occasions the male brought a prey item to the female. She also hunted by herself on two occasions.

The presence of cattle at the nest site remains a concern. During the observation period, 12 cows were grazing in the area. Two different cows rubbed against A during the observation period. The first caused the yucca to sway moderately, but the second cow was rubbing its shoulder on the yucca and caused it to shake violently.

I alerted Mike Howard about this on 03/02.

02/20/01 1500-1630

The pair of aplomado falcons were present and observed in mating and prenesting behavior. It appears that they have selected a nest site in the area where BLM people observed the pair on 01/24/01. The observations suggest that they are not incubating eggs yet. See details below, for further specifics please contact me.

One concern is the presence of cattle at the nest site. During the observation period, 2 cows were grazing there. One cow was rubbing against a yucca near the potential nest site. The yucca with the potential nest is not very tall, probably 7 ft at most. It is also leaning and appears to have been rubbed against by cattle.

Some details of the observation.

Was conducting grassland bird surveys in the general area in the morning.
While driving by the corral at 1038 I observed the female (?) enter a potential nest site (A) in a yucca north of the road (same area as BLM folks saw the birds).

At 1250 I began actual monitoring of the pair. They were present at site 1 (original sighting location west of private land).

The female was observed entering A and the male once.
On one of the occasions the female remained in A for 39 minutes (1644-1723).

During observation the male and female were observed hunting and eating individually.

While hunting alone the male apfa was harassed by a female amke. At one point the amke stooped on the apfa 10x while it was perched on a fencepost. The amke then perched on an adjacent fence post for about 5 min., stooped on the apfa 2x then flew away.

In afternoon the male vocalized while bringing a prey item to the vicinity of A where he consumed it. Soon after the female displaced him from the pluck site.

Male and female at one point engaged in what appeared to be an attempted piracy of prey item that involved 2 noha and 1 wtki. It was a dramatic aerial engagement.

Male briefly chased a male noha from the vicinity of the nest.

In the late afternoon (1724) the pair copulated briefly on a yucca flower stalk adjacent to A.

At dusk (about 1810) the pair hunted individually. At 1829 the female was barely visible but was seen with a prey item that appeared to be a small mammal.

Ray Meyer
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(505) 541-5853
latierra@qwest.net

1206-11

"Ray Meyer" <latierra@zianet.com> on 10/23/2000 11:17:09 AM

To: "Perez, Chris" <Chris_Perez@fws.gov>
cc:

Subject: Aplomado falcons

Hi Chris, here are some details on the sightings of the Aplomado falcons.

Two aplomado falcon first seen Oct. 05 at about 0915 at 13 227718 E, 3532991N, flying together chasing a bird. One falcon caught the bird, the two then perched on fence posts approx. 15 ft. apart. The falcon that caught the bird consumed it, the other remained perched. I took photos there. The birds were adults, grey mantle, unstreaked breast. They had an overall cinnamon wash to the light parts, suggesting that they had molted recently and the plumage had not faded to the characteristic white color. One bird appeared smaller than the other so I guessed that one was male, the other a female. After 20 min. or so one bird flew east to fenceline, the other flew to a yucca nearby. I took more photos of the bird on the yucca. 10 minutes later the falcon on the yucca flew to the fence near the other bird. Soon after they both flew east increasing elevation and engaged in a chase of a passerine. One bird caught it and they both perched on the fenceline again. About 10-15 minutes later they hunted cooperatively again by intercepting a passerine in flight and perched on the fence again. 20 minutes later the birds took to the air flying west northwest out of sight. Bird remains collected at pluck sites included a black bird like a Brewer's blackbird, lark bunting, and unidentified sparrows.

This is an area that was considered one of the most likely areas for aplomado falcons to occur during my survey contract for the USFWS. It was visited four times during the survey effort. It is not known how long these birds have been here. It seems more likely that the birds are a pair and have been there or in the general area for some time rather than the scenario that two adult birds recently dispersed and showed up at the same location. Despite the fact that the birds were not detected during previous surveys, it is possible that the birds attempted to nest this year, much of the area is not accessible or viewable from the roads.

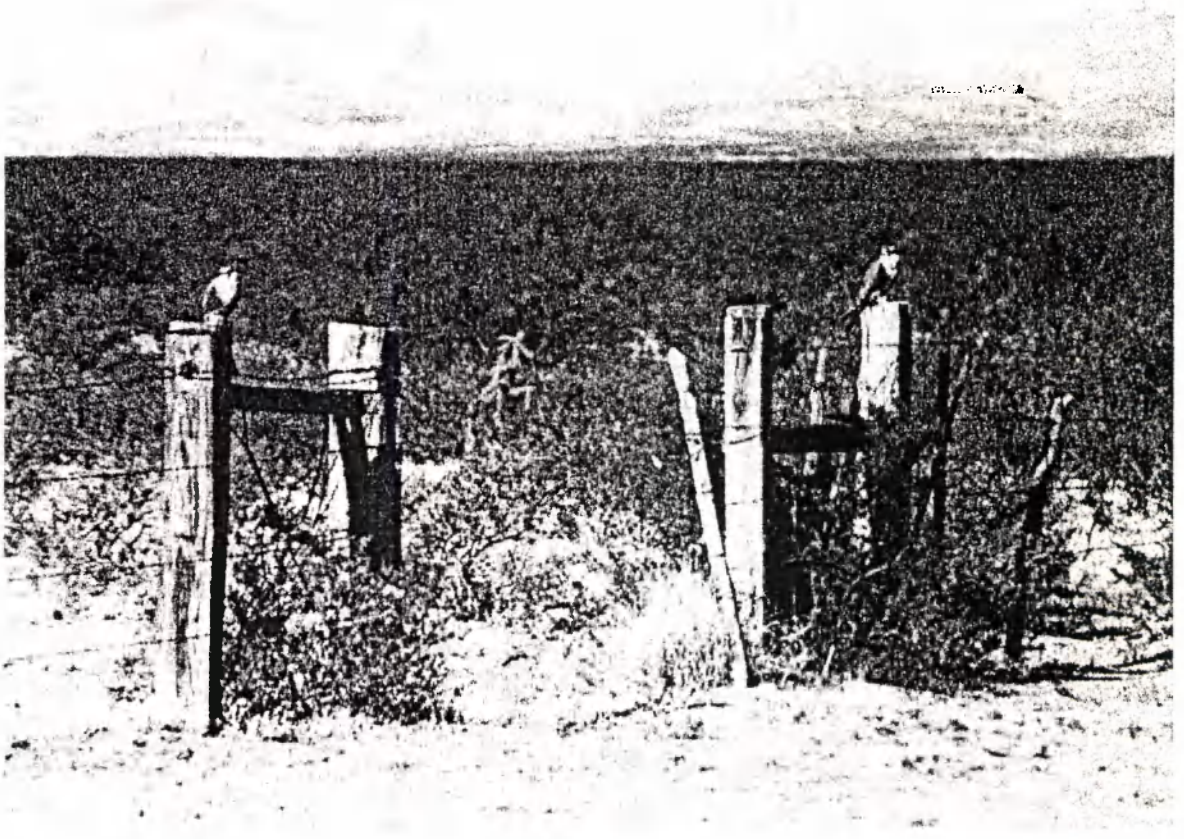
One bird was seen again on Oct. 11 at about 0830 in the same area. It appeared to be a female. The other bird was not seen.

On Oct. 20 two aplomado falcons were observed in the same area at about 1730. One bird, presumed to be a male, hunted twice, intercepting a small passerine each time and consuming them. The two falcons were observed for about 30 minutes. These birds appeared to be the same ones seen on Oct. 5 in the same area.

On Oct. 21 a single aplomado falcon was observed at 0910 approx. 7-8 km west northwest from the Oct. 05 sighting. It was located in on the edge of open grassland and was seen hunting. After about 1.25 hrs. it was no longer seen.
This location is near the sighting reported by the BLM in September and is also in the direction that the birds were last seen flying on Oct. 05.

Whether or not this is one of the two seen the previous evening is unknown.

1406-11



Aplomado falcon pair photographed by Ray Meyer;
La Tierra environmental Consulting
Las Cruces NM. Unbanded

Location: Simpson Draw NE of Hermanas, Luna Co. NM
OCT 5, 2000 hunting in the tobosa
grass swale behind Camera

1406-11

Aplomado falcon
photographed by
Ray Meyer
La Tierra Consulting
Las Cruces NM
Unbanded
Location: Simpson Draw
NE of Hermanas
Luna Co. NM
Oct 5, 2000

STATUS REPORT - SURVEY AND MONITORING OF APLOMADO FALCONS IN NEW MEXICO DURING THE 2001 BREEDING SEASON

August 2001

Pair Monitoring

The Aplomado Falcon pair was monitored at least once a month beginning in October 2000. Beginning in February, observations of the pair were conducted every 14 days or less for evidence of breeding activity. The monitoring was continued through July. Monitoring was conducted at different times of the day to observe behaviors as they varied over the course of a day. The duration of an observation period depended on the behavior of the birds and continued until the status of nesting activity at a particular time was determined. Nest sites were identified by observing the movements and behavior of the pair. Active nests were confirmed by observation of an adult at the nest in the incubation position for at least one hour and/or by observation of adults attending young or young present in the nest.

During the 2001 breeding season, the pair made two nesting attempts, both of which were unsuccessful. The first nest was initiated in March. At least one young hatched and reached the age of about 20 days. The nest was depredated in May, probably by an avian predator. Soon after a second nest was initiated by the pair. The female continued to incubate the nest until the first week of June when it was abandoned. The nest contained three eggs when it was checked on June 18. During the next visit to the nest the eggs were not present. The Aplomado falcon pair has been seen in Simpson Draw in August.

Nest Site Characteristics

Nest site characteristics were identified and measured after Aplomado Falcon activity in the vicinity of the nest ceased. The techniques used were those employed in Chihuahua at Aplomado falcon nests (pers. comm., Kendall Young, New Mexico Coop. Fish and Wildl. Res. Unit., Las Cruces, NM). The following characteristics were measured at each nest site.

Nest substrate	description/plant species identification
	dimensions including height, length, width, and depth.
Nest	location - (diff. corrected UTMs)
	dimensions including height, width, depth, cup diameter and depth
	materials used to construct it
	bird species that built it
Habitat	woody plant composition, density and cover
	herbaceous ground cover and species composition
	grass height

The vegetation sampling scheme involved three 300 m transects originating from the nest substrate. A random azimuth was selected for the first line while the other two were set at 120° from the original transect. Basal cover and plant species composition were estimated using the Step-point method (Evans and Love 1957). Step point data and grass height were collected at each meter mark on the three transects. Woody plant density and cover were calculated for a 2m width strip along each transect.

Surveys

Ten of 12 Aplomado falcon surveys have been completed in southwestern New Mexico in 2001. There were no Aplomado falcons detected on the survey routes. Effort was concentrated in and around the location of the Aplomado falcon pair being monitored. Most surveys followed routes established in 2000 during the Aplomado falcon survey and habitat assessment project (Meyer 2000). The U.S. Fish and Wildlife Service's interim survey methodology was used in surveys. Survey points were located at about 1 km intervals along routes. At each stop the observer exited the vehicle and scanned the surroundings for at least 3 minutes with binoculars (10x42) searching for birds perched or in flight. Occasionally, a spotting scope (20-60x) was used for long distance bird identification. Most surveying was conducted during mornings and late afternoon-early evening, especially in areas with increased likelihood of detecting Aplomado Falcons. Some surveys were continued during the afternoon on days when conditions were suitable, i.e., calm winds, cool temperatures, overcast skies. Inclement weather (i.e., winds above 16 kph or precipitation) precluded surveys. All raptors and ravens detected on survey routes were recorded. Nests constructed by buteos, ravens and possibly kites were also noted.

It is possible that additional Aplomado falcons were present in the general area. A single bird was noticed during the fall of 2000 about 6 miles from the location where two Aplomado falcons were seen the night before at dusk. Other sightings of Aplomado falcons in the vicinity have been reported by BLM employees in 2000 and 2001. However, there has been no confirmation of additional birds other than the pair that was monitored.

La Tierra Environmental Consulting
226 W. Willoughby
Las Cruces, NM 88005
(505)541-5853
latierra@qwest.net

Sep 6, 2001

John Sherman
Wildlife Management Biologist
USDA Bureau of Land Management
620 E. Green
Carlsbad, NM 88220

Dear John,

Please find attached the report entitled, "Aplomado Falcon Habitat Evaluation in the Carlsbad Resource Area, New Mexico, for the Bureau of Land Management, 2001 " and an invoice for services provided. I hope the report meets your expectations, but if it requires major alterations, we can discuss what is needed. There may be some specific areas I omitted that you want mentioned. Otherwise, review and send comments and revisions to me for final report preparation. There may be more appropriate terms or names for areas and habitat generalizations that may need changes. I will be unavailable June 30 - July 14.

If you require assistance with additional projects related to assessing habitat, such as nest availability and avian prey base evaluation, I will be glad to help. Thank you for the opportunity to assist with your efforts. If you have any questions or need further information please contact me.

Sincerely,
Raymond Meyer
Principal

APLOMADO FALCON HABITAT EVALUATION IN THE CARLSBAD RESOURCE AREA, NEW MEXICO, FOR THE BUREAU OF LAND MANAGEMENT, 2001

INTRODUCTION

In the U.S., the Northern aplomado falcon (*Falco femoralis septentrionalis*) was found in a variety of open grassland and savannah habitats (Blake 1977, Hector 1981, Keddy-Hector 1990). In the Chihuahuan Desert the Aplomado falcon inhabited yucca and mesquite grasslands and riparian woodlands adjacent to desert grassland (Ligon 1961, Keddy-Hector 1990, Montoya 1995). Because of its decline and loss as a breeding bird in the U.S., the Northern aplomado falcon was listed as an endangered species in 1986 by the U.S. Fish and Wildlife Service (Federal Register 1986, 51:6686- 6690).

Since the last documented U.S. Aplomado falcon nest in 1952, occasional sightings of birds have been reported in southwestern U.S., but sightings have increased in recent years (Williams 1997). Breeding populations exist less than 200 km from the U.S. border in New Mexico. Recent surveys in the border region have detected individuals even closer. In addition, there soon may be releases of captive reared Aplomado falcons in west Texas and southern New Mexico.

PURPOSE

To identify Aplomado falcon breeding habitat in the southeastern part of New Mexico where attention, management, and further research should be directed.

METHODS

The project was conducted on June 19 and 20, 2001, in southeastern New Mexico primarily on Bureau of Land Management administered Lands within the Carlsbad Resource Area. Lands within the survey area were evaluated for the potential to support breeding Aplomado falcons. Individual Aplomado falcons have been observed in a wide variety of habitat types, however, territorial pairs have a much narrower habitat breadth. In the Chihuahuan Desert, Aplomado falcons typically inhabit productive basins or swales consisting of large open grasslands with scattered tall yuccas and/or shrubs that provide perching and nesting sites. In or adjacent to some Aplomado falcon territories are patches of shrub land or dense yuccas. Core populations in Chihuahua are centered around large tracts of late seral stage grasslands. The falcons are located in mostly large patches of habitat with relatively low levels of human activity and few developments, i.e., roads, buildings, etc. Areas occupied by Aplomado falcons in New Mexico and Chihuahua, Mexico and available literature were used as references for the evaluation.

Habitat assessment was general and qualitative. It was performed mostly by observing potential habitat from a vehicle. Occasionally, stops were made to study particular features more closely. The evaluation was based mainly on geomorphology, soils, vegetation structure, and potential prey base. With respect to vegetation structure, woody plant composition, density and height, grassland community type and condition, and nest availability were considered as key factors in the evaluation.

HABITAT ASSESSMENT

Based on the general habitat model, those areas visited within the Carlsbad District were considered marginal Aplomado falcon habitat at the present time. This generalization was based on several factors. Firstly, this area represents the northernmost extremity of the Aplomado falcons historical range. Therefore, falcon density was dependent on optimum conditions of the habitat and probably was variable but low. Also, most of the surveyed lands possessed very low densities of potential nest sites (i.e., tall yuccas or shrubs and trees) in open grasslands or nests were located in unsuitable habitat. Availability of usable nests is a critical habitat requirement for Aplomado falcons. In northern Chihuahua, Mexico, breeding falcons relied on stick nests constructed by Chihuahuan ravens and buteos primarily in yuccas and mesquite trees (Montoya 1995, Young 2001). On Otero Mesa in Otero County, New Mexico, nest site availability was measured at 0.33 nests/km^2 and 0.25 nests/km^2 (Meyer 1996, Meyer and Tafanelli 1999). There are no quantitative measures of potential nest site density in habitat occupied by Aplomado falcons, but based on a visual assessment higher densities were observed in occupied areas.

Occurrences and processes in the past 200 years have altered potential habitat within this portion of the Aplomado falcon 's historical range. It has been estimated that the populations of many bird species of the North American grasslands have been reduced by 90% in the past 200 years as a result of human activities. In addition, intensive grazing has occurred over most grasslands in western U.S. since the late 1800's affecting the resident grassland bird populations. It follows that the sharp decline of potential avian prey species in southwestern grasslands would influence Aplomado falcon persistence in the northern periphery of its range.

Shrub invasion has occurred over a majority of what were once open grasslands within the region reducing available habitat. This has not only reduced the amount of potential habitat for grassland obligate species such as the Aplomado falcon, but it also has isolated the remaining grasslands. Small, isolated habitat patches are less likely to be occupied than large, contiguous areas.

Increasing developments related to oil and gas industries have further degraded and fragmented grasslands. Along with all of the disturbance to the land accompanying these industries, there is a relatively high level of human activity not conducive to the success of sensitive raptor species. Residential and agricultural developments have reduced open grasslands in southeastern New Mexico, especially in productive flood plains and basins.

Prolonged and intensive livestock grazing appears to have further reduced Aplomado falcon habitat suitability. Deleterious effects of erosion, soil degradation, changes in grassland cover and species composition have all occurred. These long-term effects have not only affected the vegetation structure but probably have limited potential avian prey populations for the Aplomado falcon.

It is important to note that the habitat evaluation was based on comparisons with areas occupied by Aplomado falcons in Chihuahua, and southwestern New Mexico where different conditions, such as geomorphology, soils, and climate, exist. Secondly, this habitat evaluation was conducted during a period of drought that has persisted in the area for successive years. Range condition and the avian prey base can change dramatically with climatic conditions. Areas that appear structurally marginal with respect to vegetation, possibly have greater potential when

above average precipitation is received.

SPECIFIC SURVEY AREAS

Structural conditions were considered good if there was open grassland containing a low shrub density, but with scattered, taller woody plants for perching, hunting, and nesting. Assessment of grassland condition included the amount of herbaceous ground cover, grass species composition, evidence of erosion, and woody plant density.

West Side and Carlsbad Area 06/19/01

Areas most similar to those inhabited by Aplomado falcons were observed adjacent to the Pecos River on the west side of the river in the vicinity of Artesia. Drainages originating from the Sacramento Mountains to the west broaden and become relatively flat swales or flood plains as they approach the Pecos River Valley. These lowlands have deep loamy productive soils, sometimes with taller yuccas and shrubs. Large, undisturbed tracts fitting this description were considered the mostly likely areas to be inhabited by Aplomado falcons. One example of this situation was observed in a portion of Fourmile Draw. It consisted of a large bottomland of open tobosa dominated grassland with very few woody plants, mostly taller yuccas. Patches of riparian shrub occurred adjacent to the grassland. Further north, a stretch of Eagle Creek was evaluated. Apart from the apparent lack of potential nest sites the basic gestalt of the area looked like Aplomado falcon habitat. Cholla density was high in some areas reducing habitat suitability. Again, the broader and flatter stretch of the drainage to the east was more favorable as habitat.

Further west approaching the Sacramento Mountains, there were extensive open grasslands, however, there was a noticeable lack of taller arborescent plants. The drainages were narrow with steeper sides. The relatively large amount of topographic relief generally is not associated with Aplomado falcon habitat. Nests may be present in the drainages, however, raven and hawk abundances seemed low. With increasing elevation the suitability of Aplomado falcon habitat probably decreases, especially for birds attempting to maintain perennial territories. The Dunken area was visited and assessed. Although the presence of a large, open grassland was promising, the higher elevation and lack of taller shrubs and trees made habitat suitability marginal. However, this area and the adjacent Russell Gap may be important as a corridor for movements of Aplomado falcons and other grassland birds.

East Side 06/20/01

To the east of Artesia and Carlsbad there was increased development associated with the oil and gas industries. Conversion of grasslands to shrub lands also was more apparent. These conditions have resulted in reduction and isolation of open grasslands. Indian flats, east of Carlsbad, was evaluated. In addition to the above condition, most arborescent vegetation was too low for ravens and raptors and the density of available nests was low in the area.

The Burton Flat Area, north of Carlsbad, was evaluated. Soils were gypseous and alkali with open grasslands dominated by gyp grama and alkali sacaton. Taller mesquites were present in bottom lands that were potential nesting sites for ravens and raptors. This habitat type is not present in areas occupied by Aplomado falcons, however, the general physiognomy of the vegetation was similar to that of habitat occupied by Aplomado falcons and in periods with

abundant precipitation, an adequate prey base may be present to support the falcons. Basins with greater productivity, such as Alkali Lake and the Nakee Ishee Lakes historically may have had higher habitat suitability, however, shrub and salt cedar invasion have occurred in these areas.

Further east in the area of Mescalero Sands and south below the cap rock, soils become more sandy in the uplands with dominant vegetation including honey mesquite, shinnery oak and associated grasses. Bottom lands and basins are mostly alkaline. This eastern area below the cap rock has the highest density of potential nests for Aplomado falcons. However, shrub invasion, especially, mesquite has occurred over vast portions of the area. In addition, the productivity and hence prey base may not be adequate, especially during drought conditions. Areas of mesquite savannah occurred in the landscape, but they were small and isolated. Oil and gas developments have made extensive tracts unsuitable habitat for species that require large areas of habitat or are sensitive to human disturbance.

As with grasslands in gypseous soils, grassland communities in sandy soils are not occupied by breeding Aplomado falcons in southwestern New Mexico or Chihuahua. These areas should be evaluated in periods when average or above average precipitation. Also, scattered playas in the eastern portion of the resource area can have high numbers of potential avian prey and could be further evaluated as Aplomado falcon habitat during certain times of the year.

Most of the Carlsbad Resource Area south of Carlsbad is dominated by shrublands with very limited grasslands. As such, there is little potential for Aplomado falcon habitat. Still, Aplomado falcons may show up in productive areas such as the margins of agricultural fields or abandoned fields along the Black River.

CONCLUSIONS AND RECOMMENDATIONS

- Habitat for breeding Aplomado falcons is mostly marginal in the Carlsbad District. Habitat types identified to be most suitable as Aplomado falcon habitat were identified in southeastern New Mexico: large tracts of open grassland or grassland savannah with loamy productive soils in broad, flat lowlands located east of the Pecos River. Generally, range condition was thought to be poorer relative to climax grasslands found in Aplomado falcon core breeding areas in Chihuahua, however, the survey was conducted in a period of drought.

- Undisturbed and unfragmented open grasslands (with low shrub cover) are limited in southern New Mexico. The value of grasslands identified as marginal Aplomado falcon breeding habitat should not be underestimated. These communities may serve as habitat for dispersing individuals and corridors for movements between more suitable habitat. The more fragmented and isolated habitat patches become, the less likely that they will be colonized. The grasslands also are important as habitat for other grassland obligate species including declining grassland birds.

- Open grassland habitat types in gypseous and sandy soils, east of the Pecos River are not represented in vegetation communities currently occupied by Aplomado falcons

elsewhere. These areas should not be precluded as potential habitat, however. Further investigation of nest site availability and avian prey base may provide important information pertaining to the suitability of these areas.

- Management for Aplomado falcons should focus on the maintenance and protection of productive grasslands free of shrub encroachment and intensive human activities. Monitoring and addressing the effects of reduction, fragmentation, and degradation of these grasslands should be of primary concern for land management agencies. Restoration of grasslands in productive flood plains and swales through control and reduction of woody plants in areas of otherwise suitable habitat should be considered to increase availability of habitat not only for the Aplomado falcon but for other open grassland species, many of which are experiencing declines.

- It is the opinion of this author that, based on experience with the Aplomado falcon's habitat requirements, current BLM regulations and guidelines regarding the density of oil and gas developments are insufficient. Oil and gas developments, as they exist in much of the Carlsbad district, in otherwise suitable habitat would preclude the presence of breeding Aplomado falcons.

- The condition of grasslands and the associated avifauna may be crucial to the persistence of the Aplomado falcon in xeric grassland habitats. Optimizing range conditions for potential avian prey species is another important approach to enhancing Aplomado falcon habitat suitability.

- Research efforts should be directed toward evaluating nest site availability and available prey base in potential habitat types. Data pertaining to avian prey base is available from areas occupied by Aplomado falcons in southwestern New Mexico and Chihuahua, Mexico.

- Currently, two Aplomado falcon habitat suitability models - one by the New Mexico Fish and Wildlife Cooperative Research Unit at New Mexico State University and the other by Geo-Marine, Inc. for the U.S. Air Force - are being constructed for application in the historical range of the species. These should be available for use in the near future.

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INVOICE

DATE: 26 June 2001
INVOICE NUMBER: 01-BLMC01
PERIOD OF PERFORMANCE: 06/19/01 - 06/26/01
CONSULTANT SERVICES

Aplomado falcon habitat assessment	2 days@ 200.00	$ 400.00
Mileage	416 miles @ 0.33	$ 137.28
Per diem	1 overnight @ 70.00	$ 70.00

TOTAL $ 607.28

RAYMOND MEYER

Memo

To: Area Manager, Caballo R.A.
From: Area Biologist, Caballo R.A.

Subject: Grazing Management, Migratory Birds, and Aplomado Falcon Habitat

I took the opportunity to review some of the recent and pertinent literature regarding the potential effects of livestock grazing on migratory birds specifically for the purpose of addressing impacts to EA's and ongoing grazing management activities. Migratory birds are a source of concern for several reasons. First, there has been a noted population decline in many species of our grassland birds. A review by the National Wildlife Federation (1997) indicated as many as 90% of the grassland bird species of the U.S. are declining. This decline has been variously attributed to loss and degradation of grassland habitats due to urban encroachment, large scale farming, and livestock grazing over the past 200 or so years and continues at present.

Activities on public land that contribute to this decline can contribute to listing under ESA. We already have the beginnings of grassland species listings occurring within the District with the consideration of Baird's sparrow, ferruginous hawk, loggerhead shrike, and the burrowing owl under consideration for listing (currently BLM Sensitive - former Category 2 Candidates for Federal Listing). Also, grassland birds are part of the food preferences of aplomado falcons. Due the requirement of ESA that federal actions avoid jeopardizing the continued existence of listed species and to proactively manage for recovery of listed species, the aplomado and other species listed in the future will, to a large degree, guide how we manage BLM desert grasslands. We can avoid increasing external control of our programs by ESA by proactively managing our grassland areas to avoid further listings. The following analysis is meant to lead toward that end.

Breeding Birds

I reviewed data available from the USGS BRD North American Breeding Bird Surveys. These are nation wide surveys that have been conducted annually for the past 30 years or so. Specifically, I reviewed trend data for 11 bird species in New Mexico and the Chihuahuan Desert, that are listed as prey items for aplomado falcons in Chihuahua, Mexico. These 11 species comprise about 77% of the diet of aplomado falcons. Table 1 summarizes the survey results for the past 30 years in 3 groups: all 30 years, the first 15 years, and the last 15 years. Results are recorded as annual % change in the population (the amount of change in 1 year, multiple years are additive). Statistically significant changes from 0 are indicated by an asterisk. Those data in a 15 yr period not showing a statistical trend may have meaning where they show a change markedly different from the other 15 year period data. The data show a divided trend when reviewed by area or species. In an effort to distinguish the trend as declining, stable, or increasing, I classified species that had consistent upward trends, some downward movement offset by upward movement changing the direction of a downward trend, or inconsistent ups and downs as stable or upward trend. I classified

those species that had consistent downward trends, or downward movement changing the direction of an upward trend as declining.

Of the 11 species 5 had stable or increasing populations trends. These species which comprise 30% of the aplomado diet included: western kingbirds, brown headed cowbirds, scotts orioles, pyrrhuloxias, and cactus wrens. The remaining 6 species, comprising 46% of the aplomado diet, had declining population trends. These species included meadowlarks (the preferred food source), common nighthawks, northern mockingbirds, mourning doves, and lark buntings. A notable occurrence was the significant upward trend of western meadowlarks in the Chihuahuan Desert that appeared to be decreased somewhat by a non-significant declining trend in the most recent 15 years. When compared to the New Mexico data which displayed a significant decline in the past 15 years, I called the species declining overall.

Wintering Birds

Raitt and Pimm (1976) studied the seasonal and annual fluctuations of bird numbers on the Jornada. They found that grasslands birds are most numerous during the migration and winter months and least numerous during the breeding season. Wintering birds are primarily seed eaters. Annual densities of birds in a given area fluctuate annually due to the availability of concentrated seed supplies. Factors affecting seed supply are competition from other species and decreased availability of food sources. This means that natural and man caused modifications of a particular area that decrease the seed source also decrease the use of the area by wintering small birds. Birds can obviously move to another area if appropriate densities of foods sources are available. Large scale regional reductions in suitability of habitat, ie. food availability, can cause large adverse affects to the species that use that habitat. The spatial distribution of areas with suitable seeds supplies, or other important factors, across the local landscape needs to be considered.

Aplomado Diet

When you look at the importance of aplomado prey items (Table 2) it becomes evident that some prey species are used by aplomados more than others. The ranking of prey items, 1-10, based on % of diet gives an idea of the individual importance of specific prey species. However, when you take a further step and compare the composition a species makes in the diet with how prevalent it is in the habitat, it gives a good idea of what the really important food items are. This is essentially the same idea as recognizing "ice cream plants" for grazing animals. I conducted this analysis and reported it in Table 2 as "Importance". When you look at the 34 species or groups in Table 2 it becomes evident that there are specific aplomado falcon diet preferences. Meadowlarks are the preferred food by virtue of their high percent of the diet and high occurrence in the habitat. Lark Buntings are listed as a Staple food item due to their high presence in the habitat, but not necessarily high diet importance. This is likely a sampling artifact due to observation of a few large flocks of lark buntings during migration (pers comm A. Montoya). The remaining species in the diet

appear to be taken opportunistically. Of interest is the fact that 6 of the 7 species that comprise greater than 6% of the diet are moderately sized birds. This suggests that there is a particular size of prey preferred by aplomados. This is likely due to the balancing of energy expenditures to capture prey versus the energy provided per prey captured. In short, aplomados are, at least in part, adapted to capturing certain size prey, and these are meadowlark size birds.

Montoya (pers. comm.) believes that the larger prey are most important during the breeding season (when bird densities are at their lowest as per Raitt and Pimm 1976). His personal observation, and hypothesis for ongoing studies, suggests that during the winter, aplomados key in on large flocks of small sparrow size birds that move into the area from the north. These large flocks of birds are noted in other studies regarding desert grasslands.

Otero Mesa Birds

Ft. Bliss has funded work regarding determination of suitability of Otero Mesa on McGregor Range as aplomado falcon habitat (Meyer 1997). The basis for the study was to compare expert (A. Montoya and B. Tafanelli) visual estimates of Otero Mesa habitat suitability against measured habitat variables on Otero Mesa against data from occupied habitat in Chihuahua. There are several interesting results. Statistical analysis on vegetation measurements (basal cover by pace point and wood plant density by point centered quarter) showed that while vegetation is similar there are some important differences between good habitat Otero Mesa and occupied habitat in Chihuahua. Woody plant densities are similar between the 2 areas, however the species composition of woody plants differs slightly, with yucca, creosotebush, and cholla being the dominants on the Otero Mesa, and mormon tea, yucca, and nolina dominant in Mexico. Basal cover of grasses was widely divergent between Mexico and Otero Mesa. Basal grass cover ranged from 16% to 20% on Otero Mesa, while Mexico had 43% basal grass cover. Dominant grasses in Mexico were gramas (53%), tobosa (20%), threeawns (13%), and dropseeds (12%). On Otero Mesa gramas (70%), tobosa (7%), muhlies (6%), and stipa (6%) were dominant. Similarity of vegetation (wood plant density and basal grass cover) between Mexico, Otero Mesa, and the Tularosa Basin was analyzed. In general, Otero Mesa fell between, was intermediate to, scores for Mexico and the Tularosa Basin containing a desert scrub community.

Analysis of bird survey data between Mexico and Otero Mesa revealed little difference between relative abundance of birds (12 detetections/25 ha. on Otero Mesa versus 11 detections/25 ha. in Mexico). However, analysis of detection data translated into biomass (to account for bird size) showed marked differences. Calculated biomass of birds in Mexico was 695 grams/site while Otero Mesa had 394 grams/site. Biomass of birds on Otero Mesa was roughly ½ to ⅔ of that in Mexico. The primary difference in species was attributed to the greater presence of meadowlarks in Mexico. Literature reviewed by Bock et al. 1992 (Table 3) supports the idea that many species of birds

are adversely (and conversely beneficially) affected by grazing activities. Meadowlarks, Baird's sparrow (BLM sensitive), grasshopper sparrow, and cassins sparrow are species adversely affected by heavy grazing pressure in shortgrass areas. Meyer noted that the bird community on Otero Mesa was comprised of species that respond favorably to grazing. Species such as Bairds Sparrow, grasshopper sparrow, and cassins sparrow, which require relatively higher, denser vegetation were not detected on transects and were only incidentally observed in certain swale areas containing suitable cover. In addition, he noted a lack of lark buntings which also require a greater amount of grass cover.

These data are considered preliminary due to collection during drought situations. There may be differences between the ecological sites of the 2 areas that have not been accounted for (rainfall and elevation are similar). However, it is suggested that grazing management within at least some of the occupied aplomado habitat in Chihuahua is more conservative than on McGregor Range. Given these conditions, similarities, and differences, the preliminary conclusions are valid. This conclusion is that grazing is likely reducing cover on Otero Mesa sufficiently to modify the small bird community. Other literature support the same general conclusion. The implications are that grazing potentially significantly affects small bird composition and abundance. Hence grazing indirectly can affect the suitability of aplomado habitat. Further work into this issue (ie. ours and other studies) will hopefully provide additional useable info to address the grazing issue. However, I believe there is sufficient information available to begin carefully addressing these issues.

Summary

Several general ideas regarding small birds and aplomado falcons are becoming evident:

1. Small birds are declining in the region.
2. Grazing affects the composition and cover of vegetation.
3. Composition and cover of vegetation affects the composition and biomass of small birds.
4. Grazing therefore affects small bird communities.
5. Meadowlarks and other dense grassland species are apparently lacking in the Otero Mesa area possibly due to low basal cover of grass attributed to grazing pressure.
6. The aplomado falcon has apparent prey preferences for at least some bird species sensitive to vegetation conditions, such as meadowlarks.

Recommendations

I strongly recommend that we begin to take a careful approach to management of our grassland areas from here forward to avoid future listing of grassland birds and to avoid increased influence of ESA in our activities. Continued blinders-on (us and them, wildlife vs range) and apathetic approaches to resource management will only serve to worsen our problems in the future. We can take prudent initial steps now to

ensure that we are adequately considering ongoing and new activities, and avoiding unneeded conflict in the future.

Table 1. Summary of North American Breeding Bird Survey Trend Data for 11 Aplomado Falcon Prey Species

		Annual % Change In Numbers								
		Chihuahuan Desert			New Mexico			FWS Region 2 (TX, NM, OK, AZ)		
Species	Diet Rank	1966-1979	1980-1996	30 yr	1966-1979	1980-1996	30 yr	1966-1979	1980-1996	30 yr
E Meadow Lark	1 Preferred	-13.8	-3.5**	-3.2*	-7.6	-2.1	-1.7			
W Meadow Lark	1 Preferred	14****	-1.9	9.2***	-0.2	-2.3***	-0.8			
Common Night Hawk	2	-0.4	0.5	-1.3	-3.8*	-1.6	-2.3*			
N Mockingbird	3	-1.4	-0.7	-1.1**	-3.6*	1.1*	-0.5			
W Kingbird	4	7.6*	-0.2	0.8	2.4	-0.2	0.1			
Brown Headed Cowbird	5	-3	1	0.7	4.7	-0.8	2.2**			
Scotts Oriole	6	2	4*	4*	12.4*	-0.5	1.2			
Mourning Dove	7	-3.6	-1.3	-2.4*	-0.2	-1.8**	-1.8			
Pyrrhuloxia	8	-2.5	5.6	0.9				-4.5**	2.8***	-1.1
Cactus Wren	9	3.3	0.4	0.4	-9.7	2.6	1.1			
Lark Bunting	Staple							0****	-10.9**	-8.1**

*** Indicates statistical significance of the change from 0. * = P <0.2, ** = P <0.1, *** = P<.05, **** = P<.01

Diet Rank - numeric rank is from Montoya & Zwank 1992, Text rank is from independent analysis of data from Montoya & Zwank

Table 2. Aplomado Falcon Diet Analysis From Montoya, Zwank, and Cardenas 1997

Species	Rank by % Diet	% of Diet	Diet Class	Bird Detections	Calculated % Occurrence	Reported % Occurrence	Occurrence Class	Importance
Chipping Sparrow		0	L	40	1.5		L	None
Blue Grosbeak		0	L	21	0.8		L	None
Lark Sparrow		0	L	20	0.8		L	None
Upland Sandpiper		0	L	18	0.7		L	None
Chihuahua Raven		0	L	17	0.7		L	None
Barn Swallow		0	L	14	0.5		L	None
Curve Billed Thrasher		0	L	9	0.3		L	None
Aplomado Falcon		0	L	4	0.2		L	None
White Winged Doved		0	L	7	0.3		L	None
House Finch		0	L	3	0.1		L	None
Brewers Blackbird		0	L	3	0.1		L	None
Burrowing Owl		0	L	3	0.1		L	None
Cassins Sparrow		0	L	310	12.0		M	None
Black Throated Sparrow		0	L	195	7.5		L	None
Horned Lark		0	L	123	4.7		L	None
Greater Roadrunner		1.2	L	0	0.0	0	L	Occasional
Hummingbirds		1.2	L	0	0.0	0	L	Occasional
Lark Bunting		<3	L	474	18.3		M	Staple
Loggerhead Shrike		<3	L	80	3.1		L	Occasional
Scaled Quail		<3	L	6	0.2		L	Occasional
Ash Throated Flycatcher		<3	L	4	0.2		L	Occasional
Says Phoebe		<3	L	4	0.2		L	Occasional
Canyon Towhee		<3	L	2	0.1		L	Occasional
American Kestrel		<3	L	1	0.0		L	Occasional
E & WMeadow Lark	1	19.5	H	920	35.5	35.78	H	Preferred
Common Night Hawk	2	9.8	M	7	0.3	0.04	L	Occasional
N Mockingbird	3	9.8	M	121	4.7	4.71	L	Occasional
W Kingbird	4	8.5	M	7	0.3	0.35	L	Occasional
Brown Headed Cowbird	5	7.3	M	0	0.0	0	L	Occasional
Scotts Oriole	6	7.3	M	49	1.9	1.91	L	Occasional
Mourning Dove	7	6.1	L	105	4.0	4.09	L	Occasional
Pyrrhuloxia	8	3.6	L	7	0.3	0.27	L	Occasional
Cactus Wren	9	3.6	L	10	0.4	0.39	L	Occasional
Unid Birds	10	8.5	M	10	0.4	0.39	L	Occasional
Totals		**86.4**		**2594**	**100**	**47.93**		

Importance Rating after Leopold (1933)

Diet Ratings
H=>11%
M=6.6-11%
L=<6.6%

Occurrence Ratings
H = 23.7% - 35.5
M=11.9% - 23.6%
L=0 - 11.8%

Diet Preferrence Rating
IceCream = H Diet - L Occurrence
Preferred = M,H Diet - H Occurrence
Staple = L, M, H Diet - M Occurence
Occassional = L,M Diet - L Occurence
Accidental = L Diet - H Occurence
None = Not in Diet

Table 3. Aplomado Falcon Prey Species (From Montoya & Zwank 1995) Response to Grazing by Habitat (From Bock et al. 1992)

Species	% Aplomado Diet	% Relative Occurence In Mexico	Grasslands	Riparian	Shrublands
Greater Roadrunner	1.2	0.0			
Hummingbirds	1.2	0.0			
Lark Bunting	<3	18.3	Negative to heavy grazing		Unresponsive or Mixed
Loggerhead Shrike	<3	3.1			
Scaled Quail	<3	0.2			
Ash Throated Flycatcher	<3	0.2			
Says Phoebe	<3	0.2			
Canyon Towhee	<3	0.1			
American Kestrel	<3	0.0			
E & WMeadow Lark	19.5	35.5	Negative to heavy grazing in other than tall grass habitats	Unresponsive or Mixed	Negative to grazing
Common Night Hawk	9.8	0.3	Positive		
N Mockingbird	9.8	4.7	Positive		
W Kingbird	8.5	0.3			
Brown Headed Cowbird	7.3	0.0	Unresponsive or Mixed	Positive	Positive
Scotts Oriole	7.3	1.9			
Mourning Dove	6.1	4.0	Unresponsive or Mixed	Unresponsive or Mixed	Unresponsive or Mixed
Pyrrhuloxia	3.6	0.3			
Cactus Wren	3.6	0.4			
Unid Birds	8.5	0.4			

belief that management actions on behalf of prairie dogs will provide a safety net for most prairie species. Such misleading assumptions weaken the scientific credibility of biologists and ultimately could hamper conservation efforts (Bury and Corn 1995). Furthermore, although managers must rely heavily on litmus tests like the keystone species concept to set conservation priorities, caution must be used to avoid misplaced emphasis on a single index of ecological integrity (Landres and others 1988).

Limitations not withstanding, there is sufficient evidence that prairie dogs are crucial to the structure and function of native prairie systems. In addition to their keystone role, prairie dogs have inherent value, and because of severe population declines, deserve protection in their own right (Wuerthner 1997). We believe that future control of prairie dogs, at least on public lands, should be weighed against potential loss of biological diversity and degradation of ecosystem integrity, as well as the loss of a unique part of our North American prairie heritage.

Acknowledgments

This paper evolved from ideas originally proposed by Fritz Knopf and discussions with participants of the Prairie Dog Conservation Round Table at the 1996 Society for Conservation Biology Meeting. Michael Bogan (mammals), Stephen Corn (herptiles), and Fritz Knopf and Beth Dillon (birds) kindly provided expert reviews of our classifications of associated species. We sincerely thank Dean Biggins, Jack Cully, James Detling, Steven Forrest, David Hayes, L. S. Hall, Robert Leachman, Brian Miller, and Julie Savidge for helpful reviews of this manuscript.

Appendix 1 Vertebrate species cited as associated with prairie dogs and evidence of dependence[a]

Species	Features of colonies used[b]	Citation[c]
a Data support at least one criterion for dependence		
Black-footed ferret *Mustela nigripes*	PD,BU	1, 8
Mountain plover *Charadrius montanus*	OV	2, 3, 7
Burrowing owl *Athene cunicularia*	BU	2, 3, 4, 6, 7, 8
Golden eagle *Aquila chrysaetos*	PD,OP	1, 2, 3, 7, 8
Ferruginous hawk *Buteo regalis*	PD,OP	2, 3, 4, 6, 7, 8
Horned lark *Eremophila alpestris*	OV	2, 3, 4, 6, 7, 8, 10
Deer mouse *Peromyscus maniculatus*	PV	1, 2, 3, 6, 8
Northern grasshopper mouse *Onychomys leucogaster*	PV	1, 3, 6, 8
Swift fox *Vulpes velox*	PD,OP	2, 8
b Abundance slightly higher on colonies compared to adjacent undisturbed grassland		
Killdeer *Charadrius vociferus*	OV	2, 3, 6, 7, 8, 10
Mourning dove *Zenaida macroura*	OV	2, 3, 4, 6, 7, 8
Barn swallow *Hirundo rustica*	PV	2, 3, 6, 7, 8, 10
White-footed mouse *Peromyscus leucopus*	PV	5
Onychomys arenarius	PV	9
c Abundance not significantly different between colonies and undisturbed grassland or abundance patterns mixed		
Western meadowlark *Sturnella neglecta*	PV	2, 3, 4, 6, 7, 8, 10
Common grackle *Quiscalus quiscula*	PV	6, 10
Thirteen-lined ground squirrel *Spermophilus tridecemlineatus*	PV	1, 2, 3, 4, 6, 8
Hispid pocket mouse *Perognathus hispidus*	PV	6, 8
Western harvest mouse *Reithrodontomys megalotis*	PV	6, 8
d Abundance higher on undisturbed grassland compared to colonies		
Upland sandpiper *Bartramia longicauda*	PV	2, 6, 7, 8
Common nighthawk *Chordeiles minor*	PV	2, 3, 7, 10
Grasshopper sparrow *Ammodramus savannarum*	PV	6, 7, 8
Lark bunting *Calamospiza melanocorys*	PV	2, 3, 6, 7, 10
Red-winged blackbird *Agelaius phoeniceus*		2, 6, 7, 8, 10
Desert cottontail *Sylvilagus audubonii*	PV	1, 2, 3, 4, 8, 9
Black-tailed jackrabbit *Lepus californicus*	PV	1, 2, 4, 8, 9
Ord's kangaroo rat *Dipodomys ordi*	PV	1, 2, 4, 8, 9
Plains harvest mouse *Reithrodontomys montanus*	PV	8
Prairie vole *Microtus ochrogaster*	PV	6, 8

Appendix 1 (Continued)

Species	Features of colonies used[b]	Citation[c]
c. No published comparative abundance data		
Tiger salamander *Ambystoma tigrinum*	BU, TP	2, 3
Plains spadefoot toad *Scaphiopus bombifrons*	TP	2
Couch's spadefoot toad *Scaphiopus couchi*	TP	2
Green toad *Bufo debilis*	TP	2
Texas toad *Bufo speciosus*	TP	2
Woodhouse's toad *Bufo woodhousei*	TP	2
Great plains toad *Bufo cognatus*	TP	8
Chorus frog *Pseudacris triseriata*	TP	3, 8
Great plains narrow-mouthed frog *Gastrophryne olivacea*	BU, TP	2
Yellow mud turtle *Kinosternon flavescens*	TP	2
Ornate box turtle *Terrapene ornata*	PV	2, 4
Prairie rattlesnake *Crotalus viridis*	PD, OP, BU	
Western diamondback rattler *Crotalus atrox*	PD, OP, BU	1, 2
Mohave rattlesnake *Crotalus scutulatus*	PD, OP, BU	9
Lesser earless lizard *Holbrookia maculata*	PV	2, 4
Eastern fence lizard *Sceloporus undulatus*	BU	2
Texas horned lizard *Phrynosoma cornutum*	BU, PV	2, 4
Short-horned lizard *Phrynosoma douglassi*	PV	3
Texas spotted whiptail *Cnemidophorus gularis*	BU, PV	2
Little striped whiptail *Cnemidophorus inornatus*	BU, PV	4
Racerunner *Cnemidophorus sexlineatus*	BU, PV	2
Gopher snake *Pituophis melanoleucus*	BU, PV	2, 3
American avocet *Recurvirostra americana*	TP	7
Lesser golden plover *Pluvialis dominica*	OV, TP	2
Marbled godwit *Limosa fedoa*	TP	7
Long-billed curlew *Numenius americanus*	SV, TP	2, 6, 7, 8, 10
Willet *Catoptrophorus semipalmatus*	TP	7
Greater yellowlegs *Tringa melanoleuca*	TP	7
Lesser yellowlegs *Tringa flavipes*	TP	7
Wilson's phalarope *Phalaropus tricolor*	TP	7, 8
Long-billed dowitcher *Limnodromus scolopaceus*	TP	8
Baird's sandpiper *Calidris bairdi*	OV, TP	2
Buff-breasted sandpiper *Tryngites subruficollis*	OV, TP	2
Turkey vulture *Cathartes aura*	PD, OP	2, 6, 8, 10
Bald eagle *Haliaeetus leucocephalus*	PD, OP	2, 8
Mississippi kite *Ictinia mississippiensis*	OP	2, 10
Northern harrier *Circus cyaneus*	OP	1, 2, 3, 6, 7, 8
Prairie falcon *Falco mexicanus*	OP	1, 2, 3, 6, 7, 8
Sharp-shinned hawk *Accipiter striatus*	OP	7
Red-tailed hawk *Buteo jamaicensis*	PD, OP	1, 2, 3, 6, 8, 9
Swainson's hawk *Buteo swainsoni*	PD, OP	2, 3, 4, 6, 7, 8, 9, 10
Rough-legged hawk *Buteo lagopus*	PD, OP	1, 2, 8
Crested caracara *Polyborus plancus*	PD, OP	9
American kestrel *Falco sparverius*	OP	2, 3, 4, 6, 7, 8, 9, 10
Merlin *Falco columbarius*	OP	7, 8, 10
Lesser prairie chicken *Tympanuchus pallidicinctus*	OV	2
Sharp-tailed grouse *Tympanuchus phasianellus*	OV	1, 6, 7, 8
Sage grouse *Centrocercus urophasianus*	OV	3, 7
Northern bobwhite *Colinus virginianus*	PV	2
Scaled quail *Callipepla squamata*	PV	2, 10
Great horned owl *Bubo virginianus*	OP	3, 6
Snowy owl *Nyctea scandiaca*	PD, OP	8
Northern flicker *Colaptes auratus*	PV	2, 7, 8
Eastern kingbird *Tyrannus tyrannus*	PV	2, 6, 7, 8, 10
Western kingbird *Tyrannus verticalis*	PV	2, 3, 6, 7, 8, 10
Cassin's kingbird *Tyrannus vociferans*	PV	10
Scissor-tailed flycatcher *Tyrannus forficatus*	PV	2
Say's phoebe *Sayornis saya*	PV	6, 8

Appendix 1. (Continued)

Species	Features of colonies used[b]	Citation[c]
Violet-green swallow *Tachycineta thalassina*	PV	8
N. rough-winged swallow *Stelgidopteryx serripennis*	PV	6, 8
Cliff swallow *Hirundo pyrrhonota*	PV	2, 3, 7, 8, 10
Black-billed magpie *Pica pica*	PV	3, 7, 8
Chihuahuan raven *Corvus cryptoleucus*	PV	2, 10
American crow *Corvus brachyrhynchos*	OP	2, 6, 8, 10
Common raven *Corvus corax*	OP	8
American robin *Turdus migratorius*	PV	7, 8
Northern shrike *Lanius excubitor*	OP	8
Loggerhead shrike *Lanius ludovicianus*	OP	2, 3, 6, 7, 8, 10
Northern mockingbird *Mimus polyglottos*	PV	2, 8, 10
Sage thrasher *Oreoscoptes montanus*	PV	7
Curved-billed thrasher *Toxostoma curvirostre*	PV	4, 10
Water pipit *Anthus spinoletta*	PV	8
Sprague's pipit *Anthus spragueii*	PV	2
Rufous-sided towhee *Pipilo erythrophthalmus*	PV	8
Baird's sparrow *Ammodramus bairdii*	PV	7
Vesper sparrow *Pooecetes gramineus*	PV	2, 3, 7, 8, 10
Savannah sparrow *Passerculus sandwichensis*	PV	2, 3, 7
Lark sparrow *Chondestes grammacus*	PV	2, 4, 7, 8, 10
Cassin's sparrow *Aimophila cassinii*	PV	10
Chipping sparrow *Spizella passerina*	PV	8
Brewer's sparrow *Spizella breweri*	PV	7
Slate-colored junco *Junco hyemalis*	PV	8
White-crowned sparrow *Zonotrichia leucophrys*	PV	8
Chestnut-collared longspur *Calcarius ornatus*	OV	2, 3, 6, 7, 8
McCown's longspur *Calcarius mccownii*	OV	2, 3, 7, 8
Lapland longspur *Calcarius lapponicus*	PV	2
Snow bunting *Plectrophenax nivalis*	PV	3
Dickcissel *Spiza americana*	PV	8
Bobolink *Dolichonyx oryzivorus*	PV	8
Eastern meadowlark *Sturnella magna*	PV	2
Brewer's blackbird *Euphagus cyanocephalus*	PV	2, 7, 8
Brown-headed cowbird *Molothrus ater*	PV	2, 3, 7, 8
Boat-tailed grackle *Quiscalus major*	PV	2
Pine siskin *Carduelis pinus*	PV	8
American goldfinch *Carduelis tristis*	PV	8
Eastern mole *Scalopus aquaticus*	PV	2
Eastern cottontail *Sylvilagus floridanus*	PV	8
White-tailed jackrabbit *Lepus townsendii*	PV	1, 3, 7, 8
Least chipmunk *Eutamias minimus*	PV	3
Spotted ground squirrel *Spermophilus spilosoma*	PV	2
Northern pocket gopher *Thomomys talpoides*	PV	8
Plains pocket gopher *Geomys bursarius*	PV	2, 4, 8
Olive-backed pocket mouse *Perognathus fasciatus*	PV	3, 8
Silky pocket mouse *Perognathus flavus*	PV	9
Southern plains woodrat *Neotoma micropus*	PV	2, 4
Coyote *Canis latrans*	PD,OP	1, 2, 3, 4, 7, 8
Red fox *Vulpes fulva*	OP	3, 7, 8
Long-tailed weasel *Mustela frenata*	PD,OP	3, 4, 8
Badger *Taxidea taxus*	PD,OP	1, 2, 3, 4, 7, 8
Spotted skunk *Spilogale putorius*	OP	8
Striped skunk *Mephitis mephitis*	OP	2, 3, 8
Bobcat *Lynx rufus*	PD,OP	1, 2, 8
Elk *Cervus elaphus*	PV	7
Mule deer *Odocoileus hemionus*	PV	3, 7, 8
White-tailed deer *Odocoileus virginianus*	PV	8
Pronghorn *Antilocapra americana*	PV	1, 3, 4, 7, 8
Bison *Bison bison*	PV	1, 2, 8

Appendix 1 (Continued)

	Species	Features of colonies used[b]	Citation[c]
f	Life history information indicates accidental species		
	Northern leopard frog *Rana pipiens*	3	
	Western toad *Bufo boreas*	3	
	Bullfrog *Rana catesbeiana*	8	
	Sagebrush lizard *Sceloporus graciosus*	3, 4	
	Chihuahua spotted whiptail *Cnemidophorus exsanguis*	4	
	Plains garter snake *Thamnophis radix*	8	
	Smooth green snake *Opheodrys vernalis*	8	
	Common garter snake *Thamnophis sirtalis*	3	
	Eared grebe *Podiceps nigricollis*	7	
	Pied-billed grebe *Podilymbus podiceps*	7	
	White pelican *Pelecanus erythrorhynchos*	7	
	Double-crested cormorant *Phalacrocorax auritus*	7	
	Black-crowned night heron *Nycticorax nycticorax*	7	
	Great blue heron *Ardea herodias*	7, 8	
	Trumpeter swan *Cygnus buccinator*	8	
	Snow goose *Chen caerulescens*	2	
	Canada goose *Branta canadensis*	7, 8	
	Mallard *Anas platyrhynchos*	6, 7, 8	
	Gadwall *Anas strepera*	7, 8	
	Ruddy duck *Oxyura jamaicensis*	7	
	Green-winged teal *Anas crecca*	3, 7	
	American wigeon *Anas americana*	7	
	Northern pintail *Anas acuta*	6, 7, 8	
	Northern shoveler *Anas clypeata*	8	
	Blue-winged teal *Anas discors*	6, 7, 8	
	Canvasback *Aythya valisineria*	8	
	Redhead *Aythya americana*	7	
	Lesser scaup *Aythya affinis*	7	
	Sora *Porzana carolina*	6, 8	
	American coot *Fulica americana*	7	
	Ring-billed gull *Larus delawarensis*	7, 8	
	Herring gull *Larus argentatus*	7	
	California gull *Larus californicus*	7	
	Belted kingfisher *Ceryle alcyon*	8	
	Red-headed woodpecker *Melanerpes erythrocephalus*	8	
	Downy woodpecker *Picoides pubescens*	8	
	Ladder-backed woodpecker *Picoides scalaris*	2	
	Blue Jay *Cyanocitta cristata*	8	
	Eastern bluebird *Sialia sialis*	8	
	Mountain bluebird *Sialia currucoides*	7, 8	
	Gray catbird *Dumetella carolinensis*	8	
	Yellow warbler *Dendroica petechia*	8	
	Common yellowthroat *Geothlypis trichas*	8	
	Yellow-breasted chat *Icteria virens*	8	
	Yellow-headed blackbird *Xanthocephalus xanthocephalus*	6, 7, 8	
	Bullock's oriole *Icterus bullockii*	2	
	Western tanager *Piranga ludoviciana*	8	
	Common redpoll *Carduelis flammea*	8	
	Richardson's ground squirrel *Spermophilus richardsonii*	7	
	Porcupine *Erethizon dorsatum*	8	
	Raccoon *Procyon lotor*	2, 3, 8	
	Mink *Mustela vison*	3, 8	
g	Domestic or introduced species		
	Gray partridge *Perdix perdix*	7	
	Ring-necked pheasant *Phasianus colchicus*	8	
	Rock dove *Columbia livia*	2, 6, 8, 10	
	European starling *Sturnus vulgaris*	2, 6, 7, 8	

Appendix 1 (Continued)

Species	Features of colonies used[b]	Citation[c]
House sparrow *Passer domesticus*		2, 6, 8
Norway rat *Rattus norvegicus*		8
House mouse *Mus musculus*		6, 8
Domestic horse *Equus caballus*		3, 7
Domestic cattle *Bos taurus*		3, 7
Domestic sheep *Ovis aries*		3, 7

[a]See Table 1 for definitions.

[b]PD = prairie dogs as prey or carrion, OP = other vertebrate prey or carrion found on colonies, BU = burrows for nesting/shelter, OV = open vegetation or bare ground for nesting/foraging, PV = prairie vegetation for nesting/foraging, TP = temporary pools for breeding/foraging.

[c]1, Koford 1958; 2, Tyler 1968; 3, Campbell and Clark 1981; 4, Clark and others 1982; 5, O'Meilia and others 1982; 6, Agnew and others 1986; 7, Reading and others 1989; 8, Sharps and Uresk 1990; 9, Mellink and Madrigal 1993; 10, Barko 1996.

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Exhibit 4: BLM Grazing Allotment Data.

Table 1: Potential Aplomado Habitat on Public Land Grazing Allotments (according to mapping modeled on Exhibit 5 and BLM EAs)

Allotment Name	State	Allotment No.	Acreage	Yucca Present
SEVEY	AZ	3077	1651	
COOPER RANCH	AZ	5013	12143	
TEE	AZ	6128	12704	
DEEP WELL	AZ	6211	320	Yes
CROWDER-WEISSER	AZ	3022	224504	Yes
NORTH CERRO HUECO	AZ	6134	1280	Yes
Total Acres in Arizona			252,602	
Total Acres with Yucca on Allotment			225,784	
SILVER CREEK	NM	136	5471	
MONTICELLO CANYON	NM	146	480	
KINSELY CANYON	NM	147	539	
WAHOO RANCH	NM	148	7219	
SAN IGNACIO	NM	155	744	
CORDOVA RANCH	NM	447	6649	
MAVERICK FLAT	NM	1004	2180	
MOUNT BALDY	NM	1005	920	
BLUE CREEK	NM	1007	10092	
WHITMIRE PASS	NM	1008	5411	
SAN SIMON CIENEGA	NM	1009	16890	
STEINS MOUNTAIN	NM	1010	10459	
COPPER CANYON	NM	1011	895	
THOMPSON CANYON	NM	1015	13270	
ROUGH CREEK	NM	1017	2892	
PRATT	NM	1018	2400	
PRATT PEAK	NM	1019	3756	
BIG CAT RANCH	NM	1020	12240	
COTTONWOOD SPRINGS	NM	1022	3200	
TRUESDALE CANYON	NM	1023	2124	
SHAKESPEARE RANCH	NM	1024	6580	
RAINBOW WASH	NM	1025	20605	
GOLD HILL CANYON	NM	1026	11626	
WOOD CANYON	NM	1027	5513	

RILEY SPRINGS	NM	1029	960
ELDERBERRY CANYON	NM	1033	240
RAFTER JL	NM	1034	17714
DOUGLAS HIWAY	NM	1035	2460
CARLISLE	NM	1037	16300
MARTIN PLACE	NM	1039	1257
BASS DRAW	NM	1040	23323
BOBCAT HILL	NM	1042	4761
GOAT CANYON	NM	1043	480
GRANITE GAP	NM	1044	9519
CANADOR PEAK	NM	1045	880
BRUSHY MOUNTAIN	NM	1047	12875
CEDAR MOUNTAIN	NM	1048	11143
REDROCK CANYON	NM	1051	4305
ANTELOPE PASS	NM	1052	4192
SWALLOW FORK PEAK	NM	1057	5583
MUD SPRINGS RANCH	NM	1059	33023
ROAD FORKS	NM	1060	6186
ANTELOPE CROSSING	NM	1063	10891
HOT WELLS	NM	1065	800
COWBOY RIM	NM	1066	3840
PLAYA	NM	1068	11738
THREE MILE HILL	NM	1069	2950
LAVA FLOW	NM	1070	5793
WEATHERBY RANCH	NM	1071	3543
GARY SIDING	NM	1072	3474
REDROCK	NM	1075	760
BROCKMAN HOMESTEAD	NM	1077	2081
MONDEL FLATS	NM	1079	1040
YOUNG PLACE	NM	1080	60
RACCOON PLACE	NM	1081	9831
CHINA POND	NM	1082	7000
CURRY PLACE	NM	1085	2790
BURRO SPRINGS	NM	1086	16954
HORSE TRAP	NM	1087	410
HARLESS RANCH	NM	1251	7346

SILVER ROAD	NM	1252	14744
SAND SAGE	NM	1253	3107
BORDO ATRAVESADO	NM	1254	20857
BOSQUECITO	NM	1255	4628
LLANO	NM	1256	4250
FOUR HILLS	NM	1259	6132
SIERRA LARGA	NM	1260	12608
SCOTT RANCH	NM	1261	19794
LAS CANAS	NM	1262	12312
BLACK MESA	NM	1263	8583
ARMIJO COMMUNITY	NM	1264	8170
COYOTE SPRING	NM	1266	11548
RYAN HILL	NM	1268	1389
TORREON COMM	NM	1269	25237
MILLIGAN GULCH	NM	1270	5331
MESA REDONDA	NM	1271	9207
SAN PASQUAL	NM	1272	13012
BRUTON RIVER	NM	1273	6406
ROCK CREEK	NM	1274	3690
OSCURA	NM	1275	33494
SAN JOSE CANYON	NM	1277	16987
ANAYA WELL	NM	1278	2940
SILVER CANYON	NM	1279	13653
TECOLOTE DRAW	NM	1280	15939
SO RANCH	NM	1281	3610
BINGHAM	NM	1282	320
BLACKINGTON MOUNTAIN	NM	1283	10863
MESA WELL CANYON	NM	1284	8820
SAND MOUNTAIN	NM	1285	21230
BLACKINGTON MTN WEST	NM	1286	5793
ARROYO DEL TAJO	NM	1287	4320
RIO GRANDE	NM	1288	4405
JORNADA COMMUNITY	NM	1289	9214
ROCK SPRINGS CANYON	NM	1290	7729
PRAIRIE SPRINGS	NM	1291	9155
CHAUNTE CANYON	NM	1292	4245

PIPE RANCH	NM	1295	8425
ANTELOPE WEST	NM	1296	2707
PUERTECITO DEL LEMIT	NM	1297	14913
WINEGLASS	NM	1298	2873
PEQUENO	NM	1299	11025
CASAS DE PIEDRAS	NM	1300	1600
WHITE SAGE	NM	1301	26537
SO RANCH	NM	1302	2690
JORNADA INDIVIDUAL	NM	1303	6935
CHATO	NM	1305	396
VERANITO	NM	1306	5028
SAN ANTONITO	NM	1308	5142
S MESA REDONDA	NM	1309	3180
CHUPADERA WASH	NM	1310	3990
LA ARENOSA	NM	1312	9682
POLVADERA	NM	1315	3268
SAN PEDRO	NM	1317	3211
PUERTECITO GAP	NM	1321	5400
PARIDA	NM	1322	11021
WATER CANYON	NM	1323	4141
WATER CANYON	NM	1324	1430
CEDAR PASS	NM	1327	5652
JONES	NM	1328	4430
LAS LOMAS	NM	1329	3504
EAST WELL	NM	1330	3121
TWIN TANKS	NM	1339	405
TWIN TANKS	NM	1340	800
CERRO PELON	NM	1342	1651
ABO	NM	1343	1678
LA JENCIA RANCH	NM	1344	6225
LA JENCIA RANCH	NM	1346	175
BLUE SPRINGS	NM	1347	468
CERRO MONTOSO	NM	1348	2169
DRIPPING SPRINGS	NM	1349	1545
VIEJO ARROYO	NM	1350	1350
RIENHARDT INDIV	NM	1351	1500

U BUTTE	NM	1352	3806
RED TANKS CANYON	NM	1353	1469
BLACK HILLS RANCH	NM	1365	28863
DRAGOO TANK	NM	1366	8493
LOBO CANYON	NM	1367	13547
CHUPADERA MESA	NM	1368	30290
LINCOLN COUNTY	NM	1369	640
CAT MESA EAST	NM	1370	4675
CUATE CANYON	NM	1371	3840
LARGO CANYON	NM	1372	11030
CARRIZOZO	NM	1373	9572
RED LAKE	NM	1374	160
CLAUNCH SE	NM	1375	640
GALLACHER NORTH	NM	1376	8206
MOUNTAIN PLACE	NM	1501	1120
CLINTON DUNAGAN	NM	1505	510
GODFREY LEASE	NM	1509	6128
KLUMP LEASE	NM	1517	3257
EAST LORDSBURG LEASE	NM	1518	160
WALNUT CREEK LEASE	NM	1519	600
POST OFFICE CANYON	NM	1520	1717
ROOS LEASE	NM	1521	1730
MANSFIELD WASH LEASE	NM	1524	40
BIORESEARCH RANCH	NM	1526	2511
HORSE CAMP DRAW	NM	1528	620
UPSHAW LEASE	NM	1532	836
BIG CREEK	NM	1534	1399
DUNAGAN LEASE	NM	1540	1079
WALTER JR LEASE	NM	1542	1681
JOHNSON MURIEL LEASE	NM	1544	2293
KERR LEASE	NM	1545	80
CLOVERDALE LEASE	NM	1548	40
TIMBERLAKE LEASE	NM	1549	4320
STEWART TRUST	NM	1553	190
WAMEL LEASE	NM	1554	360
SO. SKULL CANYON LS	NM	1556	2968

MUIR EXIT LEASE	NM	1560	1640
FLORIDA RANCH	NM	2005	4011
VICTORIO RANCH	NM	2006	48115
WEST FLORIDA RANCH	NM	2008	7867
APACHE HILLS	NM	2011	4850
DOUBLE BAR V	NM	2013	104600
HOPPY PLACE	NM	2015	4720
FLYING W RANCH	NM	2017	20917
HERMANAS RANCH	NM	2018	12157
T BAR RANCH	NM	2020	2665
ALAMO HUECO	NM	2022	58862
PLAYAS RANCH	NM	2023	33268
FLORIDA MTN. RANCH	NM	2025	7990
HATCHET RANCH	NM	2027	118729
JOE HERVOL	NM	2028	1760
AKELA NORTH	NM	2031	3528
SAN JUAN RANCH	NM	2033	24535
SPANISH STIRRUP	NM	2035	8283
RAINBOW RANCH	NM	2036	13005
RASCON	NM	2037	4870
SEVENTY-SIX DRAW	NM	2041	7180
BISBEE HILLS	NM	2042	2102
PHILLIPS RANCH	NM	2043	15114
PLAYAS PEAK	NM	2044	16513
LITTLE HATCHET	NM	2045	9442
VALIENTE PEAK	NM	2046	13511
GOAT RIDGE	NM	2047	840
SEVENTEEN WELL	NM	2049	820
NADINE E. MOORE	NM	2050	1880
STEEPLE A	NM	2051	11608
WILLOW DRAW	NM	2052	8453
POL WEST	NM	2053	11726
HACHITA HIGHWAY	NM	2057	2330
L S MESA LEASE	NM	2058	1750
GRANDMOTHER MTN LS	NM	2502	1080
RED MOUNTAIN	NM	2503	2363

MIMBRES RIVER	NM	2504	2067
BLACK MOUNTAIN RANCH	NM	2505	3000
HURT LEASE	NM	2508	6684
LITTLE GRANDMOTHR MT	NM	2509	2683
EAST COLUMBUS LEASE	NM	2510	320
HERVOL LEASE	NM	2511	160
NE COLUMBUS LEASE	NM	2512	160
SWEETWATER PASTURE	NM	2513	1280
PORTER DRAW LEASE	NM	2514	160
CATFISH COVE LEASE	NM	2516	560
SAN VICENTE ARROYO	NM	2517	1280
NUNN JOE BILL LEASE	NM	2518	760
76 DRAW LEASE	NM	2520	2907
BOBCAT CANYON LEASE	NM	2524	3205
TAYLOR MOUNTAIN	NM	2525	2560
ANTELOPE DRAW LEASE	NM	2526	1570
BUTTERFIELD	NM	2528	240
BUTTERFIELD TRAIL	NM	2530	440
PHILLIPS LEASE	NM	2537	1642
ALLEN LEASE	NM	2540	260
ADEN HILLS	NM	3001	18378
HOME RANCH	NM	3002	23447
RADIUM SPRINGS	NM	3004	961
HIGH LONESOME	NM	3005	26985
PICACHO PEAK	NM	3008	10794
LAZY E RANCH	NM	3009	32851
JUAN BUSTAMANTE	NM	3010	3465
LOCO	NM	3011	2930
SIERRA ALTA RANCH	NM	3012	6695
CORRALITOS RANCH	NM	3013	129949
HERSEY ARROYO	NM	3014	3720
ALAMO BASIN	NM	3015	22964
POL EAST	NM	3016	56394
SPRING CANYON	NM	3018	3680
BEACON	NM	3020	58002
LA UNION	NM	3022	41670

KILBOURNE HOLE	NM	3023	85488
GOODSIGHT HILLS	NM	3024	28332
BROAD CANYON	NM	3025	2870
HORSE CANYON	NM	3026	3030
BIGNELL ARROYO	NM	3027	3795
HYATT AND HYATT	NM	3028	54955
SADDLE MOUNTAIN	NM	3032	14673
ANGOSTURA	NM	3034	1680
NUTT RANCH	NM	3035	225
MIMMS WELL	NM	3036	7100
LA MESA	NM	3038	27588
ALTAMIRA RANCH	NM	3040	8963
AKELA	NM	3041	2080
UVAS VALLEY	NM	3042	57
CHAMBERINO	NM	3045	4230
LITTLE BLACK MTN	NM	3048	8690
PALMA PARK	NM	3058	28747
CHINA DRAW	NM	3060	40
GARFIELD	NM	3061	7195
RESERVE	NM	3063	12540
RANCHO PARADISO	NM	3066	2852
RINCON	NM	3067	11671
SOUTH WELL	NM	3068	22967
PINE CANYON LEASE	NM	4503	5600
PANTHER CANYON LEASE	NM	4504	1684
SEPAR LEASE	NM	4505	375
OLD MINE CANYON LS	NM	4506	3689
DUCK CREEK LEASE	NM	4507	40
96 CREEK LEASE	NM	4509	270
SHIELDS CANYON	NM	4510	40
HURLEY LEASE	NM	4512	240
UPTON MOUNTAIN LEASE	NM	4513	2063
HACHITA DIVIDE	NM	4514	4525
SYCAMORE CREEK DRAW	NM	4515	165
2C RANCH LEASE	NM	4517	3560
BLACKSMITH CANYON LS	NM	4520	200

BAYARD LEASE	NM	4521	530
TREASURE MTN LEASE	NM	4522	1980
GUNTER G. LEASE	NM	4525	9202
LAMPBRIGHT DRAW LS	NM	4526	600
CORDWOOD DRAW LEASE	NM	4527	760
STONE CANYON LEASE	NM	4528	3620
CASAS GRANDES LEASE	NM	4530	2820
WHITE SIGNAL LEASE	NM	4531	50
KEESE CANYON LEASE	NM	4532	191
DIX CANYON LEASE	NM	4533	2080
CAMERON CREEK LEASE	NM	4534	120
MANGAS VALLEY LEASE	NM	4535	405
COBRE LEASE	NM	4536	376
GREENWOOD RANCH	NM	4537	3860
THREE SISTERS LEASE	NM	4538	80
RAIN CREEK MESA LS	NM	4539	640
BRADBERRY TANK LEASE	NM	4540	200
FIVE MILE CREEK	NM	4541	2183
HANOVER LEASE	NM	4542	63
LONE MOUNTAIN LEASE	NM	4543	716
BOSTON HILL LEASE	NM	4544	49
BROCKMAN LEASE	NM	4545	N/A
WALNUT CANYON LEASE	NM	4546	594
WHITEHORSE MTN LEASE	NM	4547	4634
WOOD CANYON LEASE	NM	4548	600
SALTYS LEASE	NM	4549	2580
WILD HORSE MESA LS	NM	4550	40
SMITH DRAW LEASE	NM	4554	2560
JARRELL RANCH LEASE	NM	4555	7126
WALNUT CREEK LEASE	NM	4556	72
7XV RANCH LEASE	NM	4598	399
CROCKETT RANCH	NM	6001	4335
BAR CROSS RANCH, INC	NM	6020	37581
CASAUS BROS., DURAN	NM	6022	1960
LOS ALAMITOS	NM	6030	1120
LC RANCH	NM	6031	550

A SPEAR RANCH	NM	6041	14519
NUTT MOUNTAIN	NM	6043	7100
BERRENDA CREEK ALLOT	NM	6074	29824
W.W. RANCH	NM	6083	15876
BROWN	NM	6088	980
GREEN CANYON	NM	6110	19392
TAPICITOES	NM	6112	440
NUTT MTN	NM	6122	80
DECKER DRAW	NM	6123	692
OAK SPRING	NM	6131	1079
LAKE VALLEY	NM	6134	1591
WHITEROCK MTN	NM	6136	5015
CUTTER CATTLE CO.	NM	6145	39970
JORNADA LAKES	NM	6147	3926
COYOTE CANYON	NM	7003	2602
J W DANLEY	NM	7012	2446
APACHE	NM	7013	5684
OSIE DANLEY	NM	7014	6688
White Sands	NM	7017	3531
MONTIE GARDENHIRE	NM	7019	440
SALADO CREEK	NM	7022	4926
MULE CANYON	NM	7029	200
SUNSHINE RANCH	NM	7033	1115
HOLCOMB SOUTH	NM	7034	25371
OROGRANDE RANCH	NM	7037	42457
HOLCOMB NORTH	NM	7039	19048
BLACK LEDGE	NM	7050	16002
WHITE SANDS RANCH IN	NM	7051	16559
UTTER ESTATE	NM	7053	4470
J. A. PHELPS	NM	7054	600
QUATRO AMIGOS	NM	7055	9643
NOGAL CANYON	NM	7056	685
VIRDEN ALLOTMENT	NM	7065	7285
CHARLES R WALKER	NM	7066	5328
BAR HW RANCH	NM	7067	6060
SALLY WALKER	NM	7068	4939

N/A	NM	7069	595
HAY DRAW	NM	7081	430
UNIT 1	NM	7082	N/A
UNIT 2	NM	7083	N/A
BENNETT RANCH EAST	NM	9002	6550
J W	NM	9003	7999
SAUL	NM	9004	2776
JAMES HAVENS	NM	9005	2416
KINCAID BROTHERS	NM	9006	35560
JAMES O. COUPLAND	NM	9007	720
CLIFTON DEAN	NM	9008	1982
LITTLE AMERICAS	NM	9010	41710
BOX CANYON	NM	9011	6309
RAUCH BURNT WELL	NM	9012	4760
Y BAR	NM	9013	14717
DUGGAR ALLOT	NM	9014	7985
BENNY FLEMING	NM	9015	80
W A GAGE & SONS	NM	9016	7289
M M HAVENS	NM	9019	80
MARTINE RIDGE	NM	9020	3404
HUGHES BROTHERS	NM	9021	3238
HUGHES BROTHERS	NM	9022	400
GASTON LEWIS	NM	9023	1606
V K CATTLE COMPANY	NM	9024	640
E C AKERS	NM	9025	2065
CHESS HOME	NM	9026	15461
EAST	NM	9027	300
WICKER PLACE	NM	9028	5175
MCARRON	NM	9029	3490
MULBERRY	NM	9030	10233
ANDY LEWIS	NM	9032	5529
GUADELUPE RANCH	NM	9033	19760
AFFENDALE	NM	9034	860
ELDO LEWIS PARTNERSH	NM	9035	27528
HOWELL LEWIS	NM	9036	32942
PANTHER CANYON ALLOT	NM	9039	16065

RICHARD LEWIS	NM	9040	11824
FERREL E. STRINGER	NM	9042	7226
MERRITT RANCH	NM	9043	1456
ANCHOR BAR RANCH	NM	9044	3694
INDIAN DRAW	NM	9046	19914
DEEP WELL	NM	9047	9905
STEWART RANCH	NM	9049	28079
CORNUCOPIA RANCH	NM	9050	19882
ALVA SMITH	NM	9052	1620
SNOW RANCH	NM	9053	38362
JAMES R GILLUM	NM	9054	80
WILKERSON WELL	NM	9056	6223
TANNER & MONSON	NM	9057	240
T A TANNER	NM	9058	7391
BILL TAYLOR	NM	9059	2478
WAYLAND CANYON	NM	9060	1077
VAN CLEVE	NM	9061	349
BROKEOFF RANCH	NM	9062	16844
JANE SCHAFER	NM	9063	15107
BILL TAYLOR	NM	9066	160
CHAPARRAL	NM	15001	15630
DRIPPING SPRINGS	NM	15002	15180
SAN AUGUSTINE SPRING	NM	15003	4897
ANTHONY GAP	NM	15004	8298
ROSE WELL	NM	15006	1340
HAWKEYE CANYON	NM	15008	4316
TEX-LINE	NM	15010	3040
ORGAN	NM	15012	1180
TIERRA BLANCA CREEK	NM	16004	9185
TIERRA BLANCA CREEK	NM	16005	160
MACHO CREEK	NM	16013	120
YELLOW MOUNTAIN	NM	16015	75
BUCKHORN RANCH	NM	16017	33633
CABALLO MTN RANCH	NM	16018	10990
W SPEAR BAR	NM	16019	26280
ENGLE RANCH	NM	16021	36211

APACHE CANYON	NM	16023	12135
SALADO SPRING RANCH	NM	16024	2300
TURKEY CREEK	NM	16033	2843
L7 RANCH	NM	16044	1160
CUERVO ARROYO	NM	16046	5599
LOWER CABALLO	NM	16048	7596
LONGBOTTOM CANYON	NM	16049	14853
SOUTH KELLY CANYON	NM	16050	9595
BLUE CANYON	NM	16057	20111
TRUJILLO CANYON	NM	16063	3410
KELLY CANYON	NM	16064	8119
W SAN MIGUEL RANCH	NM	16065	4355
RACETRACK RANCH	NM	16066	3117
MESCAL SPRING RANCH	NM	16067	21756
INTERSTATE RANCH	NM	16070	940
WILLOW SPRING DRAW	NM	16075	4465
MCGREGOR RANCH	NM	16076	560
CHIZ RANCH	NM	16078	483
MUD SPRINGS	NM	16081	6060
BERRENDA RANCH	NM	16087	2790
PALOMAS GAP RANCH	NM	16089	7936
KNIFE CREEK CATTLE	NM	16091	13428
ROGUE RAMOS CANYON	NM	16094	2499
CUCHILLO CREEK	NM	16099	560
SALT SPRINGS	NM	16103	1720
WILLOW RANCH	NM	16106	630
CUCHILLO MESA RANCH	NM	16108	4927
CHIVO RANCH	NM	16109	1910
WOOLF RANCH	NM	16113	6613
ARMENDARIS RANCH	NM	16114	4140
CUCHILLO NEGRO	NM	16116	310
MACHO SPRING	NM	16121	125
LOWER WILLOWS RANCH	NM	63074	12130
MILAGRO HILL	NM	63075	1702
CROCKETT	NM	63076	11513
STEPHENSON RANCH	NM	63079	8347

COYOTE SPRINGS	NM	63080	4725
WITHERS RANCH	NM	63081	6495
MILAGRO SPRING	NM	63083	80
DIMMITT BOND	NM	63084	320
THORNTON PLACE	NM	63085	440
HARKEY	NM	63089	34
HIGHTOWER	NM	63091	2040
GRACE ROLLER	NM	63093	40
COYOTE SPRINGS	NM	63096	40
SARA JACKSON RANCH	NM	63097	2280
RED HILL	NM	63177	7138
TURKEY TRACK	NM	65075	230504
SAMS & DEAN	NM	65090	3137
TURKEY TRACK SEC.15	NM	65575	40
SAND TRAP	NM	76004	1740
PUMPJACK SOUTH	NM	76006	16760
MALJAMAR SOUTH	NM	76007	12448
QUERCHO PLAINS	NM	76008	9562
BUCKEYE NORTH	NM	76009	167
GOLF COURSE	NM	76010	480
RECORD	NM	76013	320
NADINE	NM	76015	1602
JONES CITY - NORTH	NM	76016	807
SOUTH MONUMENT DRAW	NM	76018	1240
MONUMENT - SOUTHWEST	NM	76019	960
LEA TOWNSITE	NM	76020	15426
HALFWAY	NM	76021	14346
LAGUNA TOSTON	NM	76022	2705
BILBRY BASIN	NM	76023	4837
JONES CITY	NM	76024	120
OIL CENTER NORTH	NM	76025	1868
OIL CENTER SOUTH	NM	76026	1122
SAN SIMON	NM	76027	12635
SWAG	NM	76028	8767
PLAYA DUNES	NM	76029	7297
EAST RATTLESNAKE CAN	NM	76031	40

JAL - NORTHWEST	NM	76032	640
E. RATTLESNAKE FLAT	NM	76033	17009
CUSTER MOUNTAIN	NM	76034	2130
MEDLIN-WELLS	NM	76035	10280
RED TANK	NM	76037	20576
FAIRVIEW	NM	76038	25374
BOBCAT DRAW	NM	76039	10601
TOBOSA FLATS	NM	76042	6895
JAVELINA BASIN	NM	76043	13282
COTTON PLACE	NM	76045	5886
GOEDEKE GRAZING CELL	NM	76046	7935
MONUMENT-JAL OILFIEL	NM	76047	2612
SAN SIMON SWALE	NM	76048	5830
HART RANCH	NM	76049	3520
ANDREWS FLAT	NM	76051	11184
MEXICO WELLS	NM	76052	14846
RUTH ROSS PLACE	NM	76053	10426
SOUTHEAST JAL	NM	76054	65
BROOKIN WEST	NM	76056	80
EDDY 13	NM	76058	6400
IRONHOUSE DRAW	NM	76060	40
SAND TRAP II	NM	76104	640
MALJAMAR SOUTH II	NM	76107	320
LEA TOWNSITE II	NM	76120	306
SWAG II	NM	76128	1280
RED TANK II	NM	76137	2120
TAYLOR PEAK	NM	77003	3790
LOCO HILLS	NM	77004	14183
CHALK BLUFF	NM	77006	3674
SAND HILL	NM	77007	4641
CEDAR LAKE	NM	77008	14622
BURTON NORTH	NM	77009	960
HILINE	NM	77010	1880
DIPPER ALLOTMENT	NM	77011	5337
TWIN WELLS NORTH	NM	77012	120469
CLAYTON BASIN	NM	77013	50448

BURTON SOUTH	NM	77014	5965
ANGELL DRAW	NM	77015	12374
DAGGER DRAW	NM	77016	8650
RAILROAD	NM	77018	3806
KEYSTONE	NM	77019	600
ALKALI LAKE	NM	77020	18562
WEST BILBRY	NM	77021	5838
MAROON CLIFFS	NM	77022	45795
ALACRAN HILLS	NM	77024	900
INDIAN FLATS	NM	77025	6500
QUAHADA RIDGE	NM	77026	2773
LIVINGSTON RIDGE	NM	77027	38728
OLD INDIAN DRAW	NM	77028	7429
ESPERANZA DRAW	NM	77030	745
BRUSHY KNOB	NM	77031	24280
ANTELOPE RIDGE	NM	77032	66350
NASH DRAW	NM	77033	12970
REMUDA BASIN	NM	77034	6104
PIERCE CANYON	NM	77036	22795
RUSTLER BREAKS	NM	77037	19509
LA HUERTA	NM	77038	40
SUN WELLS	NM	77039	17335
PHANTOM BANKS	NM	77040	53560
LOWER TUCKER DRAW	NM	77041	7410
TWIN WELLS	NM	77042	36694
LITTLE LAKE	NM	77043	5119
LINDSEY LAKE	NM	77045	7550
EAST TELLTALE BLUFF	NM	77046	435
HARROUN CROSSING	NM	77047	320
COTTONTAIL	NM	78020	4480
DAYTON	NM	78025	370
ANTELOPE SINK	NM	78026	10343
ROCK TANK	NM	78027	160
HOPE HILL	NM	78028	823
SINKHOLE FLAT	NM	78040	7096
SIEGREST DRAW	NM	78041	21865

MCKITTRICK DRAW	NM	78043	3312
SEVEN RIVERS NORTH	NM	78046	3885
SARGENT	NM	78047	2220
DEER CANYON	NM	78048	9688
COLLIER TANK	NM	78049	6324
TEXAS HILL	NM	78050	43103
BOX CANYON	NM	78051	9454
BLACK MUHLEY	NM	78052	8206
SEVEN RIVERS SOUTH	NM	78053	2220
SEVEN RIVERS HILL	NM	78055	7170
BRANTLEY DAM	NM	78056	690
THREE TWINS NORTH	NM	78057	3727
ROCK HOUSE	NM	78058	6529
WADCUTTER DRAW	NM	78060	5708
INDIAN BASIN	NM	78061	12204
LITTLE BOX CANYON	NM	78062	8844
BURRO HILL	NM	78063	18129
CAWLEY DRAW	NM	78064	22257
INDIAN HILLS	NM	78065	18116
ROCKY ARROYO	NM	78066	750
THREE TWINS	NM	78068	8120
GOLDEN EAGLE	NM	78069	1115
SOAPBERRY DRAW	NM	78070	160
DOLOMITE	NM	78071	815
AIRPORT	NM	78075	3430
GOPHER HILLS	NM	78076	3474
MCGRUDER HILL	NM	78077	8770
BEARDON CANYON	NM	78079	9058
AZOTEA MESA	NM	78080	14171
THREE FORKS CANYON	NM	78081	33128
BANDANNA POINT	NM	78082	7243
DARK CANYON	NM	78084	13708
CASS DRAW	NM	78086	587
BIG HACKBERRY DRAW	NM	78087	11582
HARKEY CROSSING	NM	78088	1280
THREEMILE DRAW	NM	78089	4065

BLUE SPRING	NM	78090	710
FOREHAND CROSSING	NM	78091	2317
FLUME DRAW HILLS	NM	78092	1440
CHINA DRAW	NM	78094	3546
KELLY WELL	NM	78095	1680
SALT DRAW	NM	78096	3900
WILLOW LAKE	NM	78097	3436
OTIS	NM	78098	480
HERRADURA BEND	NM	78099	845
MOSLEY CANYON	NM	78100	2836
RED BLUFF DRAW	NM	78101	360
LOWER REED WELL	NM	78102	3850
TECOLATE PEAK	NM	78103	7363
COTTONWOOD HILLS	NM	78104	9226
COTTONWOOD SPRINGS	NM	78106	21606
HAY HOLLOW	NM	78107	8583
JUMPING SPRINGS	NM	78108	12563
NUEVO CANYON	NM	78110	3440
WHITE CITY	NM	78111	2120
UPPER JURNIGAN DRAW	NM	78113	480
SERPENTINE BENDS	NM	78115	7855
LAST CHANCE CANYON	NM	78116	12847
WEST HESS HILLS	NM	78117	1060
HACKBERRY CANYON	NM	78118	1753
RATTLESNAKE CANYON	NM	78119	2525
BLACK RIVER	NM	78120	1215
DOUBLE CANYON	NM	78121	4567
GRAPEVINE DRAW	NM	78122	5074
LOWER DOUBLE CANYON	NM	78126	2309
THUPMAN DRAW	NM	78131	5470
LAZY U T SPRINGS	NM	78136	11212
SLAUGHTER CANYON	NM	78138	1891
LOWER DELAWARE RIVER	NM	78141	8170
PECOS RIVER	NM	78145	110
RAIN SPRINGS	NM	78146	6728
PENASCO CANYON	NM	79016	1755

CHERRY FLAT	NM	79018	1097	
PENASCO RIVER	NM	79019	13210	
PENASCO SCHOOL	NM	79021	3826	
PRETTY BIRD HILLS	NM	79028	38056	
SIXTEEN TANK	NM	79029	14423	
ENCINO DRAW	NM	79030	17825	
ACRES LAKE	NM	79031	8652	
BUCKHORN	NM	79033	3040	
WOODLAND	NM	79036	1915	
NORTH LONG CANYON	NM	79038	374	
CHAMPION CANYON	NM	79039	2580	
PINON	NM	79041	595	
JUNIPER	NM	79043	1291	
BEAR CANYON	NM	79045	4158	
CROOKED CREEK	NM	79046	12823	
UPPER SEGREST DRAW	NM	79048	5977	
UPPER PACKSADDLE CAN	NM	79049	1580	
STEVENS DRAW	NM	79054	102	
ANIMAS CREEK	NM	16026	2520	Yes
DOG'S HEAD	NM	1084	5713	Yes
KITCH RANCH	NM	9038	6125	Yes
REYNOLDS LEASE	NM	1547	40	Yes
DONA ANA MOUNTAINS	NM	15007	21510	Yes
ORPHAN CANYON LEASE	NM	4516	2790	Yes
CHINA DRAW	NM	6124	370	Yes
PITCHFORK RANCH	NM	16037	2648	Yes
LADDER RANCH	NM	16040	4552	Yes
CARRIZO PEAK	NM	16097	470	Yes
HILLE	NM	3065	29278	Yes
PITCHFORK RANCH	NM	4529	3597	Yes
MIDDLE WELLS LEASE	NM	1522	640	Yes
BORDER RANCH	NM	3039	52327	Yes
B T RANCH	NM	9031	40874	Yes
CAMALACHE	NM	9064	38722	Yes
MITCHELL CANYON	NM	16054	4510	Yes
FLAT LAKE	NM	16053	81005	Yes

FLYING X RANCH	NM	6080	28000	Yes
WITCH WELL ALLOT.	NM	6061	2399	Yes
GASTON LEWIS	NM	9017	240	Yes
PERCHA CREEK	NM	16085	7210	Yes
RAMOS HILLS	NM	6029	310	Yes
CALHOUN COMMUNITY	NM	16068	5515	Yes
MALPAIS	NM	1293	37363	Yes
COYOTE RANCH	NM	6148	2280	Yes
J B RUNYAN	NM	9051	24915	Yes
FOURMILE HILL	NM	1032	6088	Yes
JOSE P. CANYON	NM	1038	3320	Yes
ROCKHOUSE CANYON	NM	1050	11512	Yes
MAHAN LEASE	NM	1551	440	Yes
COLUMBUS COMMUNITY	NM	2003	5495	Yes
WEST COLUMBUS	NM	2026	2525	Yes
CLARK DRAW	NM	2039	506	Yes
SUCKERVILLE	NM	2055	7993	Yes
JONES SPRING DRAW LS	NM	2522	280	Yes
BLACK MESA	NM	3003	22445	Yes
LOST CANYON	NM	6042	3580	Yes
RANCHO DE SEDILLO	NM	16095	660	Yes
HACKBERRY HILLS	NM	78073	1130	Yes
SOUTH LONG CANYON	NM	79034	611	Yes
MCCLENAN RANCH	NM	16056	21870	Yes
BORDER RANCH LEASE	NM	2538	1668	Yes
ANIMAS	NM	1002	1460	Yes
FLYING Y	NM	2038	15473	Yes
WEST POTRILLO	NM	3029	94682	Yes
BLACKTOP	NM	2021	3080	Yes
LORDSBURG DRAW	NM	1055	5960	Yes
CAMBRAY	NM	3019	3700	Yes
SIERRA KEMADO	NM	3043	2330	Yes
PLACITA ARROYO	NM	3064	7289	Yes
SIMPSON LEASE	NM	2519	4319	Yes
BULL CREEK	NM	1003	2260	Yes
DUNAGAN L&C LEASE	NM	1506	3965	Yes

JOHNSON MOUNTAIN	NM	2032	81714	Yes
MOUNT RILEY	NM	3033	74977	Yes
WHITEWATER LEASE	NM	4524	160	Yes
DOUBLE S	NM	16082	4310	Yes
BEACON HILL	NM	1001	6690	Yes
ROUGH MOUNTAIN	NM	1013	1985	Yes
LORDSBURG MESA	NM	1014	7306	Yes
SUNSET DAM	NM	1016	1390	Yes
TANK MOUNTAIN	NM	1031	320	Yes
GILLESPIE MOUNTAIN	NM	1073	11624	Yes
TABLE TOP MTN	NM	1074	1015	Yes
HUGH'S CANYON	NM	1076	1300	Yes
BURRO PASS	NM	1514	7380	Yes
RODEO LEASE	NM	1523	1190	Yes
WINKLER LEASE	NM	1527	2640	Yes
WOODARD PLACE	NM	1533	150	Yes
AKELA WEST	NM	2001	2598	Yes
AKELA SOUTH	NM	2002	5566	Yes
CEDAR GROVE	NM	2014	19802	Yes
MOUNTAIN RANCH	NM	2016	6560	Yes
KIL RANCH	NM	2019	15540	Yes
HEARD RANCH	NM	2024	14826	Yes
AKELA WEST LEASE	NM	2501	1620	Yes
NORTH COLUMBUS LEASE	NM	2531	670	Yes
MAY LEASE	NM	2539	800	Yes
LAS UVAS RANCH	NM	3031	17289	Yes
INDIAN SPRINGS	NM	3047	14930	Yes
FAYWOOD LEASE	NM	4508	40	Yes
MCDONALD DRAW LEASE	NM	4518	464	Yes
COOK AND BATTE	NM	7005	965	Yes
SACRAMENTO GRAZING	NM	7028	991	Yes
DOMINGO SPRINGS RNCH	NM	7030	5568	Yes
MCDANIEL ALLOTMENT	NM	7063	2160	Yes
THREE RIVERS RANCH	NM	7080	19179	Yes
ALAMO MOUNTAIN	NM	9001	31866	Yes
HAT RANCH NO 1	NM	9018	57427	Yes

GEORGE RAUCH	NM	9048	6455	Yes
WILDCAT CANYON	NM	9067	4721	Yes
BISHOP'S CAP	NM	15009	33541	Yes
TORRES RANCH	NM	16102	3015	Yes
LADDER RANCH	NM	16117	6928	Yes
THOMAS A KNIGHT	NM	63092	560	Yes
OCHOA - NORTHWEST	NM	76036	80	Yes
PENN TANK	NM	76040	6700	Yes
OLD BALDY	NM	76041	569	Yes
SAND DUNE	NM	76061	3280	Yes
AVALON	NM	77017	660	Yes
HOPE CANAL ALLOTMENT	NM	78017	2720	Yes
ATOKA	NM	78024	160	Yes
GARDENER DRAW	NM	78042	800	Yes
GYP WATERHOLE	NM	78054	2283	Yes
KUYKENDALL DRAW	NM	78083	11588	Yes
EWING PLACE	NM	78112	1990	Yes
LOWER GUADALUPE RDG	NM	78114	8115	Yes
GRAPEVINE SPRING	NM	78130	1379	Yes
DELAWARE RIVER-WEST	NM	78142	3376	Yes
BURNT CANYON	NM	79011	625	Yes
FLYING H	NM	79017	1465	Yes
CHERRY ALLOTMENT	NM	79023	200	Yes
LONG CANYON	NM	79032	17180	Yes
FOURMILE CANYON	NM	79037	3505	Yes
WRIGHT WELL DRAW	NM	79044	1528	Yes
COX CANYON	NM	79047	220	Yes
RIM	NM	79056	598	Yes
PEARL LEWIS	NM	9037	10230	Yes
HACHITA	NM	2010	7795	Yes
SOUTH PYRAMID	NM	1006	20627	Yes
AFTON	NM	3056	22000	Yes
L B PASTURE	NM	1041	3863	Yes
SHERMAN MTN	NM	16090	2825	Yes
BIERNER, GERALD K	NM	16032	120	Yes
PRIEST TANK	NM	16055	2640	Yes

BECK LAND & CATTLE C	NM	3059	2370	Yes
EAST DEMING LEASE	NM	2515	140	Yes
GOAT MOUNTAIN	NM	2040	12203	Yes
WHITE ROCK CANYON	NM	4523	2320	Yes
SOUTHWELL RANCH	NM	2054	87557	Yes
MADERA CANYON	NM	6127	510	Yes
PUTNAM DRAW	NM	6149	11620	Yes
MADERA CANYON	NM	16093	1580	Yes
44 BAR RANCH	NM	16098	2370	Yes

Total Acres in New Mexico	7,064,509
Total Acres in New Mexico with Yucca on Allotment	1,378,587

Table 2: Arizona Black-tailed Prairie Dog Habitat on Public Grazing Allotments (Source: BLM EAs)

Allotment Name	Allotment No.	Acreage	Occupied Habitat	Suitable or Potential Habitat
SOUTH PYRAMID	1006	20627		X
GILLESPIE MOUNTAIN	1073	11624		X
AKELA WEST	2001	2598		X
AKELA SOUTH	2002	5566		X
HACHITA	2010	7795		X
KIL RANCH	2019	15540		X
BLACKTOP	2021	3080		X
WEST COLUMBUS	2026	2525		X
FLYING Y	2038	15473		X
SOUTHWELL RANCH	2054	87557		X
AKELA WEST LEASE	2501	1620		X
SIMPSON LEASE	2519	4319		X
BORDER RANCH LEASE	2538	1668		X
CAMBRAY	3019	3700		X
WHITE ROCK CANYON	4523	2320		X
PITCHFORK RANCH	4529	3597		X
RAMOS HILLS	6029	310		X
LOST CANYON	6042	3580		X
WITCH WELL ALLOT	6061	2399		X
MADERA CANYON	6127	510		X
COYOTE RANCH	6148	2280		X
PUTNAM DRAW	6149	11620		X
ALAMO MOUNTAIN	9001	31866	X	
GASTON LEWIS	9017	240		X
HAT RANCH NO 1	9018	57427		X
B T RANCH	9031	40874	X	
PEARL LEWIS	9037	10230		X
KITCH RANCH	9038	6125		X
ANIMAS CREEK	16026	2520		X
BIERNER, GERALD K	16032	120		X
LADDER RANCH	16040	4552		X
FLAT LAKE	16053	81005		X
MITCHELL CANYON	16054	4510		X
PRIEST TANK	16055	2640		X

MCCLENAN RANCH	16056	21870		X
CALHOUN COMMUNITY	16068	5515		X
COPPER FLAT RANCH	16079	7190		X
RANCHO DE SEDILLO	16095	660		X
44 BAR RANCH	16098	2370		X
TORRES RANCH	16102	3015		X
SALT SPRINGS	16103	1720		X
ADAMS	63002	160		X
BROWN BROTHERS	64063	1129		X
ROSENDO CASAREZ	64076	1560		X
BOONE, ETAL	65004	3240		X
CAPROCK RANCH	65045	1860		X
CLEMMONS & ERDMANN	65049	5268		X
BILL LEE	65064	840		X
WIGGINS PLACE	65072	8679		X
HARKEY CROSSING	78088	1280	X	

Total Acres Arizona Black-tailed Prairie Dog Habitat: 518,773

Table 3: Habitat for Arizona Black-tailed Prairie Dog and its Associates (Source: BLM EAs)

Allotment Name	Allotment No.	Acreage	Species Name	Occupied Habitat	Suitable or Potential Habitat
BURRO CREEK RANCH	14	34967	Ferruginous hawk	X	
SHAW CANYON	54	38233	Black-footed ferret		X
SNAKE HILL	165	2400	Black-footed ferret		X
BEACON HILL	1001	6690	Burrowing Owl		X
BEACON HILL	1001	6690	Ferruginous hawk		X
ANIMAS	1002	1460	Mountain plover		X
ANIMAS	1002	1460	Ferruginous hawk		X
BULL CREEK	1003	2260	Burrowing owl		X
SOUTH PYRAMID	1006	20627	Arizona BTPD		X
SOUTH PYRAMID	1006	20627	Ferruginous hawk		X
SOUTH PYRAMID	1006	20627	Mountain plover		X
SOUTH PYRAMID	1006	20627	Black-footed ferret	X	
WHITMIRE PASS	1008	5411	Burrowing owl		X
WHITMIRE PASS	1008	5411	Ferruginous hawk		X
LORDSBURG MESA	1014	7306	Ferruginous hawk		X
LORDSBURG MESA	1014	7306	Burrowing owl		X
ANIMAS MOUNTAINS	1030	11512	Ferruginous hawk		X
TANK MOUNTAIN	1031	320	Ferruginous hawk		X
TANK MOUNTAIN	1031	320	Burrowing owl		X
FOURMILE HILL	1032	6088	Ferruginous hawk		X
FOURMILE HILL	1032	6088	Mountain plover		X
FOURMILE HILL	1032	6088	Burrowing owl		X
JOSE P. CANYON	1038	3320	Ferruginous hawk		X
JOSE P. CANYON	1038	3320	Burrowing owl		X
L B PASTURE	1041	3863	Mountain plover		X
L B PASTURE	1041	3863	Burrowing Owl		X
L B PASTURE	1041	3863	Ferruginous hawk		X
ROCKHOUSE CANYON	1050	11512	Ferruginous hawk		X
ROCKHOUSE CANYON	1050	11512	Burrowing owl		X
ANTELOPE PASS	1052	4192	Ferruginous hawk		X
ANTELOPE PASS	1052	4192	Burrowing owl		X
WEATHERBY RANCH	1071	3543	Ferruginous hawk		X
WEATHERBY RANCH	1071	3543	Burrowing owl		X
GILLESPIE MOUNTAIN	1073	11624	Arizona BTPD		X

CEDAR GROVE	2014	19802	Mountain plover	X
CEDAR GROVE	2014	19802	Burrowing owl	X
CEDAR GROVE	2014	19802	Ferruginous hawk	X
MOUNTAIN RANCH	2016	6560	Burrowing owl	X
MOUNTAIN RANCH	2016	6560	Ferruginous hawk	X
KIL RANCH	2019	15540	Arizona BTPD	X
KIL RANCH	2019	15540	Ferruginous hawk	X
KIL RANCH	2019	15540	Mountain plover	X
KIL RANCH	2019	15540	Burrowing owl	X
BLACKTOP	2021	3080	Ferruginous hawk	X
BLACKTOP	2021	3080	Mountain plover	X
BLACKTOP	2021	3080	Burrowing owl	X
BLACKTOP	2021	3080	Black-footed ferret	X
BLACKTOP	2021	3080	Arizona BTPD	X
HEARD RANCH	2024	14826	Burrowing owl	X
WEST COLUMBUS	2026	2525	Ferruginous hawk	X
WEST COLUMBUS	2026	2525	Burrowing owl	X
WEST COLUMBUS	2026	2525	Black-footed ferret	X
WEST COLUMBUS	2026	2525	Arizona BTPD	X
JOHNSON MOUNTAIN	2032	81714	Ferruginous hawk	X
JOHNSON MOUNTAIN	2032	81714	Mountain plover	X
JOHNSON MOUNTAIN	2032	81714	Burrowing owl	X
RAINBOW RANCH	2036	13005	Ferruginous hawk	X
RAINBOW RANCH	2036	13005	Burrowing owl	X
FLYING Y	2038	15473	Ferruginous hawk	X
FLYING Y	2038	15473	Arizona BTPD	X
FLYING Y	2038	15473	Burrowing Owl	X
FLYING Y	2038	15473	Mountain plover	X
CLARK DRAW	2039	506	Ferruginous hawk	X
GOAT MOUNTAIN	2040	12203	Burrowing owl	X
GOAT MOUNTAIN	2040	12203	Mountain plover	X
GOAT MOUNTAIN	2040	12203	Ferruginous hawk	X
STEEPLE A	2051	11608	Ferruginous hawk	X
STEEPLE A	2051	11608	Mountain plover	X
STEEPLE A	2051	11608	Burrowing owl	X
SOUTHWELL RANCH	2054	87557	Ferruginous hawk	X

SOUTHWELL RANCH	2054	87557	Mountain plover		X
SOUTHWELL RANCH	2054	87557	Burrowing owl		X
SOUTHWELL RANCH	2054	87557	Arizona BTPD		X
SUCKERVILLE	2055	7993	Mountain plover		X
SUCKERVILLE	2055	7993	Burrowing owl		X
SUCKERVILLE	2055	7993	Ferruginous hawk		X
AKELA WEST LEASE	2501	1620	Mountain plover		X
AKELA WEST LEASE	2501	1620	Ferruginous hawk		X
AKELA WEST LEASE	2501	1620	Burrowing owl		X
AKELA WEST LEASE	2501	1620	Black-footed ferret		X
AKELA WEST LEASE	2501	1620	Arizona BTPD		X
SWEETWATER PASTURE	2515	1280	Burrowing owl		X
EAST DEMING LEASE	2515	140	Burrowing owl		X
NUNN JOE BILL LEASE	2518	760	Ferruginous hawk		X
SIMPSON LEASE	2519	4319	Arizona BTPD		X
SIMPSON LEASE	2519	4319	Mountain plover		X
SIMPSON LEASE	2519	4319	Burrowing owl		X
NORTH COLUMBUS LEASE	2531	670	Burrowing owl		X
BORDER RANCH LEASE	2538	1668	Ferruginous hawk		X
BORDER RANCH LEASE	2538	1668	Mountain plover		X
BORDER RANCH LEASE	2538	1668	Burrowing owl		X
BORDER RANCH LEASE	2538	1668	Black-footed ferret		X
BORDER RANCH LEASE	2538	1668	Arizona BTPD		X
COW SPRINGS DRAW LS	2541	320	Burrowing owl		X
BLACK MESA	3003	22445	Burrowing owl	X	
BLACK MESA	3003	22445	Ferruginous hawk		X
CAMBRAY	3019	3700	Ferruginous hawk		X
CAMBRAY	3019	3700	Burrowing owl		X
CAMBRAY	3019	3700	Mountain plover		X
CAMBRAY	3019	3700	Arizona BTPD		X
CROWDER-WEISSER	3022	224504	Burrowing owl		X
WEST POTRILLO	3029	94682	Mountain plover		X
WEST POTRILLO	3029	94682	Burrowing owl		X
WEST POTRILLO	3029	94682	Black-footed ferret		X
WEST POTRILLO	3029	94682	Ferruginous hawk		X
LAS UVAS RANCH	3031	17289	Ferruginous hawk		X

LAS UVAS RANCH	3031	17289	Mountain plover	X
LAS UVAS RANCH	3031	17289	Burrowing Owl	X
MOUNT RILEY	3033	74977	Burrowing owl	X
LA MESA	3038	27588	Burrowing owl	X
BORDER RANCH	3039	52327	Ferruginous hawk	X
BORDER RANCH	3039	52327	Mountain plover	X
BORDER RANCH	3039	52327	Burrowing owl	X
SIERRA KEMADO	3043	2330	Burrowing owl	X
INDIAN SPRINGS	3047	14930	Burrowing owl	X
WEST LA MESA	3050	8466	Burrowing owl	X
AFTON	3056	22000	Mountain plover	X
AFTON	3056	22000	Burrowing Owl	X
AFTON	3056	22000	Ferruginous hawk	X
BECK LAND & CATTLE C	3059	2370	Ferruginous hawk	X
BECK LAND & CATTLE C	3059	2370	Burrowing owl	X
PLACITA ARROYO	3064	7289	Ferruginous hawk	X
PLACITA ARROYO	3064	7289	Burrowing owl	X
HILLE	3065	29278	Ferruginous hawk	X
HILLE	3065	29278	Mountain plover	X
HILLE	3065	29278	Burrowing owl	X
FAYWOOD LEASE	4508	40	Ferruginous hawk	X
WHITE ROCK CANYON	4523	2320	Burrowing owl	X
WHITE ROCK CANYON	4523	2320	Ferruginous hawk	X
WHITE ROCK CANYON	4523	2320	Arizona BTPD	X
WHITE ROCK CANYON	4523	2320	Mountain plover	X
PITCHFORK RANCH	4529	3597	Arizona BTPD	X
PITCHFORK RANCH	4529	3597	Burrowing owl	X
PITCHFORK RANCH	4529	3597	Ferruginous hawk	X
PITCHFORK RANCH	4529	3597	Mountain plover	X
ANDREWS	5148	585	Mountain plover	X
BISTI SOUTH	5149	1845	Mountain plover	X
WOODY	5151	663	Mountain plover	X
ALAMO WASH	5152	832	Mountain plover	X
HARRISON	5153	1520	Mountain plover	X
BISTI NORTH	5154	3517	Mountain plover	X
PABLO	5155	643	Mountain plover	X

PINE H	5156	958	Mountain plover	X
PINE, THOMAS	5157	1227	Mountain plover	X
TSOSIE HELEN	5158	80	Mountain plover	X
TSOSIE, HENRY	5159	1442	Mountain plover	X
WERITO	5160	1133	Mountain plover	X
YAZZIE	5161	140	Mountain plover	X
YESO ARROYO	6003	2718	Ferruginous hawk	X
YESO ARROYO	6003	2718	Burrowing owl	X
BISTI COMMUNITY	6008	4903	Mountain plover	X
NAVAJO TRIBE - SMITH	6009	424	Mountain plover	X
BLACK LAKE	6010	37998	Mountain plover	X
KIMBETO COMMUNITY	6013	61864	Mountain plover	X
STAR LAKE COMMUNITY	6023	67392	Mountain plover	X
RAMOS HILLS	6029	310	Burrowing owl	X
RAMOS HILLS	6029	310	Ferruginous hawk	X
RAMOS HILLS	6029	310	Black-footed ferret	X
RAMOS HILLS	6029	310	Arizona BTPD	X
LOST CANYON	6042	3580	Ferruginous hawk	X
LOST CANYON	6042	3580	Burrowing owl	X
LOST CANYON	6042	3580	Arizona BTPD	X
LOST CANYON	6042	3580	Black-footed ferret	X
WITCH WELL ALLOT	6061	2399	Burrowing owl	X
WITCH WELL ALLOT	6061	2399	Ferruginous hawk	X
WITCH WELL ALLOT	6061	2399	Black-footed ferret	X
WITCH WELL ALLOT	6061	2399	Arizona BTPD	X
FLYING X RANCH	6080	28000	Mountain plover	X
FLYING X RANCH	6080	28000	Burrowing owl	X
FLYING X RANCH	6080	28000	Ferruginous hawk	X
CHINA DRAW	6124	370	Ferruginous hawk	X
MADERA CANYON	6127	510	Burrowing owl	X
MADERA CANYON	6127	510	Mountain plover	X
MADERA CANYON	6127	510	Ferruginous hawk	X
MADERA CANYON	6127	510	Black-footed ferret	X
MADERA CANYON	6127	510	Arizona BTPD	X
NORTH CERRO HUECO	6134	1280	Burrowing owl	X
WHITEROCK MTN	6136	5015	Ferruginous hawk	X

WARM SPRINGS RANCH	6143	151	Ferruginous hawk		X
COYOTE RANCH	6148	2280	Burrowing owl		X
COYOTE RANCH	6148	2280	Ferruginous hawk		X
COYOTE RANCH	6148	2280	Arizona BTPD		X
COYOTE RANCH	6148	2280	Black-footed ferret		X
PUTNAM DRAW	6149	11620	Burrowing owl		X
PUTNAM DRAW	6149	11620	Ferruginous hawk		X
PUTNAM DRAW	6149	11620	Black-footed ferret		X
PUTNAM DRAW	6149	11620	Arizona BTPD		X
COOK AND BATTE	7005	965	Burrowing owl		X
COOK AND BATTE	7005	965	Ferruginous hawk		X
WHITE SANDS	7017	3531	Ferruginous hawk		X
WHITE SANDS	7017	3531	Burrowing owl		X
SACRAMENTO GRAZING	7028	991	Ferruginous hawk		X
SACRAMENTO GRAZING	7028	991	Burrowing owl		X
DOMINGO SPRINGS RNCH	7030	5568	Burrowing owl	X	
DOMINGO SPRINGS RNCH	7030	5568	Ferruginous hawk		X
MCDANIEL ALLOTMENT	7063	2160	Ferruginous hawk		X
VIRDEN ALLOTMENT	7065	7285	Burrowing owl		X
MS. LEON GREEN	7075	80	Ferruginous hawk		X
MS. LEON GREEN	7075	80	Burrowing owl		X
THREE RIVERS RANCH	7080	19179	Mountain plover		X
THREE RIVERS RANCH	7080	19179	Burrowing owl		X
THREE RIVERS RANCH	7080	19179	Ferruginous hawk		X
ALAMO MOUNTAIN	9001	31866	Arizona BTPD	X	
ALAMO MOUNTAIN	9001	31866	Mountain plover		X
ALAMO MOUNTAIN	9001	31866	Burrowing owl		X
ALAMO MOUNTAIN	9001	31866	Ferruginous hawk		X
GASTON LEWIS	9017	240	Burrowing owl		X
GASTON LEWIS	9017	240	Black-footed ferret		X
GASTON LEWIS	9017	240	Arizona BTPD		X
HAT RANCH NO 1	9018	57427	Arizona BTPD		X
HAT RANCH NO 1	9018	57427	Burrowing owl		X
HAT RANCH NO 1	9018	57427	Ferruginous hawk		X
B T RANCH	9031	40874	Mountain plover		X
B T RANCH	9031	40874	Arizona BTPD	X	

B T RANCH	9031	40874	Ferruginous hawk	X
B T RANCH	9031	40874	Burrowing owl	X
PEARL LEWIS	9037	10230	Arizona BTPD	X
PEARL LEWIS	9037	10230	Mountain plover	X
PEARL LEWIS	9037	10230	Burrowing owl	X
PEARL LEWIS	9037	10230	Ferruginous hawk	X
KITCH RANCH	9038	6125	Burrowing owl	X
KITCH RANCH	9038	6125	Ferruginous hawk	X
KITCH RANCH	9038	6125	Arizona BTPD	X
GEORGE RAUCH	9048	6455	Mountain plover	X
GEORGE RAUCH	9048	6455	Burrowing owl	X
GEORGE RAUCH	9048	6455	Ferruginous hawk	X
J B RUNYAN	9051	24915	Ferruginous hawk	X
J B RUNYAN	9051	24915	Burrowing owl	X
CAMALACHE	9064	38722	Mountain plover	X
CAMALACHE	9064	38722	Ferruginous hawk	X
CAMALACHE	9064	38722	Burrowing owl	X
BOX LAKE	10023	11854	Black-footed ferret	X
COYOTE CANYON	10024	21272	Black-footed ferret	X
Y RANCH	10028	24199	Black-footed ferret	X
Y RANCH	10028	24199	Mountain plover	X
COYOTE CANYON	10040	160	Black-footed ferret	X
RANCHO ALEGRE	10070	79285	Black-footed ferret	X
RANCHO ALEGRE	10070	79285	Black-footed ferret	X
RANCHO ALEGRE	10070	79285	Black-footed ferret	X
DONA ANA MOUNTAINS	15007	21510	Ferruginous hawk	X
DONA ANA MOUNTAINS	15007	21510	Mountain plover	X
DONA ANA MOUNTAINS	15007	21510	Burrowing owl	X
BISHOP'S CAP	15009	33541	Mountain plover	X
BISHOP'S CAP	15009	33541	Burrowing owl	X
BISHOP'S CAP	15009	33541	Ferruginous hawk	X
ANIMAS CREEK	16026	2520	Ferruginous hawk	X
ANIMAS CREEK	16026	2520	Mountain plover	X
ANIMAS CREEK	16026	2520	Burrowing owl	X
ANIMAS CREEK	16026	2520	Black-footed ferret	X
ANIMAS CREEK	16026	2520	Arizona BTPD	X

BIERNER, GERALD K.	16032	120	Mountain plover		X
BIERNER, GERALD K.	16032	120	Burrowing owl		X
BIERNER, GERALD K.	16032	120	Black-footed ferret		X
BIERNER, GERALD K.	16032	120	Arizona BTPD		X
PITCHFORK RANCH	16037	2648	Ferruginous hawk		X
NORDSTROM ARROYO	16038	240	Ferruginous hawk		X
NORDSTROM ARROYO	16038	240	Burrowing owl		X
LADDER RANCH	16040	4552	Mountain plover		X
LADDER RANCH	16040	4552	Arizona BTPD		X
LADDER RANCH	16040	4552	Ferruginous hawk		X
LADDER RANCH	16040	4552	Burrowing owl		X
LADDER RANCH	16040	4552	Black-footed ferret		X
SECO CREEK	16047	1920	Ferruginous hawk		X
SECO CREEK	16047	1920	Mountain plover		X
SECO CREEK	16047	1920	Burrowing owl		X
FLAT LAKE	16053	81005	Mountain plover		X
FLAT LAKE	16053	81005	Burrowing owl	X	
FLAT LAKE	16053	81005	Ferruginous hawk		X
FLAT LAKE	16053	81005	Black-footed ferret		X
FLAT LAKE	16053	81005	Arizona BTPD		X
MITCHELL CANYON	16054	4510	Burrowing owl		X
MITCHELL CANYON	16054	4510	Arizona BTPD		X
MITCHELL CANYON	16054	4510	Ferruginous hawk		X
PRIEST TANK	16055	2640	Ferruginous hawk		X
PRIEST TANK	16055	2640	Black-footed ferret		X
PRIEST TANK	16055	2640	Arizona BTPD		X
PRIEST TANK	16055	2640	Burrowing owl		X
MCCLENAN RANCH	16056	21870	Ferruginous hawk		X
MCCLENAN RANCH	16056	21870	Mountain plover		X
MCCLENAN RANCH	16056	21870	Burrowing owl		X
MCCLENAN RANCH	16056	21870	Black-footed ferret		X
MCCLENAN RANCH	16056	21870	Arizona BTPD		X
CALHOUN COMMUNITY	16068	5515	Burrowing owl		X
CALHOUN COMMUNITY	16068	5515	Ferruginous hawk		X
CALHOUN COMMUNITY	16068	5515	Arizona BTPD		X
CALHOUN COMMUNITY	16068	5515	Black-footed ferret		X

PALO SECO	16077	1035	Ferruginous hawk	X
PALO SECO	16077	1035	Burrowing owl	X
COPPER FLAT RANCH	16079	7190	Ferruginous hawk	X
COPPER FLAT RANCH	16079	7190	Burrowing owl	X
COPPER FLAT RANCH	16079	7190	Black-footed ferret	X
COPPER FLAT RANCH	16079	7190	Arizona BTPD	X
DOUBLE S	16082	4310	Burrowing owl	X
DOUBLE S	16082	4310	Mountain plover	X
PERCHA CREEK	16085	7210	Mountain plover	X
PERCHA CREEK	16085	7210	Burrowing owl	X
PERCHA CREEK	16085	7210	Ferruginous hawk	X
SHERMAN MTN	16090	2825	Ferruginous hawk	X
SHERMAN MTN	16090	2825	Burrowing owl	X
MADERA CANYON	16093	1580	Mountain plover	X
MADERA CANYON	16093	1580	Burrowing owl	X
RANCHO DE SEDILLO	16095	660	Ferruginous hawk	X
RANCHO DE SEDILLO	16095	660	Burrowing owl	X
RANCHO DE SEDILLO	16095	660	Arizona BTPD	X
RANCHO DE SEDILLO	16095	660	Black-footed ferret	X
CARRIZO PEAK	16097	470	Ferruginous hawk	X
44 BAR RANCH	16098	2370	Mountain plover	X
44 BAR RANCH	16098	2370	Burrowing owl	X
44 BAR RANCH	16098	2370	Ferruginous hawk	X
44 BAR RANCH	16098	2370	Black-footed ferret	X
44 BAR RANCH	16098	2370	Arizona BTPD	X
TORRES RANCH	16102	3015	Burrowing owl	X
TORRES RANCH	16102	3015	Mountain plover	X
TORRES RANCH	16102	3015	Ferruginous hawk	X
TORRES RANCH	16102	3015	Arizona BTPD	X
TORRES RANCH	16102	3015	Black-footed ferret	X
SALT SPRINGS	16103	1720	Burrowing owl	X
SALT SPRINGS	16103	1720	Mountain plover	X
SALT SPRINGS	16103	1720	Ferruginous hawk	X
SALT SPRINGS	16103	1720	Arizona BTPD	X
SALT SPRINGS	16103	1720	Black-footed ferret	X
FLORES, ALFREDO	62020	557	Ferruginous hawk	X

CHAVES, ERNESTO	62021	279	Ferruginous hawk	X
SAIZ	62027	40	Ferruginous hawk	X
SAIZ	62027	40	Mountain plover	X
MARTINEZ	62042	1280	Mountain plover	X
SHAFIE HINDI RANCH	62047	720	Ferruginous hawk	X
BYRD, BOB	62052	40	Ferruginous hawk	X
BYRD, BOB	62052	40	Mountain plover	X
VAN EATON, FRED	62067	1960	Ferruginous hawk	X
CORTESE, JOE	62083	75	Ferruginous hawk	X
HAGE & WEBB	62085	176	Ferruginous hawk	X
ADAMS	63002	160	Mountain plover	X
ADAMS	63002	160	Arizona BTPD	X
SULTEMEIER, FRANK	63006	1629	Ferruginous hawk	X
SULTEMEIER, FRANK	63006	1629	Mountain plover	X
WASHBURN, L JOANNE W	63008	1500	Ferruginous hawk	X
SULTEMEIER	63010	160	Ferruginous hawk	X
HUBBARD-JICARILLA	63024	99	Ferruginous hawk	X
ELDRIDGE, GRADY	63025	1948	Ferruginous hawk	X
ARMSTRONG,G. G.	63031	160	Ferruginous hawk	X
ARMSTRONG,G. G.	63031	160	Mountain plover	X
MCTEIGUE, FRED ET AL	63052	400	Ferruginous hawk	X
RILEY PLACE	63058	2818	Ferruginous hawk	X
COYOTE SPRINGS	63080	4725	Ferruginous hawk	X
DIMMITT BOND	63084	320	Ferruginous hawk	X
THORNTON PLACE	63085	440	Ferruginous hawk	X
THORNTON PLACE	63085	440	Mountain plover	X
HARKEY	63089	34	Mountain plover	X
HARKEY	63089	34	Ferruginous hawk	X
JACK HARKEY	63090	560	Ferruginous hawk	X
JACK HARKEY	63090	560	Mountain plover	X
THOMAS A KNIGHT	63092	560	Ferruginous hawk	X
THOMAS A KNIGHT	63092	560	Mountain plover	X
COYOTE SPRINGS	63096	40	Ferruginous hawk	X
SARA JACKSON RANCH	63097	2280	Ferruginous hawk	X
SARA JACKSON RANCH	63097	2280	Mountain plover	X
BARRAZA DIPPING VAT	63098	54	Ferruginous hawk	X

NORTH FOUR-MILE	64012	3276	Ferruginous hawk		X
NORTH FOUR-MILE	64012	3276	Mountain plover		X
HUGGIN'S DRAW	64042	6780	Ferruginous hawk		X
HUGGIN'S DRAW	64042	6780	Mountain plover		X
COTTONWOOD	64046	5611	Ferruginous hawk		X
COTTONWOOD	64046	5611	Mountain plover		X
KILLGO ALLOTMENT	64052	160	Ferruginous hawk		X
HENRY RUSSELL FARMS	64059	400	Ferruginous hawk		X
BROWN BROTHERS	64063	1129	Mountain plover		X
BROWN BROTHERS	64063	1129	Arizona BTPD		X
FELIZ RIVER RANCH	64073	6701	Mountain plover		X
ROSENDO CASAREZ	64076	1560	Mountain plover		X
ROSENDO CASAREZ	64076	1560	Arizona BTPD		X
DUH RANCH	64081	160	Ferruginous hawk		X
DUH RANCH	64081	160	Mountain plover		X
SEA RANCH	65001	3021	Ferruginous hawk		X
BOJAX RANCH	65003	200	Ferruginous hawk		X
BOONE, ETAL	65004	3240	Ferruginous hawk		X
BOONE, ETAL	65004	3240	Mountain plover		X
BOONE, ETAL	65004	3240	Arizona BTPD		X
VAN EATON, FRED & L.	65006	160	Ferruginous hawk		X
VAN EATON, FRED & L.	65006	160	Burrowing owl	X	
VAN EATON, FRED & L.	65006	160	Mountain plover		X
COOPER SMITH RANCH	65007	2876	Ferruginous hawk		X
VAN EATON RANCH	65008	2342	Ferruginous hawk		X
VAN EATON RANCH	65008	2342	Burrowing owl		X
VAN EATON RANCH	65008	2342	Mountain plover		X
MITCHELL DAIRY	65011	1933	Ferruginous hawk		X
MITCHELL DAIRY	65011	1933	Burrowing owl		X
MITCHELL DAIRY	65011	1933	Mountain plover		X
COOPER PYEATT RANCH	65019	3597	Ferruginous hawk		X
T.COOPER & FARM-100%	65020	6043	Ferruginous hawk		X
HUSTON, HARRY G. EST	65031	951	Ferruginous hawk		X
HUSTON, HARRY G. EST	65031	951	Mountain plover		X
CATO BROTHERS EST.	65033	220	Mountain plover		X
COMANCHE HILL	65037	6228	Ferruginous hawk		X

COMANCHE HILL	65037	6228	Mountain plover	X
MALCOLM C. HARRALL	65040	287	Ferruginous hawk	X
MALCOLM C. HARRALL	65040	287	Mountain plover	X
CAPROCK RANCH	65045	1860	Ferruginous hawk	X
CAPROCK RANCH	65045	1860	Mountain plover	X
CAPROCK RANCH	65045	1860	Arizona BTPD	X
MEDLIN CAPROCK EAST	65048	679	Ferruginous hawk	X
MEDLIN CAPROCK EAST	65048	679	Mountain plover	X
CLEMMONS & ERDMANN	65049	5268	Ferruginous hawk	X
CLEMMONS & ERDMANN	65049	5268	Burrowing owl	X
CLEMMONS & ERDMANN	65049	5268	Mountain plover	X
CLEMMONS & ERDMANN	65049	5268	Arizona BTPD	X
MARLEY CAPROCK SEC15	65052	40	Ferruginous hawk	X
L. A. RANCH	65056	200	Ferruginous hawk	X
L. A. RANCH	65056	200	Mountain plover	X
SORENSON RANCH	65058	2805	Ferruginous hawk	X
WOODS PLACE	65061	340	Ferruginous hawk	X
JULIA CULP	65063	2944	Burrowing owl	X
JULIA CULP	65063	2944	Ferruginous hawk	X
JULIA CULP	65063	2944	Mountain plover	X
BILL LEE	65064	840	Mountain plover	X
BILL LEE	65064	840	Arizona BTPD	X
OLD SPEARS PLACE	65066	2400	Mountain plover	X
CALUMET RANCH	65069	11110	Ferruginous hawk	X
MILES, DON L.	65070	400	Ferruginous hawk	X
MILES, DON L.	65070	400	Mountain plover	X
WIGGINS PLACE	65072	8679	Ferruginous hawk	X
WIGGINS PLACE	65072	8679	Mountain plover	X
WIGGINS PLACE	65072	8679	Arizona BTPD	X
LLOYDS CANYON	65137	7556	Ferruginous hawk	X
LLOYDS CANYON	65137	7556	Mountain plover	X
TAYLOR SEC. 15 LAND	65148	320	Ferruginous hawk	X
TAYLOR SEC. 15 LAND	65148	320	Mountain plover	X
MEDLIN CAPROCK WEST	65185	1773	Mountain plover	X
MEDLIN CAPROCK WEST	65185	1773	Ferruginous hawk	X
MEDLIN-TAYLOR SEC.15	65548	320	Ferruginous hawk	X

MEDLIN-TAYLOR SEC.15	65548	320	Mountain plover		X
ROY F. PEARCE, JR.	65563	40	Burrowing owl		X
ROY F. PEARCE, JR.	65563	40	Ferruginous hawk		X
ROY F. PEARCE, JR.	65563	40	Mountain plover		X
OLD SPEARS PLACE	65566	120	Mountain plover		X
OCHOA - NORTHWEST	76036	80	Ferruginous hawk		X
PENN TANK	76040	6700	Burrowing owl		X
OLD BALDY	76041	569	Ferruginous hawk		X
OLD BALDY	76041	569	Burrowing owl		X
OLD BALDY	76041	569	Mountain plover		X
OLD BALDY	76041	569	Black-footed ferret		X
SAND DUNE	76061	3280	Burrowing owl	X	
AVALON	77017	660	Mountain plover		X
AVALON	77017	660	Black-footed ferret		X
EL RANCHO GRANDE	78003	1214	Burrowing owl	X	
CHASE FARMS	78007	3200	Ferruginous hawk	X	
HOPE CANAL ALLOTMENT	78017	2720	Mountain plover		X
ATOKA	78024	160	Burrowing owl	X	
PENASCO RIVER FARM	78036	160	Burrowing owl	X	
GARDENER DRAW	78042	800	Burrowing owl	X	
KUYKENDALL DRAW	78083	11588	Ferruginous hawk	X	
HARKEY CROSSING	78088	1280	Arizona BTPD	X	
HARKEY CROSSING	78088	1280	Burrowing owl	X	
OTIS	78098	480	Burrowing owl		X
TECOLATE PEAK	78103	7363	Burrowing owl		X
COTTONWOOD HILLS	78104	9226	Burrowing owl	X	
EWING PLACE	78112	1990	Burrowing owl	X	
FOURMILE CANYON	79037	3505	Ferruginous hawk	X	
COX CANYON	79047	220	Ferruginous hawk	X	

Total allotments with prairie dogs or associates: 236
(Allotments with multiple species were only counted once)

Exhibit 5: BLM Guidance
Criteria on Grazing Effects
(Excerpted)

GUIDANCE CRITERIA

for

Determinations of Effects of

Grazing Permit Issuance and Renewal

on

Threatened and Endangered Species

Bureau of Land Management
Fish and Wildlife Service

Arizona and New Mexico

January 1999

GUIDANCE CRITERIA ON GRAZING EFFECTS

Aplomado Falcon (*Falco femoralis septentrionalis*)

Status: Endangered, 2/25/86

Critical Habitat: None

Recovery Plan: 1990

I. THREATS

A. THREATS TO THE SPECIES:

(Taken from the Final Rule for the Species, FR Vol 51 No. 37 pp 6686-6689)

1. **Destruction, modification, or curtailment of its habitat or range.**
   - Brush encroachment in open rangelands caused by severe overgrazing, suppression of range fires, and other vegetative disturbances.
   - Elimination of nest sites due to agricultural development or other vegetative type conversions.

2. **Overutilization of commercial, recreational, scientific, or educational purposes**
   - Collection, inadvertent shooting, and commercial use are not likely to be factors causing decline of the species.

4. **Disease or Predation.**
   - Not likely to be a factor causing decline; however, because this factor is not well established.

4. **Inadequacy of existing regulatory mechanisms**
   - While State listing provides some protection from taking and exploitation of this subspecies, such listing does not provide protection to its habitat. The aplomado is not subject to damaging levels of direct exploitation. Instead, the subspecies is sensitive to habitat degradation and chemical contamination.

5. **Other natural or manmade factors affecting its continued existence.**
   - The primary threat to the species at the time of listing was believed to be eggshell thinning and reduced reproductive success due to the effects of organochlorine pesticides.

B. THREATS TO CONSTITUENT ELEMENTS OF DESIGNATED CRITICAL HABITAT:

No critical habitat was designated for the aplomado falcon due to the lack of an extant breeding population in the U.S.

II. SECTION 7 EFFECT DETERMINATIONS:

MAY AFFECT

After reviewing the Threats Section above against the expected impacts of the proposed action, do any of the following conditions apply?

1. Habitat for the species or primary constituent elements of critical habitat may be modified.

2. Improvement of potential habitat for the species or development of primary constituent elements of critical habitat may be precluded or impeded.

3. An individual may be disrupted from breeding, feeding, or sheltering-related activities or otherwise taken (as defined in U.S. Fish and Wildlife Service, 1998).

If none of the conditions above are met, then the action has No Effect and Section 7 consultation is not required. If any of the above conditions are met, the species may be affected. Formal consultation is required for all actions that may affect listed species or designated critical habitat {50 CFR 402.14(a)} unless, through informal consultation, the Fish and Wildlife Service (Service) concurs with the BLM's determination that the action is Not Likely To Adversely Affect (NLAA) listed species or designated critical habitat {50 CFR 402.14(b)}.

A. LIKELY TO ADVERSELY AFFECT

All effects, not just net effects are considered; thus, if a net effect is beneficial, but has some components with adverse effects, the project may be likely to adversely affect the species. Formal consultation is required for situations where both of the following conditions are met:

1. Livestock grazing occurs within potential aplomado falcon habitat

2. Apparent ecological status (range condition) of potential aplomado habitat is stable or declining in midseral, or declining in areas in high seral or potential natural community (pnc).

B. NOT LIKELY TO ADVERSELY AFFECT

The project is either wholly beneficial, or has adverse aspects that are discountable, or insignificant. The Service may concur with the action agency's determination of NLAA when the following conditions are met:

1. Livestock grazing occurs within potential aplomado falcon habitat.

2. Apparent ecological status (range condition) of potential aplomado habitat is improving in midseral or is stable or improving in areas in high seral or potential natural community (pnc).

3. Aplomado falcon nesting is not likely to occur during the term of the permit.

III. DEFINITIONS, BACKGROUND BIOLOGICAL INFORMATION, AND REFERENCES SUPPORTING THE CRITERIA

The northern aplomado falcon was listed as endangered in 1986 due to its extirpation from the United States (Service 1990) and evidence of population declines and high levels of pesticide contamination in Mexico (Kiff et al. 1978). Grassland habitat degradation was cited as the main factor responsible for the falcon's extirpation in the U.S. (Service 1986). Recent confirmed observations of aplomados in south central New Mexico and west Texas, the confirmation of two breeding populations in northern Chihuahua, Mexico (Montoya et al. 1997), and reintroduction efforts in south Texas have heightened interest in this species.

Until 1992 it was believed that the distribution of the northern aplomado was restricted to eastern Mexico, from southern Tamaulipas south. In 1992, breeding populations in Chihuahua, Mexico, approximately 80 miles south and 50 miles west of the U.S. border (Big Bend, Texas) were confirmed. Since that time several reliable sightings have been reported in areas west of the initial breeding population. The discovery of breeding aplomados in northern Chihuahua may have identified the source of aplomados recently observed in southern New Mexico and west Texas. Numerous sightings of aplomados have occurred over the years.

The species was historically reported from most of the counties in southern New Mexico. The last documented nesting pair of aplomados in New Mexico (and the U.S.) was in Luna County in 1952. Historic sightings are concentrated in the southwestern corner of New Mexico from Sierra and Dona Ana Counties to the Bootheel Region. Historic sightings from Otero County east are few. Within Arizona, the aplomado occurred in the southeastern portion of the state. The last confirmed records of the species were from the Sulphur Springs Valley (1939), near Saint David

(1940), and the border area near Rodeo, NM in 1977. None of the relatively frequent reports since then has been confirmed (AGFD 1996).

Habitat for the aplomado is variable over its range, but generally consists of open terrain with scattered trees or shrubs (Service 1990). In Mexico, reported habitats included palm and oak savannas, open tropical deciduous woodlands, wooded fringes of extensive marshes, various desert grassland associations, and upland pine parklands (Service 1990). The Chihuahuan Desert habitat includes open grasslands with scattered mesquite and/or yuccas (*Yucca torreyi* and *Yucca elata*). Existing data suggests that ecological status of Chihuahuan Desert grasslands currently occupied by aplomados is high seral to pnc (potential natural community or climax) with significant basal cover of grass species. Montoya et al. (1997) reported occupied (nesting) habitat as having basal ground cover ranging from 29% to 70% with a mean of 46%. Woody plant density was 5 to 56 plants per acre, with a mean of 31 plants per acre. Dominant woody plant species were Mormon tea, soaptree yucca, sacahuista, mesquite, senecio, creosotebush, and baccharis comprising 74% of the community.

Montoya et al. (1997) found breeding season ranges of radio-telemetered birds in Chihuahua ranged from 16 km^2 (3953 ac. or 6.1 sec.) to 21 km^2 (5189 ac. or 8.1 sec.). In the Recovery Plan (Service 1990), Hector estimated aplomado home range requirements based on a regression of body weights and home ranges of other falcon species at approximately 34 km^2 (8401 ac. or 13.1 sec.). Differences in nest site availability and prey abundance can cause differences in home range size. Hector suggested that 60 km^2 (14826 ac. or 23.1 sec.) may be an upper limit of home range size. For the purposes of habitat management an intermediate of these home range sizes might be applied. Hector's low range totaling 8400 acres or 13 sections may be an appropriate measure . This home range estimate may be applied for habitat management by describing a circle with a radius of 2 miles from a feature, such as a potential nest site, to encompass a potential home or breeding season range.

Prey species of the aplomado are variable. Service (1990) reported that small birds accounted for 97% of the prey biomass, but that insects represented 65% of the prey individuals. Ligon (1961) suggested that aplomado food habits "consisted almost wholly of small reptiles, lizards, mice, other rodents, grasshoppers, and various other kinds of insects, rarely small birds except in winter when other food is lacking". Montoya et al. (1997) listed 82 species of small birds found as prey items. Of these, nine species comprised 76% of the diet. These species included meadow larks, the apparent preferred food item, common nighthawks, northern mockingbirds, western kingbirds, brown-headed cowbirds, scotts oriole, mourning doves, cactus wrens, and pyrrhuloxia. The data suggest a preference for medium-size song birds.

The current understanding of the relationships of aplomados, their prey species, and the habitat suggests that extremely high (by existing southern New Mexico standards)

cover of grasses is required to support the preferred prey bird species. Several of the key prey species, such as meadow larks, are sensitive to declines in cover within the habitat. Of further concern is a noted decline in migratory birds in New Mexico and the Chihuahuan Desert. A review of the North American Breeding Bird Survey Trend Data (BRD 1998) suggests declines in the populations of six of eleven prey species in New Mexico. Wintering birds likely comprise much of the winter diet of aplomados. Factors affecting habitat suitability for these migratory species may also affect the suitability of aplomado habitat, and hence, potential for survival of aplomado falcons.

Aplomado nesting within Chihuahuan Desert Grasslands occurs in multi-stemmed yuccas and mesquite trees. Aplomados do not build their own nests, but use the nests constructed by other raptors such as Swainson's hawks and Chihuahuan ravens. It is suspected that aplomados do line the nest with fine material from yucca stalks (Montoya and Zwank 1995). Suitable nesting substrates are therefore dependent on available nesting structures and ongoing nest building of other raptors and corvids. Therefore, aplomados are reliant on nesting activities of other stick nest building birds and their habitat requirements. Breeding in aplomado falcons is reported to occur from January through June in eastern Mexico (Service 1990). Adults produce clutches throughout this period, with most clutches being produced in March to May. Incubation has occurred in mid-June, suggesting that some young aplomados may be dependent on their parents until August.

The BLM Las Cruces Field Office has initiated a five year aplomado falcon habitat study. This study is expected to apply to southern New Mexico and may have applicability to areas of west Texas and southeastern Arizona. The study is a requirement (Reasonable and Prudent Measures (RPM) or Conservation Measures (CR)) of biological opinions on three BLM Resource Management Plans. The purposes of the study are to develop a habitat model based on crucial habitat components of aplomado falcons, map suitable and potential habitat, and collect information regarding the effects of land use practices on aplomado falcons. Information collected during the study will be applied (as a condition of the Biological Opinions on the three RMPs) to guide management of land use activities toward recovery of the species. The three RMPs and grazing permits for allotments within the BLM Las Cruces and Socorro Field Offices and within identified suitable or potential habitat may be subject to re-initiation of Section 7 consultation following completion of the study.

Potential habitat for the aplomado falcon in southern New Mexico is defined, until completion of the aplomado habitat study as:

1. Patches of the following desert grasslands mapping units are present :

Standard Habitat Sites: Grass Flat NM011
Grass RUP NM012

Salt Flat NM022

BLM Veg Type: Short Grass 1001
Mid Grass 1002
Tall Grass 1003

GAP Veg Type: Short Grass Steppe 5121
Gr. Basin Foothill Piedmont Grassland 5212
Chih Des. Grassland 5220
Chih. Des. Foothill Piedmont Des. Grassland 5221
Chih. Des. Lowland Swale Des. Grassland 5222

(Note: all areas mapped within these GAP veg types must be field checked to assure that the areas are in fact a grassland.)

and

2. grassland habitat patches are greater than 320 acres in size (areas of grassland contiguous to grasslands on public land are counted in the 320 ac.),

and

3. within the following NRCS Hydrologic Units (HUCs):
13020203, 13020210, 13020211, 13030101, 13030102, 13030103, 13030201, 13030202, 13050003, 13050004, 13060011, 13070001, 13070002, 13070007, 15040002, 15040003, 15040006, 15080302, 15080303

and

4. grassland habitat patches are below 6500 ft elevation

5. adequate nest substrates (multi-stemmed yuccas and large mesquites or other trees) and nesting activity of other raptors and ravens are present.

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Exhibit 6: Otero Mesa
O & G Lease Parcels
Record of Conversation

LAS CRUCES DISTRICT
WHITE SANDS RESOURCE AREA

ENDANGERED SPECIES
RECORD OR CONVERSATION AND CONSULTATION

PROJECT NAME Otero Mesa O&G Lease Parcels

PROJECT SPECIALIST J. Waggoner T/E SPECIALIST M. Howard/R. Bracken

INFORMAL SEC. 7 CONSULTATION INITIATED 11/9/92 COMPLETED

FORMAL SEC. 7 CONSULTATION INITIATED COMPLETED

SEC. 7 CONFERENCE INITIATED COMPLETED

NON-CONSULTATION COORDINATION INITIATED COMPLETED

DATE	PARTIES	CONVERSATION ABSTRACT
11/9/92	Howard Bucky Cully FWS	I called Bucky to get his opinion on the potential impacts of O-G leasing on Aplomado falcons in this area. I also wanted to know the results of Jim Hervey's trip thru the area - what they thought the habitat condition/suitability was for the falcons. He said much of the area appeared to be good falcon habitat. While this species is not currently known to occur in the area,

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11/9/88 Cont'd	Howard/Cully	it is historic habitat and the birds appear to be moving back into surrounding areas.) His concerns on the leasing proposal were direct impacts of disturbance and habitat loss and also indirect impacts of decrease in prey base and hazards such as dump pits, powerlines, various toxic substances. I suggested to him that I thought an overall plan of development was in order that would require organized development (roads, roads, etc.) to minimize disturbance and habitat loss impacts. He thought a plan to accomplish this for Brighton (which I suggested) would likely work for P. falcons as well. The conclusion of the conversation was that an informal Sec 7

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11/9/92	Howard/Cully	Consultation is appropriate. We should begin by requesting an official species list.
11/25/92	Howard/Cully	Cully returned my calls. I told him: 1. Management's reluctance to get involved with a S.7 now due to their belief that leasing is not an impact. 2. My reservations in that I feel that we should be doing an informal at this point, in effect that we have the cart before the horse. Also that I was in a touchy position because of this. 3. I told him we had shipped the parcels forward for leasing in January with the NTL for endangered species attached. 4. I am waiting for some info from Santa Fe. When I digest that

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	Curry/Howard	into I would be preparing a letter (informal) to them. 5. Purpose of the call was to let him know what was done and when we [illegible] coming from. He told me: 1. He probably won't be the contact any more. Karen Kathy probably would handle it. 2. When I asked how he thought his office would handle it, he said he didn't think it would be a problem. They generally settle such things easily and with little fuss. 3. He said as a result of the plaza problems at Carlsbad, and because of the current goings on with the [illegible] in the area they would like to do an informal cons. to prevent the Carlsbad problems at this early stage.

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	Cully/Howard	He reiterated (from last call) that Congressional [illegible] could also be an issue they would want to address.
11/16	Mike Howard to Marcus Gerresen FWS	I was trying to contact Buck Cully. He was out so I spoke to Thomas. The purpose was to try to convince them that a consultation was not needed. ~~Thomas~~ After discussing potential impacts of leasing and development a little - Thomas felt like they needed more info to decide. He wanted a letter describing the action.
11/16	Mike Howard to Mike Donahoe FWS	I called Mike D. to try to see if he would agree to forego Sec 7 on the Ohio lease. I described the action and our management's desire to avoid 7 due to lack of impacts from leasing itself. Mikes response was that while leasing itself

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	Howard/Donahoo	did not cause impacts, the program of leasing - oil and gas development - finally causes impacts. APD's are interrelated to the leasing action and should be analyzed at this point. He feels like informal Sec 7 is still needed. I told him I couldn't argue with that, and that we would ship a letter up for an informal consultation.
11/25/92	Mike Howard Ann Henry FWS	I called Ann to see what her opinion was of Otero Mesa for Aplomado Falcon habitat based on her field trip to McGregor Range this past fall. 1. She didn't feel like she saw enough to know the whole situation. 2. She saw areas of good grass cover with yuccas as well as less desirable shrub/bare ground areas. She doesn't know if

CONTINUED PAGE 7

DATE	PARTIES	CONVERSATION ABSTRACT
11/25/92	Howard/Henry	There is a large enough contiguous piece of land that could support 1 or more pairs of falcons. 3. Bottom site - there is good habitat present, but she is not familiar enough with the area to judge its suitability for falcons. She says [illegible] [illegible] is [illegible]. I explained to her that I was collecting info for a [illegible] as an O&G leasing project
11/25/92		

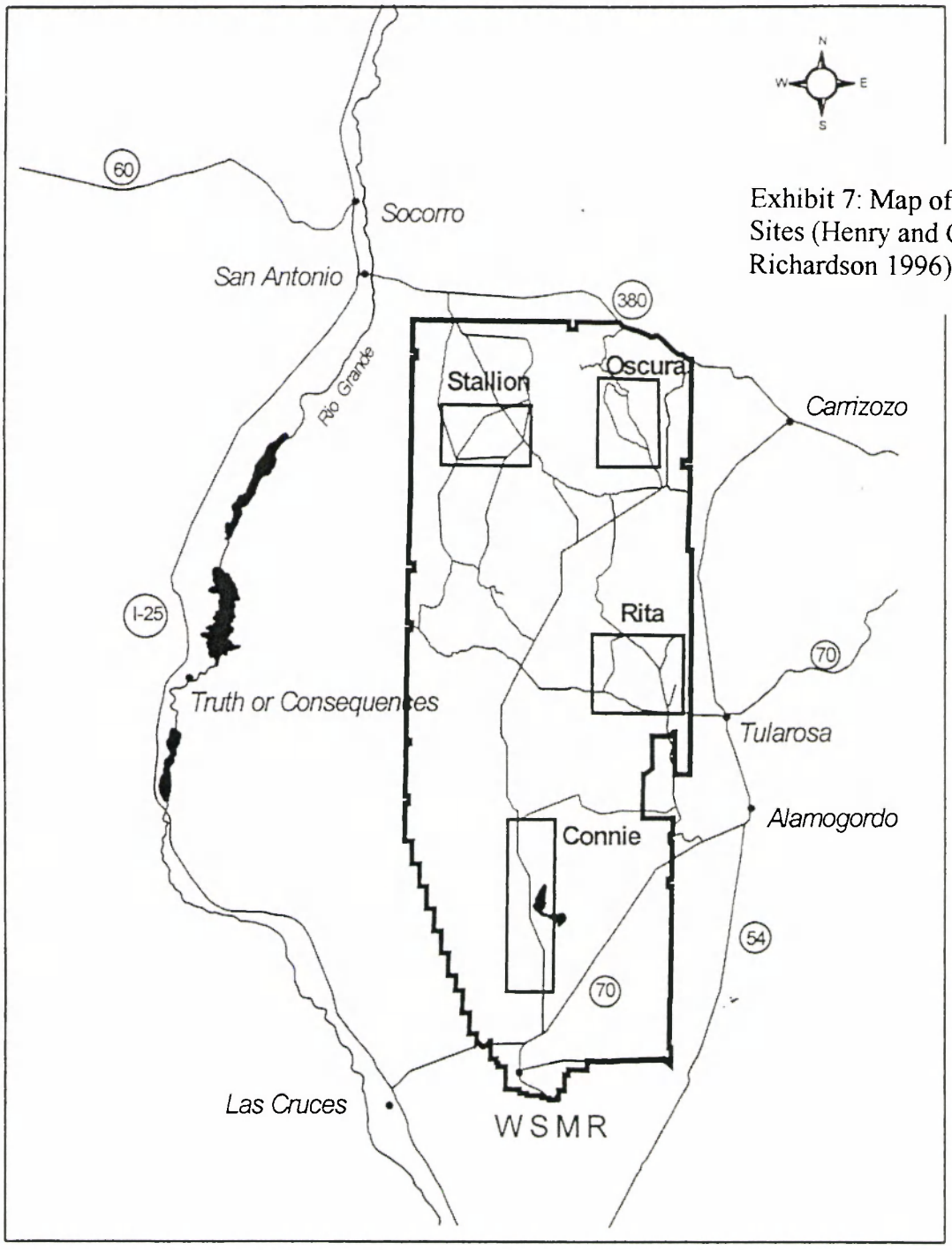
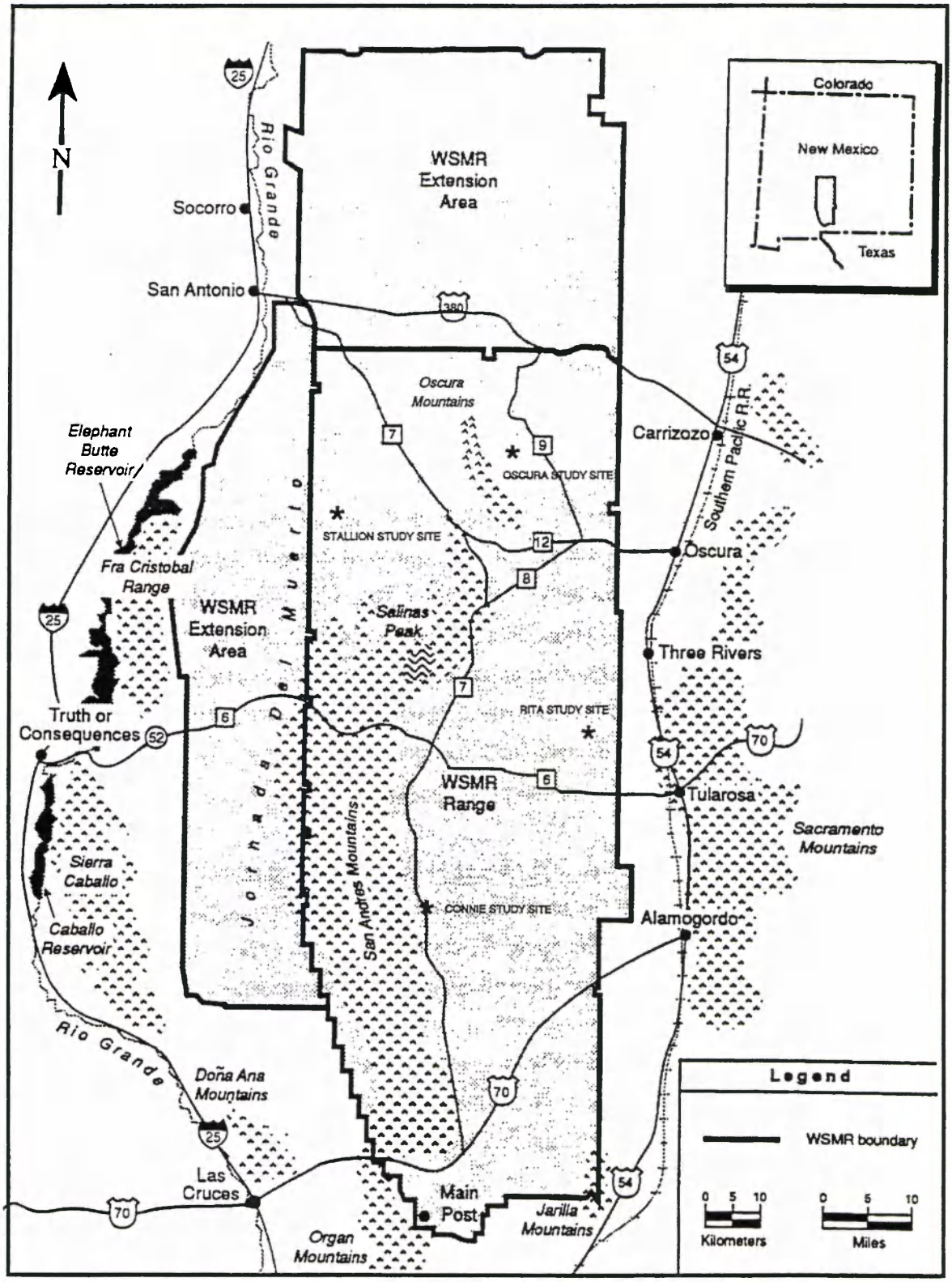


Exhibit 7: Map of WSMR Study Sites (Henry and Cathey 1995; Richardson 1996)

Figure 1. General map of White Sands Missile Range study areas.

Figure 1. Four study sites on White Sands Missile Range, New Mexico



FISH AND WILDLIFE SERVICE
DOCUMENT TRACKING CONTROL SLIP

FWS Form 3-2180
Attach to front of folder

DCN: 010730	ES No:

Orig. Office: CCU	Received Date: 12/27/2002	Addressee: Rosmarino,Nicole
Due Date:	Signature Level:	
Subject: Petition - Northern Aplomado Falcon		

Comments:

Action Codes:

0 - Prepare Draft Reply
1 - Prepare Reply
2 - Appropriate Action
3 - Surname
4 - Signature
5 - Review/Comment
6 - Revise
7 - Obtain Additional Surnames
8 - Other - See Comments
9 - Mail/Distribute
10 - Finalize
11 - Simultaneous Surnames

Routing:

Routed To	Action	Assigned Date	BF DATE	Returned Date
CCU	2 - Appropriate Action	12/27/2002		12/27/2002
AES	2 - Appropriate Action	12/27/2002		

December 16, 2002

Hon. Gale A. Norton
Secretary of the Interior
U.S. Department of the Interior
1849 C Street NW
Washington, DC 20240

Steven A. Williams, Director
U.S. Fish and Wildlife Service
U.S. Department of the Interior
1849 C Street NW
Washington, DC 20240

BY CERTIFIED MAIL – RETURN RECEIPT REQUESTED

RE: Notice of Violation of Section 4(b)(3)(D) of the Endangered Species Act Relating to the Petition to Revise the Critical Habitat Designation for the Northern Aplomado Falcon

Dear Secretary Norton and Director Williams,

We are writing to inform you that you are in violation of the Endangered Species Act ("ESA"), 16 U.S.C. §§ 1531-1544, by failing to take action required by section 4(b)(3)(D)(i), concerning the petition to revise the critical habitat determination for the Northern Aplomado Falcon (Falco femoralis septentrionalis). 16 U.S.C. § 1533(b)(3)(D)(i). This letter is being provided to you pursuant to the 60-day notice requirement of the citizen suit provision of the ESA. 16 U.S.C. § 1540(g)(2)(C).

Secretary Norton, on September 9, 2002, you received a petition to revise the critical habitat determination for the Northern Aplomado Falcon. ESA section 4(b)(3)(D)(i) and its regulations require you, within 90 days of receiving the petition, to make a finding as to whether the petition presents substantial scientific or commercial information indicating that the petitioned critical habitat revision may be warranted. 16 U.S.C. § 1533(b)(3)(D)(i); 50 C.F.R. § 424.14(c). Accordingly, the 90-day finding was due on or before December 8, 2002.

You have not made the required 90-day finding on the petition to revise the critical habitat determination for the Northern Aplomado Falcon, and so are in violation of the ESA. None of the petitioners – Forest Guardians, Chihuahuan Desert Conservation Alliance, and the Texas chapter of Public Employees for Environmental Responsibility – have received any correspondence from the U.S. Fish and Wildlife Service regarding its review of the petition to revise the Northern Aplomado Falcon's critical habitat determination.

If you do not make the required finding on the Northern Aplomado Falcon within the next sixty days, Forest Guardians, Chihuahuan Desert Conservation Alliance, and the Texas

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www.fguardians.org ▼ swwild@fguardians.org

chapter of Public Employees for Environmental Responsibility intend to file suit to force you to do so. Please contact me if you have any questions or if you would like to discuss this matter.

Sincerely,

Nicole J Rosmarino

Nicole J. Rosmarino, Ph.D.
Endangered Species Coordinator
Forest Guardians

for
Steve West
Chihuahuan Desert Conservation Alliance

Scott Royder
Texas Public Employees for Environmental Responsibility

cc: Dale Hall, U.S. Fish and Wildlife Service Region 2 Director

Exhibit 8: Map of Falcon Reintroduction Areas in Arizona (Corman 1992; King et al. 1995, Bahre 1995).

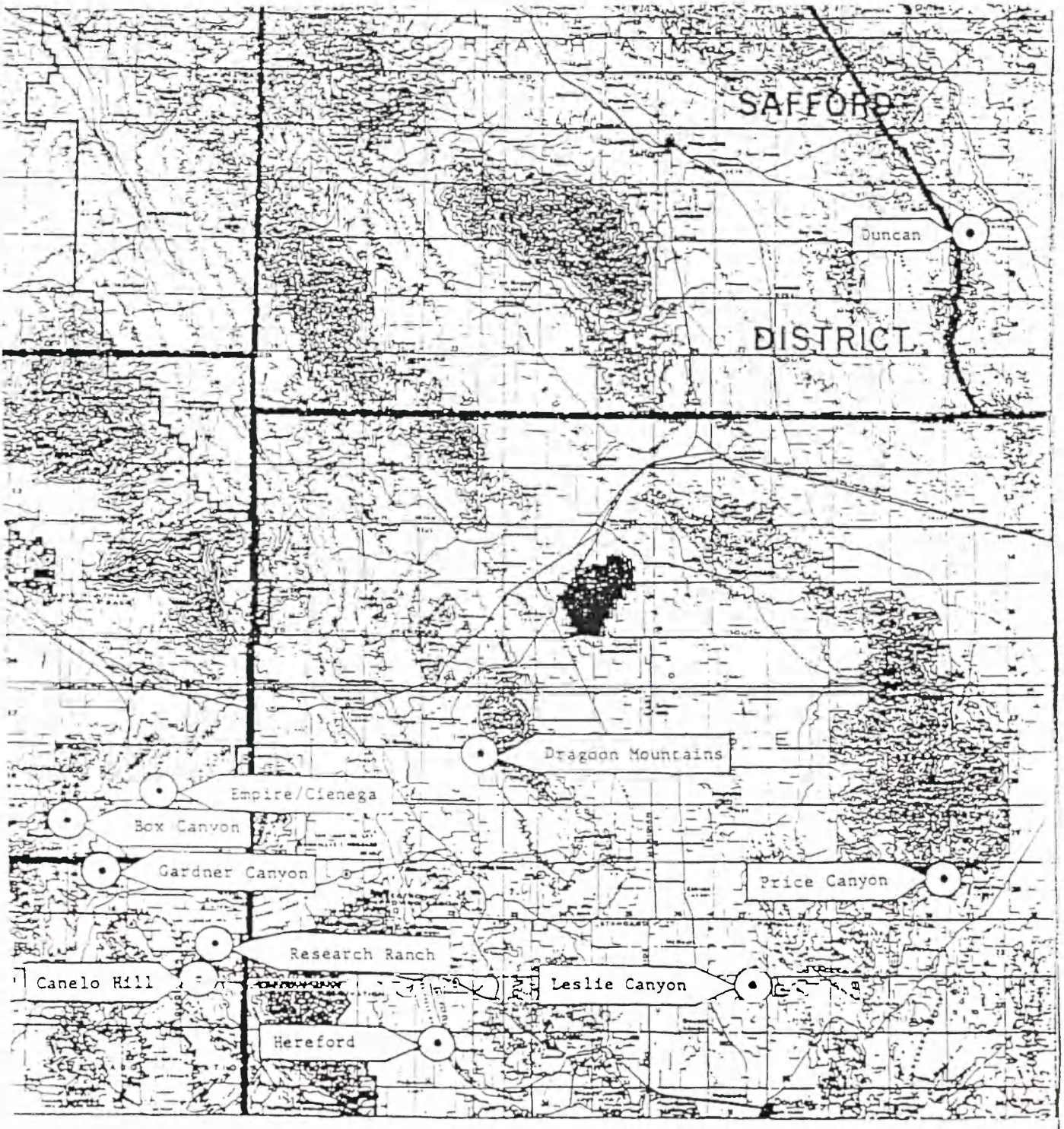
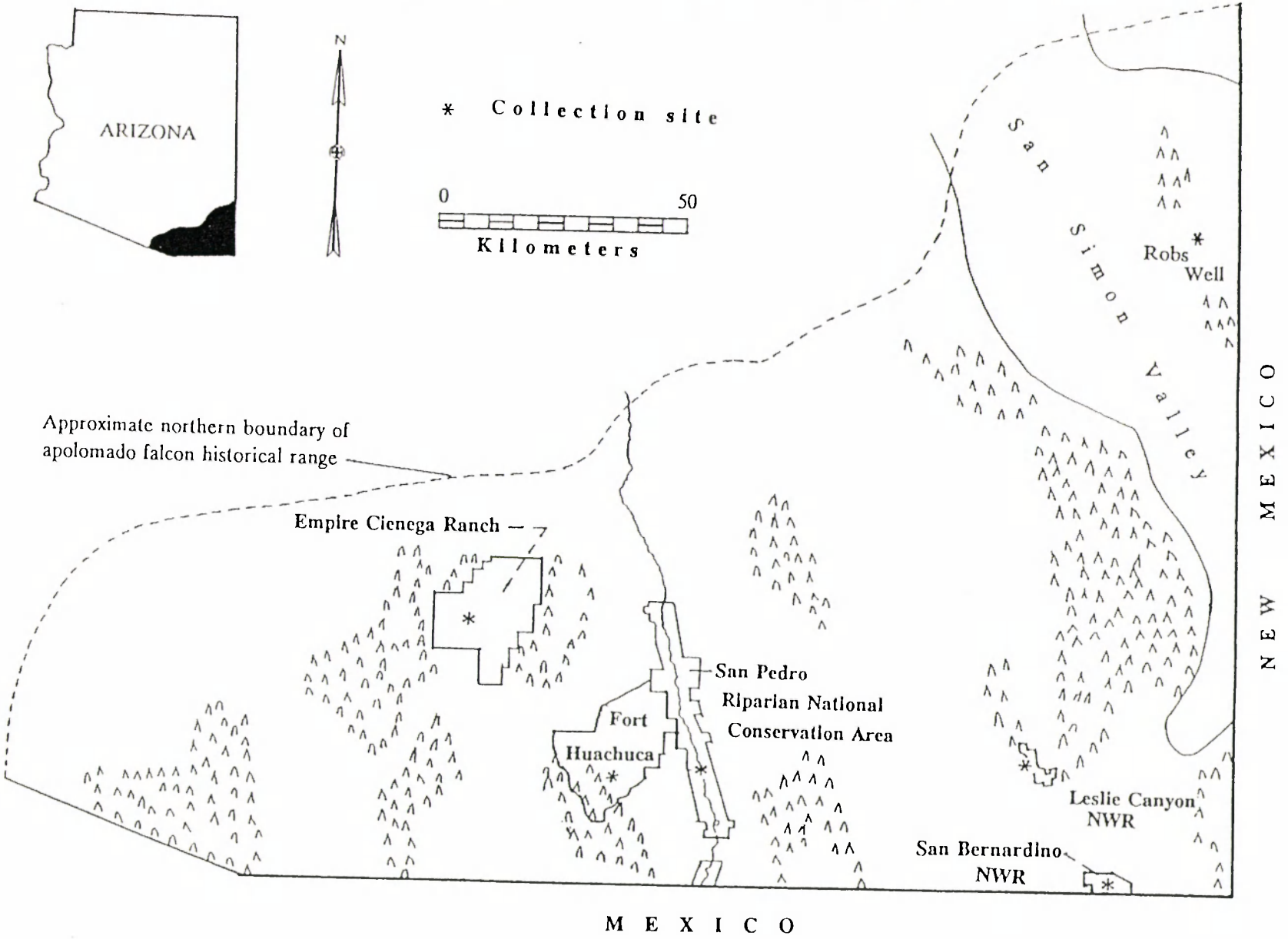


Figure 1. Location of ten potential aplomado falcon release sites in southeastern Arizona.

Map Location


ARIZONA
N
* Collection site
0
50
Kilometers
San Simon Valley
Robs Well
Approximate northern boundary of apolomado falcon historical range
Empire Cienega Ranch
San Pedro Riparian National Conservation Area
Fort Huachuca
Leslie Canyon NWR
San Bernardino NWR
NEW MEXICO
MEXICO

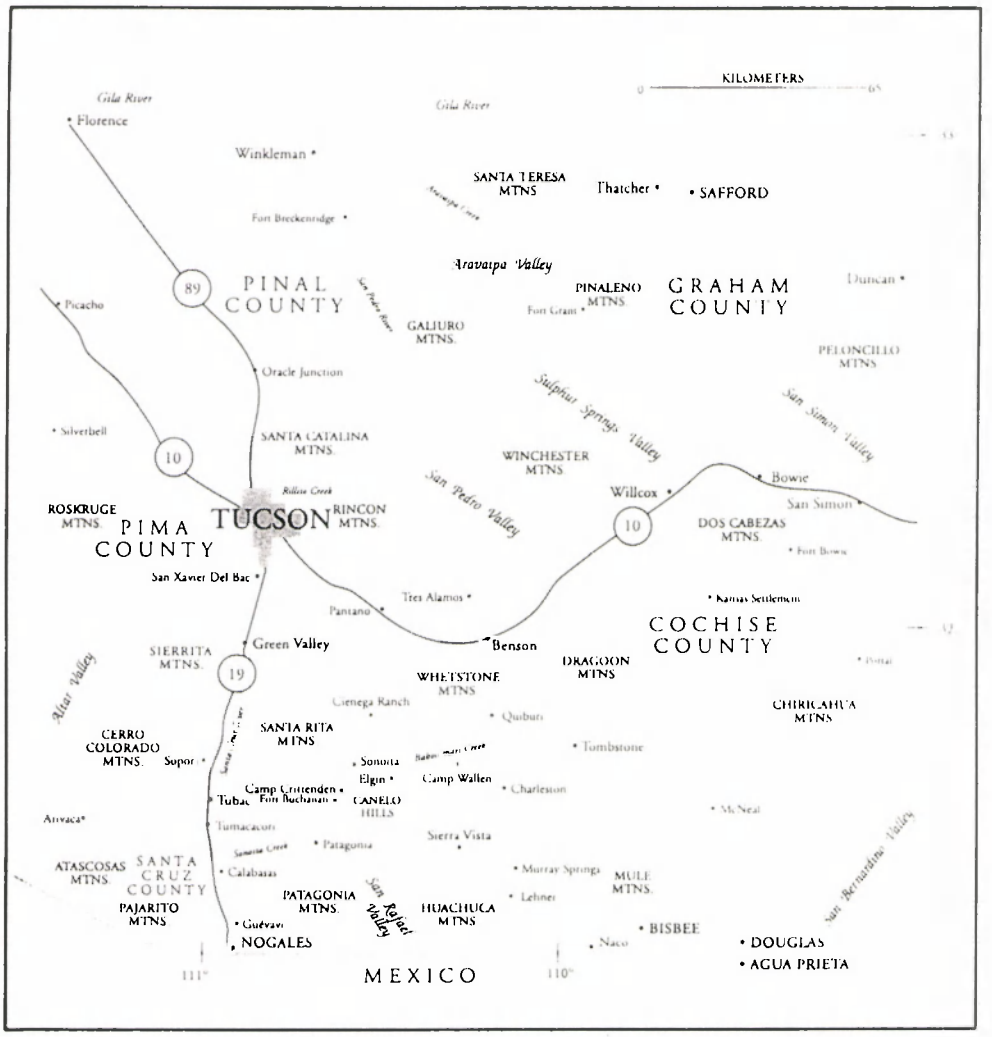


Figure 8.1. Place-name map of southeastern Arizona.

lope (*Antilocapra americana*), prairie dog (*Cynomys ludovicianus*), and Mexican wolf (*Canis lupus baileyi*) were abundant. Today, the landscape is different. The native grasses have declined, and in many areas nonnative species have replaced them; wildfires are rare; erosion is commonplace; and several grassland predators and herbivores have been eliminated. Probably the two most dramatic changes in the grasslands are the extensive increases in woody shrubs and trees and the landscape fragmentation resulting from localized urban and rural settlements.