A COOPERATIVE REINTRODUCTION PLAN FOR BLACK-FOOTED FERRETS AUBREY VALLEY, ARIZONA

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in cooperation with

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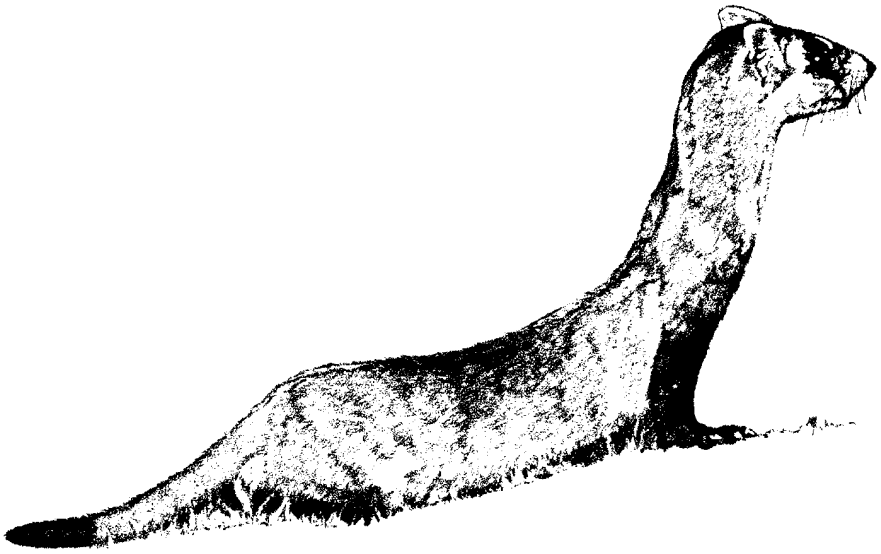

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EXECUTIVE SUMMARY

1. The Aubrey Valley Complex located in Coconino and Yavapai counties, Arizona was probably occupied by black-footed ferrets. Due to the excellent habitat potential, this complex has been proposed by the Arizona Game and Fish Department and the Black-footed Ferret Interstate Coordinating Committee for the fourth reintroduction site of black-footed ferrets in the United States.

2. The Arizona Game and Fish Department, The Navajo Nation, United States Fish and Wildlife Service, Arizona State Land Department, and The Phoenix Zoo began drafting this plan in early 1993 to designate a management area boundary, identify and address issues and concerns, and complete planning for reintroduction.

3. The Aubrey Valley Complex is comprised of Gunnison's prairie dog (*Cynomys gunnisoni*) towns which covered approximately 7100 hectares (17,544 acres) in 1990 and 1991. In 1992, intensive mapping showed the Aubrey Valley Complex to actually include 6959 hectares (17,196 acres) of prairie dog towns which is estimated to have a carrying capacity of 35 ferret families or approximately 53 adult ferrets.

4. The Aubrey Valley management area encompasses 25,598 hectares (63,253 acres) of deeded land and 18,536 hectares (45,802 acres) of state trust land. The management area is comprised of 42 percent state trust land and the remainder is deeded land owned by the Navajo Nation and other landowners.

5. This plan presents the management actions necessary to re-establish a naturally breeding, self-sustaining population of ferrets. Their management will be compatible with existing land uses such that ranch life styles, recreational public use and income potential will not be negatively impacted.

6. To achieve these goals, we propose that reintroduced ferrets and the subsequent population be designated as "nonessential experimental." Such a designation essentially removes the extremely restrictive regulations that protect each individual of an endangered population and instead promotes the conservation of the population.

   This designation is justified because a captive population exists, thus ensuring long-term survival of the species. Similar designations have been proposed for reintroduction sites in Montana and South Dakota and finalized for Shirley Basin, Wyoming.

   The "nonessential experimental" area is defined as the Aubrey Valley west of the Aubrey Cliffs, starting from Chino Point running north, to the southeast boundary of the Hualapai Indian Reservation, running southwest along the boundary to U.S. Highway Route 66, and back to Chino Point east and north of the Juniper Mountains

7. To landowners and Arizona State Land Department in the management area, this "nonessential experimental" designation and this reintroduction plan means:

   - They can continue operations and activities associated with their lands without concerns about problems that could develop from the potential or actual accidental killing or displacement of an endangered species.

   - The opportunity to cooperatively decide the number and distribution of prairie dogs and corresponding ferrets that may occur on deeded and leased lands.

   - The assurance that they will not be forced to place benefits to ferrets ahead of economic gain and/or stability.

8. For landowners adjacent to the management area, the experimental population designation and this reintroduction plan mean:

   - Same items as listed for landowners within the management area.

   - As part of an experimental population, ferrets could be quickly removed and returned to the management area or captivity if they appear on lands outside the management area and the landowner approves or requests such action.

9. For sportsmen who hunt in the management area, this reintroduction plan means:

   - Hunting for game animals or predators and shooting of prairie dogs will not be restricted, except on prairie dog towns with release cages during the release phase of the reintroduction. This procedure would be necessary for less than 50% of the Aubrey Valley Complex during any release period of 4-6 weeks.

   - Accidental take of a black-footed ferret will not result in prosecution if properly reported.

10. The plan details objectives and problems which may prevent the attainment of objectives and strategies to overcome such problems.

11. The most worrisome problems concern the potential impacts of epizootics involving both ferrets (canine distemper) and prairie dogs (sylvatic plague), the ferret's primary prey base. Strategies in this plan establish minimum criteria for avoiding reintroduction in areas where these epizootics are likely to significantly impact the program.

A Cooperative Reintroduction Plan for Black-footed Ferrets Aubrey Valley, Arizona

INTRODUCTION

This cooperative plan for the reintroduction and management of black-footed ferrets (*Mustela nigripes*) in Aubrey Valley was written by the Arizona Game and Fish Department (AGFD), Navajo Natural Heritage Program, United States Fish and Wildlife Service (USFWS), and The Phoenix Zoo. Its development also included coordination with Arizona State Land Department. The AGFD, as the primary preparer, received project review and recommendations from the Wyoming Game and Fish Department, USFWS, and the Black-footed Ferret Interstate Coordinating Committee. This plan is intended to be a dynamic document that will be annually reviewed and updated if necessary through recommendations from the cooperating agencies and participating landowners. This plan is to be accomplished within existing authorities and is not intended to supersede previous agreements or agency responsibilities. Nor will it preclude a full evaluation of management alternatives in present or future planning processes.

The Aubrey Valley Complex (AVC) in northwestern Arizona is proposed to be the fourth ferret reintroduction site for black-footed ferrets in the United States. This plan was prepared on the schedule shown in Appendix 1 in order to have the AVC site ready to receive ferrets in 1994.

Other pertinent documents include a Final Rule for designating the population as an "nonessential experimental" population and an AGFD report titled **An evaluation of a potential black-footed ferret reintroduction site in the Aubrey Valley, Coconino County, Arizona** (Belitsky et al. 1993).

BACKGROUND

The black-footed ferret has been threatened with extinction since the 1940s. Fragmentation and loss of habitat, along with declining ferret populations, are detailed in USFWS (1988). Despite massive inventory efforts, no natural occurring populations of ferrets are known to exist today. An ongoing reintroduction effort in Wyoming, similar to the one proposed here, has succeeded in establishing a reproducing population (Wyoming Game and Fish Department 1992). Thorne and Oakleaf (in press.) present an analysis of historical population trends in the United States based on the number of museum specimens per decade. Statistically, the curvilinear decline of natural occurring ferret populations since the 1940s is highly significant (R^2=0.9207). Extrapolation of this historical trend, calculated by the regression formula, presents a convincing argument that even if unknown natural occurring populations remain the species will become extinct in 20 years without the intervention of man. The only hope of preventing the extinction depends on re-establishing several populations in the wild and intensive management to offset causal factors of decline.

There is ample evidence that ferrets historically occupied northern Arizona. Museum specimens of ferrets were collected from three locations in Coconino County from 1929 to 1931 (Fig. 1 and Table 1). Louis Cox, Animal Damage Control (ADC) trapper, remembered seeing ferret sign eight km east of the AVC while poisoning prairie dogs in 1967 (pers. com. 1993).

Recovery objectives for the historical range of the ferret, as outlined in the recovery plan (USFWS 1988), include the following:

1. Increase the captive breeding population of ferrets to 200 breeding adults by 1991.

2. Establish a pre-breeding census population of 1500 free-ranging, breeding adults in ten or more populations with no fewer than 30 breeding adults in any population by the year 2010.

3. Encourage the widest possible distribution of reintroduced ferret populations.

The Department's objective is to re-establish at least one wild ferret population that maintains a total of at least 53 breeding-aged adults (Belitsky et al. 1993). After review of several sites presented to the 12 state group known as the Black-footed Ferret Interstate Coordinating Committee, the AVC site in Arizona was recommended by the group as a fourth reintroduction site. This reintroduction plan was prepared on a time schedule which allowed public review and approval of this and other legally required documents to facilitate a release in 1994.

Reasons for developing this plan include:

1. Providing a communications tool with all major participants to ensure that conflicts are identified and addressed.

2. Solicit input from landowners in and around the management area, the public, and professional biologists.

3. Promote and encourage actions toward the common goal of a successful reintroduction.

The plan is intended as a working document which outlines the actions necessary to maintain the suitability of the area for reintroduction and maintenance of a wild population of black-footed ferrets.

This plan is coordinated with other plans for ferret recovery (USFWS 1988, Belitsky et al. 1993), and is only part of a package of planning documents needed to reintroduce an "experimental population" of ferrets in AVC. Another document needed is a final ruling in the Federal Register to designate the reintroduced population as an "nonessential experimental" population as authorized under Section 10 (j) of the Endangered Species Act of 1973, as amended (Appendix 4).

MANAGEMENT AREA DESCRIPTION

The management area is defined as the Aubrey Valley west of the Aubrey Cliffs, starting from Chino Point running north, to the southeast boundary of the Hualapai Indian Reservation, running southwest along the boundary to U.S. Highway Route 66, and back to Chino Point east and north of the Juniper Mountains (Fig. 2).

Aubrey Valley is characterized by Brown (1982) as a Plains Grassland community, with the annual precipitation averaging 25 to 30 cm. The valley floor includes approximately 220 km^2 and ranges in elevation from 1600 to 1900 m. It is bounded on both sides by pinyon-juniper ridges along a 41 km northwest-southeast axis. Near mile marker #124, along Highway Route 66, the valley is 12 km wide.

The Aubrey Valley management area includes 25,598 ha (63,253 ac) of deeded land and 18,536 ha (45,802 ac) of state trust land for a total of 44,134 ha (109,055 ac) in Coconino and Yavapai counties. Deeded land represents 58 percent of the management area while state trust land makes up the other 42 percent.

The management area boundary was developed based on the following criteria:

1. It encompasses a majority of the prairie dog acreage in the complex as mapped using the "7 km Rule" (Biggins et al. undated).

2. It encompasses areas adjacent to the mapped complex where prairie dog expansion could occur.

3. It can be delineated with easily recognized boundaries.

PRAIRIE DOG INFORMATION

Distribution
Surveys conducted in the Aubrey Valley in 1992, the last year for which complete information is available, indicate approximately 6959 ha (17,196 ac) of prairie dog towns exist in the AVC (Fig. 2 and Table 3). These towns exhibit some of Arizona's highest prairie dog densities. Few areas within the AVC with habitat suitable for prairie dogs are not currently occupied. Approximately 600 ha of old prairie dog mounds, without burrow openings, are located on the southeastern edge of Pica Camp town. This is the only known area in the AVC which apparently was inhabited by prairie dogs but no longer is, and which may have potential for re-colonization. Other unoccupied areas in and adjacent to AVC include those overlain with deep, sandy soil which is probably unsuitable for burrow construction, areas within small basins that flood periodically, and areas within highway or railroad right-a-ways. Standardized prairie dog mapping techniques developed at Meeteetse, Wyoming (Biggins et al. undated) were used for all surveys completed in 1990, 1991, and 1992. The technique involves mapping and transecting all prairie dog towns, including low density areas. Therefore, the resulting maps are used to tally prairie dog acreage and density for lands within the management area, and to monitor changes before and after ferrets are reintroduced.

Control History
Prairie dog control by use of toxicants is not a widespread practice in the management area. Predatory Animal and Rodent Control agents of the U.S. Biological Survey treated prairie dog towns in the Aubrey Valley with poisoned grain in the mid-1950s and 60s, but the effort was apparently ineffective and not thorough. Control efforts have not been attempted since (Rex Williams pers. com. 1990 and Louis Cox pers. com. 1993).

Sport Shooting
Sport shooting of prairie dogs is common in the management area. Much of the shooting takes place on state land near highways and roads, or on accessible deeded lands. This factor should be considered since prairie dog removal could inhibit survival of black-footed ferrets.

Plague Management History

Gunnison's prairie dogs in Arizona have been affected by plague outbreaks since 1932 (Eskey and Haas 1940). Hoffmeister (1986) reports that prairie dogs in Arizona are recognized as reservoirs of plague. Arizona's Department of Health Services, Division of Disease Prevention, has monitored plague occurrence in humans, wildlife, and domestic pets since 1950. Dr. John Doll, the Division's Manager of Vector and Zoonotic Diseases (VZD), provided the following information:

> VZD monitors plague activity in Arizona by documenting human cases, testing carnivore blood samples for plague titers, and testing flea pools collected from Gunnison's prairie dog towns. The first human case of plague in Arizona was diagnosed in 1950, with subsequent cases as recently as 1992. Blood samples from carnivores collected by USDA Animal Damage Control and AGFD personnel have been analyzed for plague antibodies since 1974.

VZD has monitored plague outbreaks in prairie dog towns since 1974, verifying the outbreaks with analysis of flea samples. The monitoring includes annual visits to prairie dog towns along a route that parallels Interstate Highway 40 in Apache, Navajo, and Coconino counties. One of the monitoring locations is Aubrey Valley, where, over the last 18 years, a wide spread die-off has never been observed. Furthermore, flea pools from AVC prairie dog burrows have always tested negative for plague. These observations are supported by Tim Pender (pers. com. 1991), the AGFD Wildlife Manager stationed in Seligman, Arizona. During 100 person-hours of field work in 1990, 300 person-hours in 1991, and nearly 400 person-hours in 1992, AGFD field crews observed no dead or dying prairie dogs in AVC except for those attributable to predation. The present study's 1990, 1991, and 1992 estimates of 7170 ha, 7025 ha, and 6959 ha, respectively, of habitat occupied by prairie dogs in the AVC also fail to indicate substantial die-offs.

Despite the absence of documented plague occurrence in AVC, at least some fluctuation in the prairie dog population is likely. Plague is probably epizootic at times in locations adjacent to AVC, as is indicated by carnivore blood titer analysis. The carnivores may be exposed to plague as a result of preying on rock squirrels (*Spermophilus variegatus*), which may be the most widespread and consistent carrier of plague in Arizona (John Doll pers. com. 1991), and which are relatively common around AVC.

Adjacent Complexes

The Aubrey Cliffs separate the southeastern part of the AVC from a smaller complex, containing approximately 1100 ha (2750 ac) of prairie dogs, on the east side of the Aubrey Cliffs. This complex is referred to as the Seligman Complex and is approximately three miles from the AVC. Even though it is within the guidelines of the "7 km rule" (Biggins et al. undated), it is not included in AVC nor the management area because Aubrey Cliffs provide a significant barrier to potential ferret dispersal into this complex.

A complex known as the Farm Dam Complex, totalling approximately 530 ha (1309 ac), is located northeast of the AVC. This complex is separated from the AVC by the Aubrey Cliffs and is approximately 35 km from the AVC. In this case, the Aubrey Cliffs and the distance between complexes is expected to be a significant barrier to potential ferret dispersal.

There is also a small complex of four towns, totalling approximately 200 ha (494 ac), 10 km north of the AVC but within the management area. This complex might serve as a ferret expansion area, as there are no barriers like Aubrey Cliffs to inhibit ferret movements.

Intra-Complex Expansion
Approximately 16 percent of the management area is active prairie dog towns. Although prairie dog expansion is possible, it is not expected nor is it proposed as ferret habitat improvement. Intensive monitoring since 1991 has shown total prairie dog acreage to be stable and current prairie dog occupancy of the management area is considered sufficient to support the target level of ferrets.

BLACK-FOOTED FERRET INFORMATION

Surveys
Since 1990, intensive ferret surveys have been conducted within the experimental population boundary. A total of ten surveys were conducted within the management area. The surveys expended 499 person-hours and encompassed an estimated 2540 ha (6276 ac)(Table 4).

Estimated Carrying Capacity
The ferret family rating is a numerical value derived from the acreage and density of prairie dogs, and used to estimate ferret carrying capacity of a prairie dog complex. The ferret family rating for the AVC was extrapolated from 1992 prairie dog density transects. Sampling was conducted on 6477 ha (16,004 ac) in nine prairie dog towns which represents nearly 93 percent of the entire mapped complex. The areas sampled had a ferret family rating of 35 (Appendix 3).

These calculations are based on guidelines set up by Biggins et al. (undated) using data collected from white-tailed prairie dog (*Cynomys leucurus*) colonies. The species of prairie dog found in northern Arizona, including the Aubrey Valley, is known as the Gunnison's prairie dog (*C. gunnisoni*). According to Pizzimenti (1975), *C. gunnisoni* has a looser form of social organization than *C. leucurus* but is in the same subgenus, *Leucocrossuromys*. Therefore, we assume that Gunnison's prairie dog compares closely to the white-tailed prairie dog when determining the carrying capacity of a complex.

Captive Population
The Phoenix Zoo received breeding stock for a captive population in December 1991, and held 26 adult black-footed ferrets as of January 1, 1993. The objective is to increase the population to 36 adult ferrets by 1995.

GENERAL WILDLIFE INFORMATION

Wildlife
There are 38 species of mammals (Hoffmeister 1986) and 57 species of nongame birds (Troy Corman pers. com. 1993) currently known to occupy the management area. According to the **Arizona Wildlife Viewing Guide** (Carr 1992) Aubrey Valley is a prime area for viewing prairie dogs from the highway. The guide also mentions other commonly seen wildlife such as, pronghorn, golden eagle, red-tailed and ferruginous hawks. There are no likely conflicts with black-footed ferret management and wildlife viewing opportunities.

Sport Hunting
Portions of Hunt units 10 and 18A are in the management area. Hunting for game animals or predators and shooting of prairie dogs occur within the management area. There are no likely conflicts with black-footed ferret management and sport hunting opportunities unless shooting results in significant declines of prairie dogs in areas where ferrets have recently been released and attempting initial establishment.

Canine Distemper History
No historical information is available regarding distemper in the management area. A canine distemper monitoring effort will be established in 1994 before release of ferrets. As in other ferret release sites (Williams 1991), distemper in coyotes is expected. The objective of the monitoring is to act as an early warning for an outbreak.

Predator Occurrence
Common mammalian predators in the area include coyote, gray fox, and badgers. Common raptors include great-horned owl, red-tailed hawk, ferruginous hawk, rough-legged hawk, golden eagle, Swainson's hawk, northern harrier, American kestrel, burrowing owl, and prairie falcon. Extensive, long-term predator control programs are not planned for the management area.

CURRENT LAND USE

Grazing and Recreation
All lands in the management area are subject to livestock grazing, range improvements, and to a variety of recreational activities. To date, no recreational activities, range

improvements, or grazing practices have been observed that would adversely impact ferret habitat. Any future recreational activities or range improvement projects would not be expected to have adverse impacts to ferrets or their habitat.

MANAGEMENT DECISIONS/EVALUATIONS

Land ownership in the management area is a combination of 42 percent state trust lands and the remainder deeded. AGFD policy requires approval from owners of deeded land directly involved in reintroduction before any program is approved. Therefore, the first step in the process began in 1992 when landowners were contacted about the ferret project. Since mapping outside the AVC was conducted simultaneously with transecting, the AVC management area could not be viewed as a whole until all mapping was compiled in 1992. The purpose of the landowner involvement was to discuss the following:

1. The purpose of prairie dog habitat mapping and transecting of prairie dog towns conducted over the past three years.

2. The potential of the area as a future ferret reintroduction site.

3. Preliminary issues and concerns.

The Navajo Nation acquired the Big Boquillas Ranch in 1987. The Ranch occupies the majority of the management area (Fig. 3). The Arizona State Land Department, Navajo Nation, and other landowners granted permission for the mapping and transecting on their ranches, and have not expressed opposition to this evaluation as long as the population is designated "nonessential experimental." This designation is justified because a captive population exists, thus ensuring long-term survival of the species. Similar designations have been proposed for reintroduction sites in Montana and South Dakota, and finalized for Shirley Basin, Wyoming.

Such a designation essentially removes the extremely restrictive regulations that protect each individual of an endangered population and instead promotes the conservation of the population.

As part of an experimental population, ferrets could be quickly removed and returned to the management area or captivity if they appear on lands outside the management area and the landowner approves or request such actions.

Ferret reintroduction and occupation of deeded or state trust lands under the "nonessential experimental" designation does not supersede or in any way reduce the fundamental rights of landowners to manage their property and control activities including those related to the ferret program.

The "nonessential experimental" designation allows the Arizona State Land Department and landowners to continue operations and activities associated with their lands without

concerns about problems that could develop from the potential or actual accidental killing or displacement of an endangered species.

OBJECTIVES

1. In compliance with the USFWS BFF Recovery Plan, manage one reintroduction site in Arizona with ≥ 30 breeding adults and retain enough prairie dog habitat to support these ferrets.

2. Cooperatively work with the Arizona State Land Department and landowners in the management area to maintain at least 90 percent of the prairie dog acreage known in 1992.

3. Promote a working relationship between the Department, Navajo Natural Heritage Program, U.S. Fish and Wildlife Service, The Phoenix Zoo, Arizona State Land Department, and landowners.

4. Initiate ferret reintroduction into AVC in 1994. If AVC should fail as the priority experimental reintroduction site in 1994, use the site in the future when it meets the minimum criteria.

5. Reintroduce up to 50 ferrets initially; annually reintroduce an adequate number to establish a population with ≥ 30 breeding adults by 1998.

GOALS

1. Design the ferret management program to be compatible with existing ranch livestock and other operations so that neither lifestyles nor income potential are negatively affected.

2. Establish within the management area a free-ranging ferret population of ≥ 53 breeding adults.

3. Maintain a working relationship between the Department, Navajo Natural Heritage Program, U.S. Fish and Wildlife Service, The Phoenix Zoo, Arizona State Land Department, and landowners.

MINIMUM CRITERIA FOR IMPLEMENTATION

Criteria under which ferret reintroduction will be re-evaluated at the AVC site include:

1. Failure to maintain ferret habitat rating index of ≥ 30 breeding adults or data that this will occur within five years.

2. Inability of the AGFD and cooperators to accept this reintroduction plan.

3. Failure to acquire or maintain a "nonessential experimental" designation for the AVC management area through the Final Rule.

4. A wild ferret population is discovered within the management area.

5. An active case of canine distemper is documented in any wild mammal inside the management area within six months prior to the scheduled reintroduction.

PROBLEMS AND STRATEGIES

This section identifies the possible problems (indicated by numbers) that may prevent the attainment of objectives. Possible strategies (indicated by letters) are developed for each problem. Problems and strategies apply to all lands regardless of ownership status. The Arizona Game and Fish Department will be responsible for all implementation of strategies along with the other agencies denoted. Abbreviations are as follows: U.S. Fish and Wildlife Service (USFWS); landowners or managers; Navajo Natural Heritage Program (NNHP); The Phoenix Zoo (TPZ); and the Arizona State Land Department (ASLD); and Landowners.

1. **Some landowners, especially those not directly involved in management planning, may be concerned that their operations or deeded land rights could be affected by the reintroduction plan or the appearance of ferrets on their land. This concern could jeopardize the reintroduction program.**

    a) The management strategies proposed in this plan were formulated so they would not conflict with landowner operations. If new conflicts or problems are identified in the future, management strategies will be implemented on deeded lands only with the approval of the individual landowner involved. ASLD

    b) Provide information to landowners on the flexibility provided by the "nonessential experimental" designation of this proposed reintroduction effort. This flexibility is discussed in the Final Rule and the Executive Summary of this plan. USFWS, NNHP, ASLD

    c) Provide adjacent landowners with information on the low potential for dispersal inherent in the species and at the request or approval of the landowner ferrets located outside the management area may be relocated back to the management area. ASLD

    d) Implement Strategies 1a-c as follows:

        1) Provide landowner review of the working draft of this reintroduction plan in April 1993.

        2) Provide landowner and public review of a draft reintroduction plan in July 1993.

        3) Landowner representatives provide input during all phases of plan preparation, including working drafts. Landowners

4) Circulate the Proposed Rule to designate this population as "nonessential experimental" to all interested parties upon publication in the **Federal Register**. USFWS

5) Ensure circulation of this plan, especially the Executive Summary to all interested parties, both in state and out of state. USFWS

6) Through distribution of drafts of the reintroduction plan and frequent personal contact, keep all interested parties with responsibilities in the management area informed of the current status of the program. NNHP, ASLD

2. **Landowner support for prairie dog objectives and the ferret recovery program is essential.**

a) Structure this reintroduction plan and future programs to ensure that the ferret program is compatible with Arizona State Land Department and landowner operations, potential conflicts are identified early, and projected human activity levels associated with the program are acceptable to landowners. NNHP, ASLD, Landowners

b) Emphasize that current management of state trust and deeded rangelands in AVC is compatible with ferret habitat needs and that no management changes are needed to accommodate ferrets under the reintroduction plan. NNHP, ASLD

c) Emphasize that ferret reintroduction and occupation of state trust and deeded lands under "nonessential experimental" does not supersede or in any way reduce the fundamental rights of landowners to manage their property and control activities including those related to the ferret program. NNHP, ASLD

d) The goal will be to retain a minimum prairie dog acreage sufficient to support ≥ 30 breeding adults within the management area. NNHP, ASLD

e) Utilize the system described in Biggins et al. (undated) to monitor prairie dog acreage changes and identify expansion or reduction on all towns, or establishment of new towns. Annually evaluate transect data for comparison of acreage objectives. If necessary, recommend management techniques compatible with prairie dog and ferret objectives to address any potential problems. Examples of such techniques may include prairie dog control methods that are not lethal to ferrets, removal of ferrets prior to control methods, the use of ferrets to control prairie dog numbers, or agreements to allow expansion of acreage elsewhere in the management area to compensate for the acreage lost during the control program. ASLD, NNHP, Landowners

3. **Ferrets are not widely known to Arizona's public which may inhibit support for the reintroduction and management of ferrets.**

a) At appropriate stages provide program information through news releases to local newspapers, radio and television stations, the Nongame Newsletter, and Arizona Wildlife Views magazine as well as other publications. TPZ, NNHP

b) Develop interpretive exhibit on black-footed ferrets and their potential for reintroduction in Arizona. Conduct public educational programs on black-footed ferret biology and reintroduction. Promote the endangered status of ferrets to the public and interpret the species natural history. TPZ, NNHP

4. **Canine distemper and other diseases common to carnivores may pose a serious threat to successful ferret reintroduction.**

a) Samples from coyotes and badgers will be obtained prior to reintroduction efforts. Predator density is unknown, but a maximum of 40 coyotes and 15 badgers will be sampled from the AVC for comparable results with Williams et al. (1991) disease survey. USFWS, NNHP

b) Sampling and handling procedures should be coordinated with the Adobe Mountain Wildlife Center coordinator or other wildlife veterinarians. TPZ

c) Encourage local residents to report wildlife that appears to be sick and to vaccinate dogs and cats.

d) Discourage visitors from bringing dogs to the management area and prohibit the same for biologists.

e) Conduct periodic checks with local veterinarians for data on infectious diseases which may affect the project.

f) Dogs in the AVC are primarily ranch/house dogs and occasional hounds used for lion hunting. Educate hunters using the management area regarding the potential for introduction of distemper by hunting dogs. Advertise locally and provide free vaccination for local residents to improve voluntary compliance.

5. **Sylvatic plague may cause a significant decline in prairie dog numbers.**

Although, there is little that can be done to contain a plague outbreak, advanced knowledge of active plague areas will allow adjustment of release sites to avoid areas with plague, and may indicate the need for relocation of ferrets.

a) Collect all dead prairie dogs found in the management area during prairie dog habitat evaluations. Arrange with the Arizona Department of Health Services to analyze dead prairie dogs for evidence of plague.

b) Continue to use standard flea sampling information provided by Arizona Department of Health Services, which began in 1974, for the occurrence of plague in the management area.

c) Use standard techniques for monitoring prairie dog populations as a second indicator of plague or other factors causing a population decline which may impact ferrets. NNHP

d) If pre-release studies indicate that plague is significantly affecting prairie dog populations over the entire management area, the release site will be temporarily abandoned in favor of another site. No attempt will be made to treat prairie dog burrows to control plague since this technique proved ineffective when attempted at Meeteetse, Wyoming in 1985.

e) If the ferret habitat rating index in AVC drops to 50 percent or less of the objective level due to plague, reintroduction efforts should cease. No attempt will be made to treat prairie dog burrows to control plague. If ferrets already occupy the AVC, young-of-the-year and possibly all ferrets should be translocated to another complex, if justified, or back into captivity. The number to be translocated will be determined by population modeling and the predicted habitat rating index so that the ferret population does not exceed the calculated carrying capacity. USFWS, TPZ, NNHP

6. **Trapping for furbearers and predators by USDA Animal and Plant Health Inspection Service or private trappers could result in ferrets being accidentally killed.**

a) Predator control related to ADC actions may be carried out within the management area. In prairie dog towns, the use of leghold traps with enough tension that would preclude a ferret being caught and/or snares equipped with a stop that would preclude ferret capture will be required. Use of M-44s would not be allowed in prairie dog towns. NNHP, USFWS, ASLD, Landowners

b) Designate the management area as a special use trapping area requiring trappers to work closely with the AGFD Wildlife Manager stationed in Seligman. This would require Arizona Game and Fish Commission rule change. AGFD Wildlife Managers will instruct trappers on techniques and locations that will avoid ferrets. An information packet will inform trappers of opportunities to provide data relevant for monitoring diseases.

c) Other special regulations may be applied to minimize accidental capture of ferrets.

7. **Optimum ferret habitat has been maintained with current levels of prairie dog shooting. However, ferret reintroduction efforts could be negated if large increases in prairie dog shooting occur without adequate management attention or shooting results in significant declines of prairie dogs in areas where ferrets were recently released and attempting initial establishment.**

a) Attempt to locate release cages in areas where shooting rarely occurs. NNHP

b) Sign and monitor release areas to encourage shooters to use other prairie dog colonies where personnel will not be in danger from shooting activity. NNHP

c) Continue to monitor prairie dog numbers, distribution, and shooting. If prairie dog numbers decline below objectives due to shooting (as measured by the ferret family rating; see Strategy 2d and Appendices 2 and 3), implement necessary management recommendations to prevent further declines. Such management might include limiting the number of shooters on a specific ranch or partial closure on a rotational basis. NNHP

d) Provide prairie dog shooters with an information packet that describes black-footed ferrets and explains the recovery program.

8. **Peak hunter use periods (i.e. opening weekend of antelope season) could conflict with safety in release activities if hunters shoot at, molest, or closely approach ferret release cages during the first few weeks of release. Hunters may be concerned that the reintroduction effort will involve widespread activity by biologists monitoring released ferrets which would disrupt their hunt.**

a) Locate release cages > 200 meters from roads when possible; cages will be carried to release site to prevent establishing two-track trails.

b) Attempt to schedule ferret releases so overlap with opening weekends does not occur.

c) Make an information and education packet available to hunters using the area and sign sensitive areas during reintroduction activities.

d) All successful applicants for antelope permits in Hunt unit 10 & 18A will be mailed an information packet informing them of the ferret reintroduction and the activities being conducted in the release area. The boundary of the release area will be signed to inform hunters.

e) A hunter information station will be operated during the 10 day acclimation and 2-4 week post release period to inform passing hunters of the ferret release program and area of activity of field personnel.

9. **Current livestock operations appear compatible with reintroduction efforts and long-term habitat potential for ferrets. Yet, some supporters of ferret reintroduction may recommend additional restrictions or curtailment of some land use activities.**

a) Continue to provide information on the need to avoid unnecessary restrictions and design recovery programs to fit in with ongoing land use patterns. NNHP, ASLD

b) Insist that all management actions are justified and relevant to objectives and the "nonessential experimental" designation. USFWS, NNHP

10. **Reintroduced ferrets will have to survive in association with populations of other predator species if we are to truly develop a wild free-ranging population of ferrets.**

Extensive, long-term predator control programs to benefit ferrets are not planned. However, during the release and initial population establishment phase of the program, it may be necessary to reduce the local population of some predator species or remove individuals of some species (coyote, badger, and great-horned owl) which show a tendency to specialize on recently released ferrets and may significantly increase mortality rates before ferrets become oriented in their new environment.

a) In cooperation with the AGFD Research Branch, initiate a project to monitor predator densities and the impact predators may have on ferrets and prairie dog abundance. NNHP

b) Attempt to locate initial releases in areas where populations or foraging situations of other predators are naturally low or where pre-release predator control has been carried out. NNHP

c) Closely monitor temporary holding pens or areas with recently released ferrets for predator activity or sign that indicates apredator may be actively concentrating on ferrets. Remove individual predators as necessary to reduce the predation. The AGFD Nongame Mammals Program Manager will make this determination and implement the strategy. USFWS, NNHP

11. **Interest in ferrets by researchers, biologists, photographers, and writers could escalate to a point at which tolerance limits by landowners, ferrets, and other wildlife are exceeded. Exceeding such tolerance limits could result in land closures, depressed wildlife populations, or diversions from priority management tasks.**

a) Annually obtain landowner approval of human activity necessary for actions specified in this plan and summarized in Table 2.

b) Progress of ongoing activities will be reviewed biannually by all concerned parties.

c) Proposed management strategies, monitoring, and research projects will be reviewed biannually by all concerned parties.

12. **Other resource uses not specifically identified in this plan could conflict with ferret management if adequate input and coordination among cooperators is lacking.**

a) Although, formal consultation is not required with the "nonessential experimental" designation, the Navajo Nation, affected agencies, and landowners will contact the AGFD's Nongame Mammals Program Manager for input and coordination during the preliminary design of proposed projects or activities in the management area.

13. **Adequate funding will need to be obtained from a wide spectrum of sources.**

a) Continue funding under Section 6 cost share and the Heritage Program. Pursue establishing additional funding sources for specific aspects of the project.

PLANNED MANAGEMENT ACTIONS

This section summarizes the strategies developed in the previous section of this plan. The section is intended to display the actions necessary for successfully reestablishing ferrets in the AVC management area by the Arizona Game and Fish Department and cooperators.

1993-1994

1. Develop a captive population between 30 and 36 potential breeders at TPZ.

2. Maximize breeding of ferrets at TPZ. Numbers designated for release in Arizona determined by USFWS.

3. Determine the status of canine distemper.

4. Continue prairie dog monitoring and habitat evaluation to aid in selecting specific release sites.

5. Continue coordination with all affected parties.

6. Monitor the status and effects of sylvatic plague.

7. Map potential prairie dog habitat that is not currently occupied.

8. Utilize state-of-the-art reintroduction techniques to insure adequate results.

9. Describe specific ferret release sites within AVC.

10. Finalize this plan and the Final Rule designating reintroduced ferrets as a "nonessential experimental" and obtain agreement with the plan from all landowners and affected agencies in the management area.

11. Schedule timing and exact location of release sites. Coordinate with landowners and affected agencies and obtain cultural clearances.

12. Schedule monitoring, research, and public information activity.

13. Prepare necessary equipment.

14. Develop temporary holding stations for ferrets.

1995-1998

1. If ferrets are released in 1994 as planned, annually repeat 1994 actions and reintroduce up to 50 ferrets per year until a population is established.

2. Annually monitor the ferret population level and distribution by nocturnal and/or diurnal surveys.

3. Continue to monitor population trends and distribution of prairie dogs.

4. Continue to monitor the status of sylvatic plague and canine distemper.

5. Continue evaluations of reintroduction protocol and adjust program accordingly (this action includes: release techniques, demographics and genetics of ferrets, response to conflicts with other predators, etc.).

6. Continue coordination with all affected parties.

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APPENDICES

Appendix 1. Schedule of black-footed ferret site evaluation and reintroduction proposal review.

January 1991	AGFD and inter-agency review of preliminary project proposal. First communication with major landowners.
Feb. 22, 1991	Arizona Game and Fish Commission (AGFC) reviews preliminary project proposal. Recommends pursuing the proposal to next stage.
March-April, 1991	Develop Issues and Concerns list from agency, public, and landowner contacts.
May 12, 1991	Arizona Republic prints a story on the potential reintroduction of ferrets into Arizona.
December 1991	AGFD presents an evaluation of the Aubrey Valley site at USFWS Black-footed Ferret Interstate Coordinating Committee meeting. The Phoenix Zoo holds open house for ferret breeding facility; event covered by Phoenix television.
February 1992	Arizona Great Outdoors prints a story on captive breeding program at The Phoenix Zoo and the potential reintroduction into Arizona; state wide distribution.
Oct.-Nov. 1992	Inter-agency and public review of revised report titled **An evaluation of a potential black-footed ferret reintroduction site in the Aubrey Valley, Coconino County, Arizona**.
December 1992	Revised evaluation of Aubrey Valley site submitted at Black-footed Ferret Interstate Coordinating Committee meeting.
January 27, 1993	Cooperators meet in Albuquerque to finalize comments on **An evaluation of a potential black-footed ferret reintroduction site in the Aubrey Valley, Coconino County, Arizona**.
March 27, 1993	Update AGFC of black-footed ferret reintroduction effort.
March 29, 1993	AGFD begins drafting site specific reintroduction plan.

April 1993	Arizona Great Outdoors prints story on prairie dogs and mentions potential reintroduction of ferrets into Arizona; state wide distribution.
April 6, 1993	The Tucson Citizen prints a story on potential ferret reintroduction.
April 7, 1993	The Arizona Republic prints a story on potential ferret reintroduction.
April 12, 1993	Working draft of **A Cooperative Reintroduction Plan for black-footed ferrets in Aubrey Valley, Arizona** circulated to cooperators, landowners, and the public for review.
June 1993	Summarize comments and revise reintroduction plan.
June 1993	First ferret litter born at The Phoenix Zoo.
July 1993	Submit draft of the reintroduction plan to cooperators, landowners, AGFC, and the public for review.
August 1993	Summarize comments and review proposal. Submit to AGFD Director for action.
November 1993	Revised evaluation of Aubrey Valley site submitted to the Black-footed Ferret Interstate Coordinating Committee meeting.
November 17, 1993	Arizona Republic prints a story on the potential reintroduction of ferrets into Aubrey Valley.
January 1994	Proposed Rule drafted for "nonessential experimental" designation for AVC by USFWS.

Appendix 2. A quantified system for evaluating black-footed ferret habitat.

A quantified system of evaluating ferret habitat was developed to assist national comparison and rankings of potential reintroduction sites and to standardize methods for monitoring habitat trends at established sites (Biggins et al. undated).

Biggins et al. (undated) chose to base quantitative evaluations of ferret habitat on abundance of prey for two primary reasons: 1) prey base seems fundamentally important to the ferret and 2) the relationship is founded on empirical evidence. Variables are combined as follows into a rating index:

$$R = \sum_{i=1}^{n} (A_i * P_i)/763 \quad \text{for } A_i * P_i => 272.5$$

where:

R = the number of ferret family groups that could be supported by the complex

A = area of colony with => 3.63 prairie dogs per hectare

P = density of prairie dogs in area "A" (prairie dogs per hectare)

763 = the number of prairie dogs needed, under typical conditions, to support one ferret family group for one year

272.5 = the minimum number of prairie dogs needed to support one ferret family group for one year

i = colony number

n = the number of colonies in the complex

Individual ratings are calculated for each colony within the complex, and the overall rating is the sum of those individual ratings. The rating, R, for a complex is an estimate of the number of ferret family groups the complex can support. Colonies with fewer than 272.5 prairie dogs do not contribute to the rating of a complex. The minimum and typical number of prairie dogs needed was calculated from consumption rates in captivity and prairie dog densities incurred in home ranges of breeding ferrets at Meeteetse, Wyoming. Colonies with ratings < 1.0 are not expected to support family groups of ferrets every year. Data collection, calculations and application of the rating procedure to a prairie dog complex is presented with further discussion of appropriate details in Biggins et al. (undated).

Appendix 3. Evaluation of Aubrey Valley prairie dog complex.

PICA CAMP-164 transects ran 6/9-11,22-25/92
1. 70/164=43% (percent of "good" habitat)
2. (.43)(1935)=832 (ha of "good" habitat)
3. 926/70=13.23/.3=44.10 (average active burrows/ha on "good" habitat)
4.(.073)(44.10)=3.22/.495=6.50 (prairie dog density/ha on "good" habitat)
5.(6.50)(832)=5408 (total number of prairie dogs on "good" habitat)
6. 5408/763=7.09 (number of ferret families that can be supported on this town)

AUDLEY-241 transects ran 5/20,27-28,6/2-5,8,7/7-8/92
1. 135/241=56%
2. (.56)(4132)=2314
3. 2107/135=15.61/.3=52.0
4. (.073)(52.0)=3.80/.495=7.67
5. (7.67)(2314)=17748
6. 17748/763=23.26

GRAND CANYON-11 transects ran 6/9/92
1. 7/11=64%
2. (.64)(67)=43
3. 115/7=16.43/.3=54.77
4. (54.77)(.073)=4.00/.495=8.07
5. (8.08)(43)=347
6. 347/763=0.45

MISSION-5 transects ran 7/9/92
1. 5/5=100%
2. (1)(86)=86
3. 102/5=20.4/.3=68
4. (68)(.073)=4.96/.495=10.03
5. (10.03)(86)=863
6. 863/763=1.13

BURROW PIT-5 transects ran 6/12/92
1. 3/5=60%
2. (.60)(19)=11
3. 46/3=15.33/.3=51.11
4. (51.11)(.073)=3.73/.495=7.54
5. (7.54)(11)=83
6. 83/763=0.11

Appendix 3 (continued). Estimated prairie dog burrow status according to Biggins et al. (undated) in AVC.

VALLEY-10 transects ran 7/8/92
1. 9/10=90%
2. (.90)(106)=95
3. 136/9=15.11/.3=50.37
4.(50.37)(.073)=3.67/.495=7.43
5. (7.43)(95)=706
6. 706/763=0.93

TIN SHACK-4 transects ran 6/3/92
1. 2/4=50%
2. (.50)(13)=6.5
3. 58/2=29/.3=96.67
4. (96.67)(.073)=7.06/.495=14.26
5. (14.26)(6.5)=93
6. 93/763=0.12

NORTH CATERPILLAR-5 transects ran 6/3/92
1. 4/5=80%
2. (.80)(35)=28
3. 77/4=19.25/.3=64.17
4. (64.17)(.073)=4.68/.495=9.46
5. (9.46)(28)=265
6. 265/763=0.35

SOUTH CATERPILLAR-10 transects ran 5/27/92
1. 10/10=100%
2. (1)(84)=84
3. 203/10=20.3/.3=67.67
4. (67.67)(.073)=4.94/.495=9.98
5. (9.98)(84)=838
6. 838/763=1.10

The AVC will support 34.54 ferret families. Nine of the 21 towns can support ferret families greater than 0.1. However, there were some new towns discovered after transects were run and no data was collected this year. Some of these new towns may be able to support ferrets. Nine of 11 towns in which data was collected can support ferrets. This comprises 6477 of the 6959 ha mapped out as prairie dog towns.

Appendix 4. Excerpt of Section 10 (j) of the Endangered Species act of 1973, as amended.

Section 10 (j) Experimental populations.

(1) For purposes of this subsection, the term experimental population means any population (including any offspring arising solely therefrom) authorized by the Secretary for release under paragraph (2), but only when, and at such times as, the population is wholly separate geographically from non-experimental populations of the same species.

(2)(A) The Secretary may authorize the release (and the related transportation) of any population (including eggs, propagules, or individuals) of an endangered species or a threatened species outside the current range of such species if the Secretary determines that such release will further the conservation of such species.

(2)(B) Before authorizing the release of any population under subparagraph (A), the Secretary shall by regulation identify the population and determine, on the basis of the best available information, whether or not such population is essential to the continued existence of an endangered species or a threatened species.

(2)(C) For the purposes of this Act, each member of an experimental population shall be treated as a threatened species; except that-

(i) solely for purposes of section 7 (other than subsection (a)(1) thereof), an experimental population determined under subparagraph (B) to be not essential to the continued existence of a species shall be treated, except when it occurs in an area within the National Wildlife Refuge System or the National Park System, as a proposed to be listed under section 4; and

(ii) critical habitat shall not be designated under this Act for any experimental population determined under subparagraph (B) to be not essential to the continued existence of a species.

(3) The Secretary, with respect to populations of endangered species or threatened species that the Secretary authorized, before the date of the enactment of this subsection, for release in geographical areas separate from other populations of such species, shall determine by regulation which of such populations are an experimental population for the purposes of this subsection and whether or not each is essential to the continued existence of an endangered species or a threatened species. [10(j) added by PL 97-304]

TABLES AND FIGURES

Table 1. Location of physical evidence of black-footed ferrets in Coconino County, 1929-1931.

DATE	LOCATION	COLLECTOR	DISPOSITION
Jan. 1929	7 mi. north of Williams	-	U.S. National Museum
Oct. 1931	12 mi. west of Winona	-	Univ. of Cal. Berkeley
Nov. 1931	Government prairie	W.S. Carlos O. Wright	Univ. of Cal. Berkeley

Table 2. Anticipated human activity associated with black-footed ferret reintroduction in Aubrey Valley.

ACTIVITY/YEAR	# OF BIOLOGIST	ACTIVITY PERIOD	ACTIVITY DURATION	YEAR
Prairie dog population monitoring	2	May-Aug	90 days	93-98
Prairie dog plague monitoring	1	May-Oct	5 days	93-98
Canine distemper survey	2	May-Aug	30 days	93-95
Ferret release	6-8	Aug-Oct	90 days	94-98
Spotlighting for ferret	4-6	July-Oct	10 days	94-98
Snowtrack for ferret	2	Dec-Feb	10 days	94-98

Table 3. Prairie dog towns sampled in Aubrey Valley in 1992.

Prairie dog town number	Prairie dog town name	Estimated ha/town	# Transects completed	% of town sampled
1	Reservation	45	8	5.3
2	Last Chance	22	5	6.8
3	Crossroads	106	0	0
4	Cliff	11	0	0
5	Lone tree	22	0	0
6	G.C. Caverns	67	10	4.5
7	Pica Camp	1935	164	2.5
8	Hyde Park	17	5	8.8
9	Valley	106	10	2.8
10	Longhorn	208	0	0
11	Audley	4132	239	1.7
12	Mission	86	5	1.7
13	Buffalo Skull	34	0	0
14	Roundup	6	0	0
15	Borrow Pit	19	5	7.9
16	Pica Station	11	0	0
17	North Caterpillar	35	5	4.2
18	Tin Shack	13	4	9.2
19	South Caterpillar	84	10	3.6
20	Topeka	11	0	0
21	Santa Fe	11	0	0
22	Indian Wells	151	0	0
23	McCain	17	0	0
24	Trible	22	0	0
25	Crater	6	0	0
TOTAL		7177	470	2.0

Table 4. Black-footed ferret surveys within the Aubrey Valley between 28 December 1990 and 15 December 1992.

LOCATION	SURVEY DATE	SURVEY TYPE	SURVEY TIME	AREA SURVEYED
[redacted]				

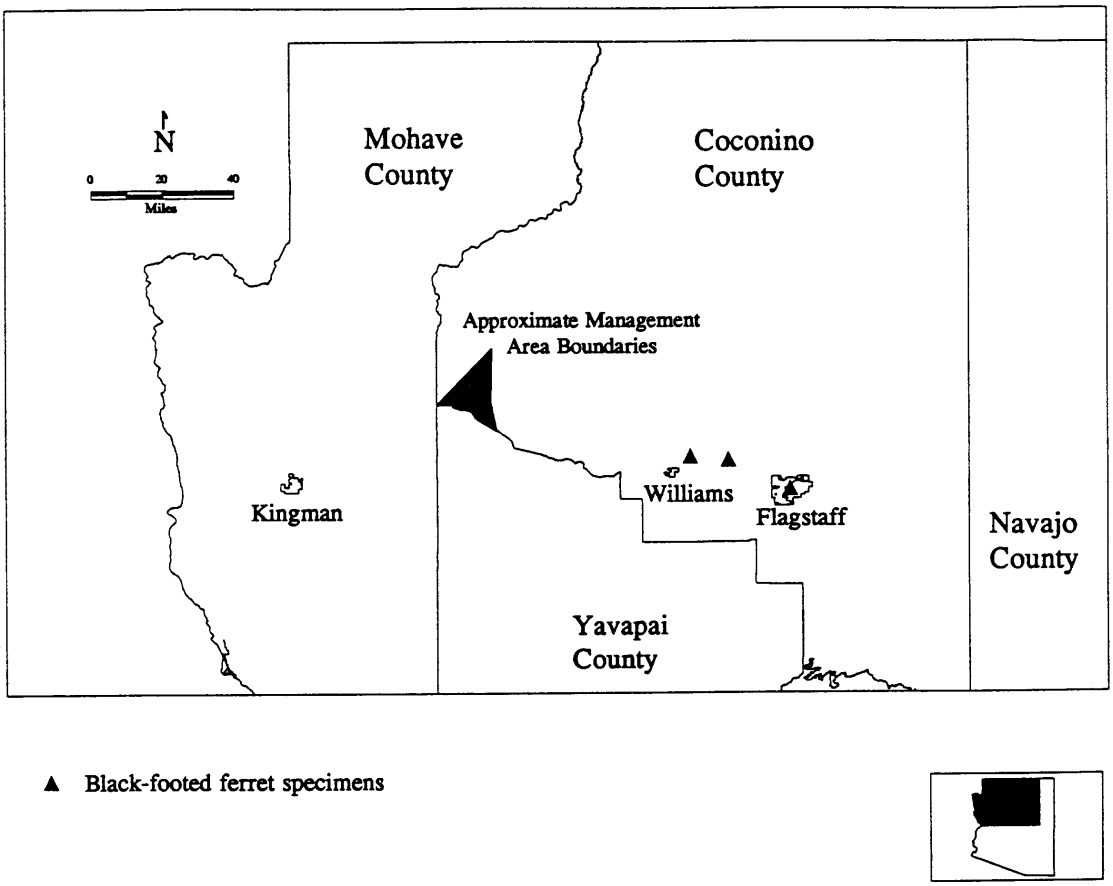

Figure 1. Location of black-footed ferret physical evidence and the proposed management area in Coconino county.

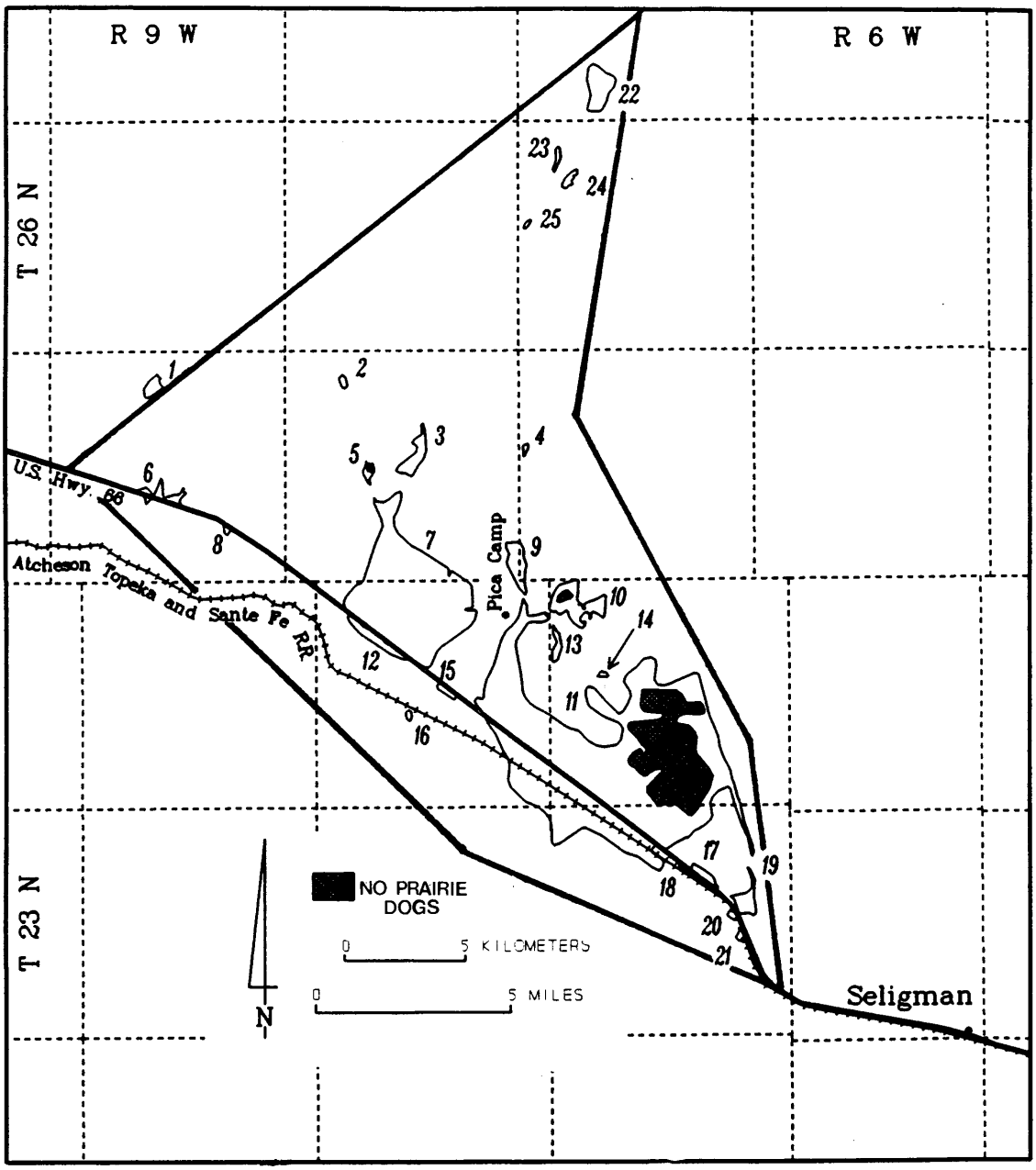

Figure 2. Location of prairie dog towns within proposed management area in Aubrey Valley. Prairie dog town numbers correspond with Table 3.

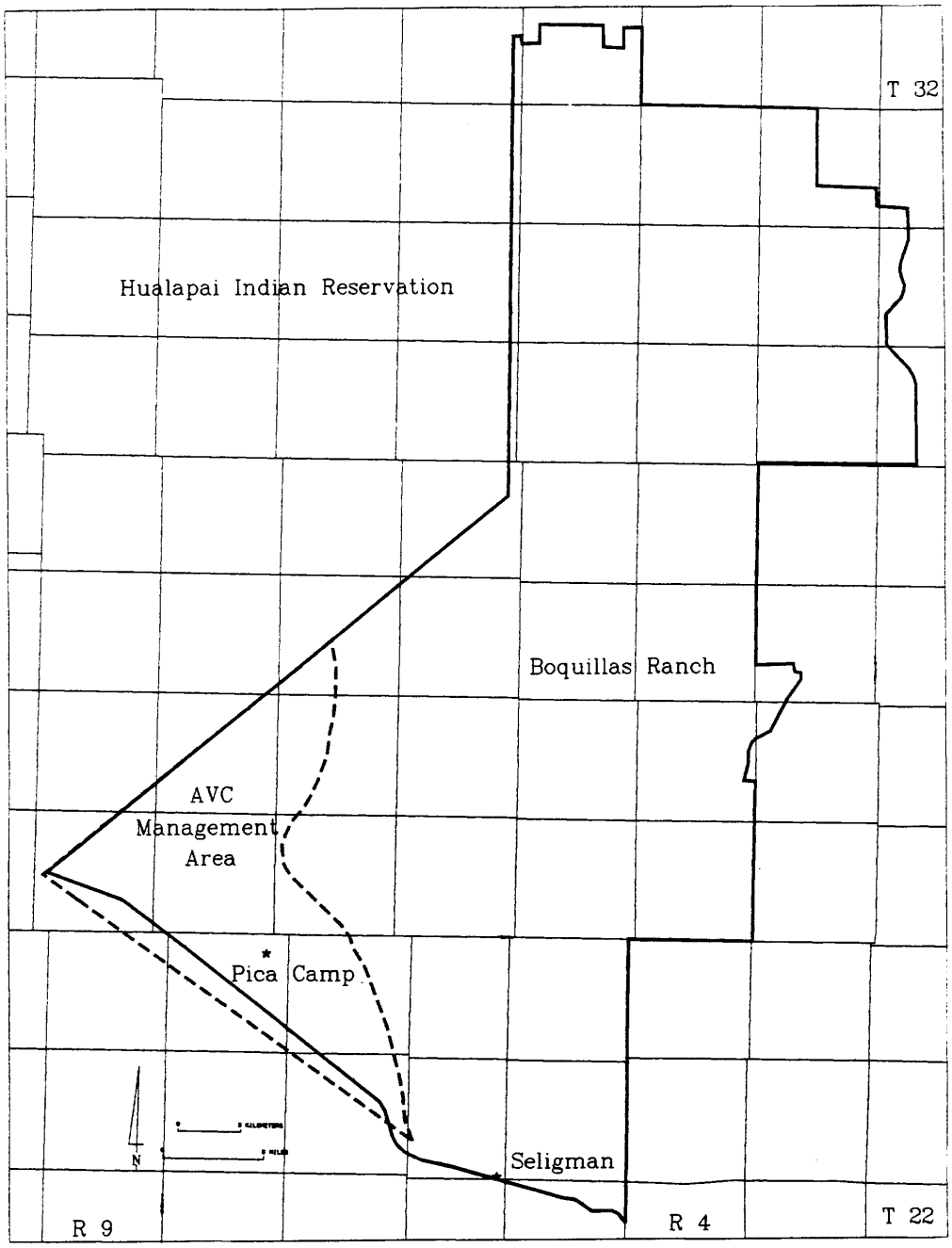

Figure 3. Boundaries of Big Boquillas Ranch (------) and proposed management area (- - - -).