

**RESULTS OF THE 1999  
BLACK-FOOTED FERRET RELEASE EFFORT  
IN AUBREY VALLEY, ARIZONA**

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# RESULTS OF THE 1999 BLACK-FOOTED FERRET RELEASE EFFORT IN AUBREY VALLEY, ARIZONA

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## INTRODUCTION

This report describes Arizona Game and Fish Department (AGFD) activities directed toward reintroducing the black-footed ferret (*Mustela nigripes*) into Aubrey Valley, Arizona, during calendar year 1999. Field activities included prairie dog density surveys; monitoring of diseases, such as canine distemper and plague, which may have a detrimental effect on establishing a self-sustaining ferret population; use of on-site, acclimation pens as a practical tool for releasing ferrets into the wild and for breeding animals on-site; and monitoring of released ferrets.

This reintroduction project is a cooperative effort among AGFD, Arizona State Land Department, The Phoenix Zoo, U.S. Fish and Wildlife Service (USFWS), The Navajo Nation, The Hualapai Nation, and private land managers. AGFD and USFWS are charged with project leadership, with AGFD assuming primary responsibility for initiating field activities.

AGFD's ferret reintroduction activities are evaluated on an annual basis to help ensure that objectives outlined in the annual allocation proposal and release protocol (Van Pelt 1996) are being accomplished. Annual evaluations may determine that protocols or procedures need to be modified to allow for unforeseen circumstances or events.

## BACKGROUND

Once occurring in 12 western states, the black-footed ferret was listed as endangered on March 11, 1967. It was also included on *Threatened Native Wildlife in Arizona* (AGFD 1988) as endangered.

Since 1987, AGFD has been involved with black-footed ferret reintroduction activities (Yarchin et al. 1988, Belitsky et al. 1994). Beginning in 1990, matching funds were made available to AGFD through Section 6 of the Endangered Species Act, and more recently, the AGFD Heritage Fund, to intensely evaluate existing habitat for possible reintroduction of black-footed ferrets in Arizona. After evaluating eight Gunnison's prairie dog (*Cynomys gunnisoni*) complexes across northern Arizona, the Aubrey Valley was selected as the best site for an initial reintroduction (Van Pelt 1995).

Brown (1982) characterizes Aubrey Valley as a Plains and Great Basin Grassland Community, with annual precipitation averaging 25 to 30 cm. The valley floor is approximately 220 km<sup>2</sup> in area and ranges in elevation from 1,600 to 1,900 m. Bounded on both sides by pinyon-juniper ridges, it runs along a 41 km northwest-southeast axis. The valley is 12 km wide near mile marker 124 on U.S. Highway 66.

While evaluating potential ferret habitat, a statewide scoping effort was initiated to determine and discuss with the public their attitude toward black-footed ferret reintroduction. Through this process, it was determined that the designation of a nonessential experimental population (as prescribed in Section 10j of the Endangered Species Act of 1973, as amended) would be essential to development of a viable ferret reintroduction project in Arizona.

In October 1993, after recommending Aubrey Valley as the fourth reintroduction site to the Black-footed Ferret Interstate Coordinating Committee, AGFD and USFWS initiated the nonessential experimental population designation process. In November 1995, a proposed rule was published in the Federal Register (USFWS 1995). A hearing was held in Seligman, Arizona on December 12, 1995, to facilitate public comment. The public comment period closed on January 2, 1996. A final rule designating the Aubrey Valley Experimental Population Area (AVEPA) was published on March 20, 1996 (USFWS 1996).

The AVEPA is described as the Aubrey Valley west of the Aubrey Cliffs, starting from Chino Point and running along the crest of the cliffs north to Indian Route 18. The boundary then runs along Route 18 to the line bordering townships 27 and 26 north. It then runs east to the line bordering ranges 10 and 11 west, at which point it turns south to the line bordering townships 24 and 25 north. From that point, the boundary runs east to the corner section marker and turns south to the Hualapai Indian Reservation boundary. It then follows the reservation boundary until it reaches U.S. Highway 66, where it turns east and runs along the highway approximately 6 km to a northern point of the Juniper Mountains. It then follows the Juniper mountains back to Chino Point (Fig. 1).

## METHODS

The primary goal of the Arizona reintroduction effort is to re-establish black-footed ferrets in the Aubrey Valley as quickly as possible. To do this, our focus has been on pre-conditioning release candidates and developing on-site breeding protocols that will enhance and contribute to the national recovery of the black-footed ferret (USFWS 1988).

With the release of 35 black-footed ferrets in September 1996, Arizona became the fourth reintroduction site in the United States (Van Pelt and Brennan 1997). An important aspect of the Arizona release was the development and evaluation of on-site, acclimation pens for pre-conditioning of release candidates. Arizona also received pregnant females to determine if recently shipped females would whelp, but there was no evidence that any did.

To establish on-site breeding protocols, personnel involved with black-footed ferrets in Arizona received training for black-footed ferret husbandry and breeding techniques at the National Black-footed Ferret Conservation Center and The Phoenix Zoo. Information obtained during these training exercises was used to develop protocols applicable for large, on-site pens.

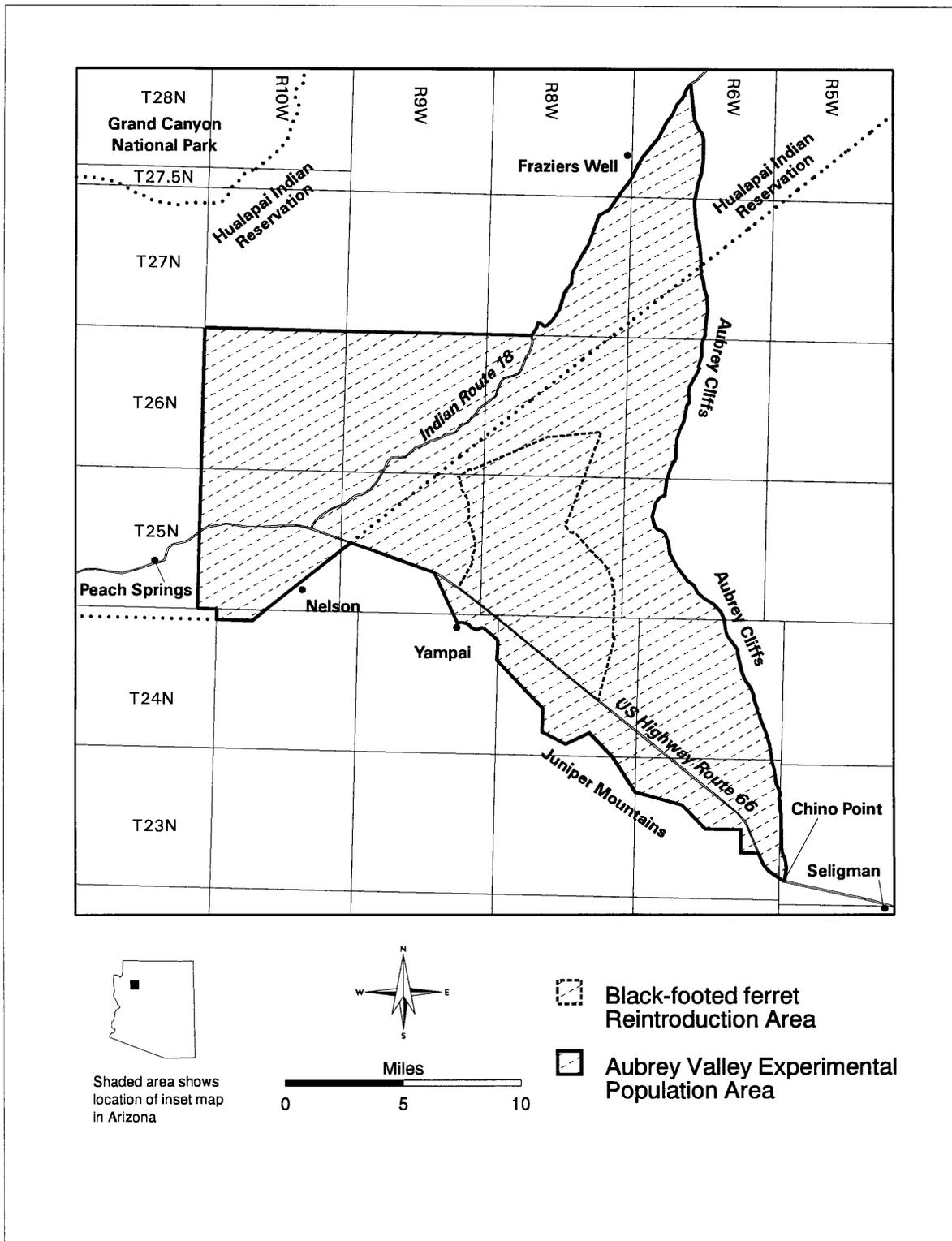


Figure 1. Delineation of the Aubrey Valley Experimental Population Area.

Arizona's work with on-site breeding began in 1997 when an unsuccessful hands-off approach was attempted. This technique placed males adjacent to compatible females in acclimation pens. When ferrets displayed physical and behavioral signs of breeding, males were allowed access to adjacent females through passive introduction using plastic tubing placed in the fencing between pen sections. Bred females were allowed full access to prairie dog burrows within their pen. However, this management technique did not produce any kits. No releases occurred that year and all allocated ferrets were retained for further pen breeding trials in 1998 (Van Pelt et al. 1998).

In 1998, breeding protocols were modified to include confinement of females in a buried nest box connected by an artificial tube to an above ground cage. Biologists were then able to confirm whelping and monitor the status of kit development. Changes in testicular and vulval size and condition were monitored to determine reproductive condition and cytological samples taken from females were used to predict onset of estrus (Harder and Kirkpatrick 1994). Project biologists stained the samples and interpreted results. Pairing occurred when observed cornified epithelial cells approached 90% of all cells counted. A pairing was considered successful if samples taken after pairing showed a decrease in these epithelial cells and physical signs such as orange saliva staining on the back of the female ferret's neck was observed by biologist.

This hands-on approach was more successful and produced 26 kits, of which 18 (69%) survived to weaning age. Twenty-six ferrets were released from pre-conditioning pens that year (Winstead et al. 1999). The same breeding technique produced 63 kits in 1999 but only 11 (16%) survived to weaning.

In addition to breeding efforts, previously established monitoring programs were continued in 1999. This included techniques described by Biggins et al. (1993) for monitoring prairie dog densities and procedures outlined by Clark et al. (1984) for nocturnal ferret surveys. Disease monitoring efforts for plague and canine distemper established in 1996 were continued in 1999 with the assistance of the Arizona Department of Health Services Vector and Zoonotic Diseases Division (VZD), the U.S. Department of Agriculture Animal and Plant Health Inspection Service-Wildlife Services (APHIS-WS), and the University of Arizona (UA). Methods were similar to those described by Williams (1991).

## RESULTS

### PEN DESIGN

Ten pre-conditioning pens, each encompassing 1 acre of prairie dog habitat, are currently on-site in the AVEPA and are at least 0.25 mile apart from each other. Van Pelt (1996) describes the design and construction. Each pen is divided into 4 equal sections and contains adequate burrows for ferret exploration and habitation. Monofilament line is stretched across the top of the pens to deter raptors. To reduce escapes, prairie dogs within 10 m of the pen are removed and their burrows plugged using an inverted chicken wire box.

In 1999, improvements were made to seven pens. These improvements included installation of additional electric wires to the interior of each pen section to reduce ferret climbing, isolating portions of the electric fence to improve the ability to locate short circuits, and more aggressive weed control along pen fences. Separate solar-powered fence chargers power upper and lower wires, now isolated from one another. Six new chargers have meters that indicate quality of fence charge and make monitoring of fence condition easier. Also more insulators were installed to prevent grounding of the electric fence on the chicken wire.

Aluminum flashing is attached on the inside above the electric wiring as a third-level deterrent for escape. In 1999, a thicker, more durable flashing was used to replace or repair old flashing. This flashing should last longer, hold up to the wind better and reduce the number of shorts that occur in the electric system.

Depending on funding, we plan to upgrade two pens in 2000 and to construct barbed wire fences to replace electric livestock fence around pens. The remaining pen has deteriorated badly and will not be upgraded. It will be removed.

#### PEN INTEGRITY

The pens have continued to be successful at keeping terrestrial predators out. However, prairie dogs digging under the fencing continue to be a challenge. Pen breaches are located using a leaf blower and blowing non-toxic smoke into burrows. Burrows that compromise the pen's integrity are sealed with an inverted chicken wire box and back-filled. To prevent further digging into pens, all prairie dogs within approximately 10 m of the pens are trapped and removed.

Pens that had the outer electrical fencing replaced with barbed wire have been very successful at keeping livestock away. This remedy will be used on other pens if livestock continue to damage perimeter fences.

The original intent of the acclimation pens was to hold animals for 90 days pending release. We have been quite successful at holding animals for this period of time, and 110 (49%) animals in the last four years have been held for more than 90 days. By incorporating minor pen modifications, such as monofilament line for raptor protection, the pen design was improved to allow for holding animals longer and to attempt on-site breeding. Other actions implemented to increase holding times included intense spotlighting after the arrival of new animals to guard against escapes, prairie dog trapping in the immediate area surrounding pens, filling and marking possible problematic burrows, and creating new solutions to prevent burrow escapes. These actions were necessary to make the transition from short-term holding to a more long-term holding capacity. The past misfortunes and current successes of our pen design have been of value to other sites that use acclimation pens.

With improvements in pen design, use of better materials, and active monitoring of prairie dogs close to the pens, our success at holding ferrets has improved. Proportionally fewer animals held in pre-conditioning pens escaped or were missing this year than in years past (13% vs. 20-30%).

## PRAIRIE DOG MONITORING

Based on studies of white-tailed (*C. leucurus*) and black-tailed prairie dog (*C. ludovicianus*) towns, Biggins et al. (1993) proposed guidelines for analyzing prairie dog town densities. They defined a measure of good ferret habitat in white-tailed prairie dog towns to be the proportion of transects in a hectare with at least 25 active burrows, divided by the total number of transects.

Biggins et al. (1993) found burrow densities in Meeteetse, Wyoming varied from 39 to 108 burrows per hectare for white-tailed prairie dogs (*C. leucurus*). Surveys in Arizona show similar ranges for the Gunnison's prairie dog (Van Pelt 1995). Pizzimenti (1975) discussed the relationship of Gunnison's prairie dogs to other species of prairie dogs. He considered Gunnison's prairie dog to be a member of the subgenus *Leucocrossuromys* or white-tailed prairie dogs. Therefore, Gunnison's prairie dog densities are assumed to compare closely to the white-tailed prairie dog.

In 1999, the Aubrey Valley complex was not remapped because boundaries did not appear different from those of 1997 or 1998. In 1997, the total prairie dog acreage in Aubrey Valley was estimated to be 29,653 acres (12001 ha) (Fig. 2).

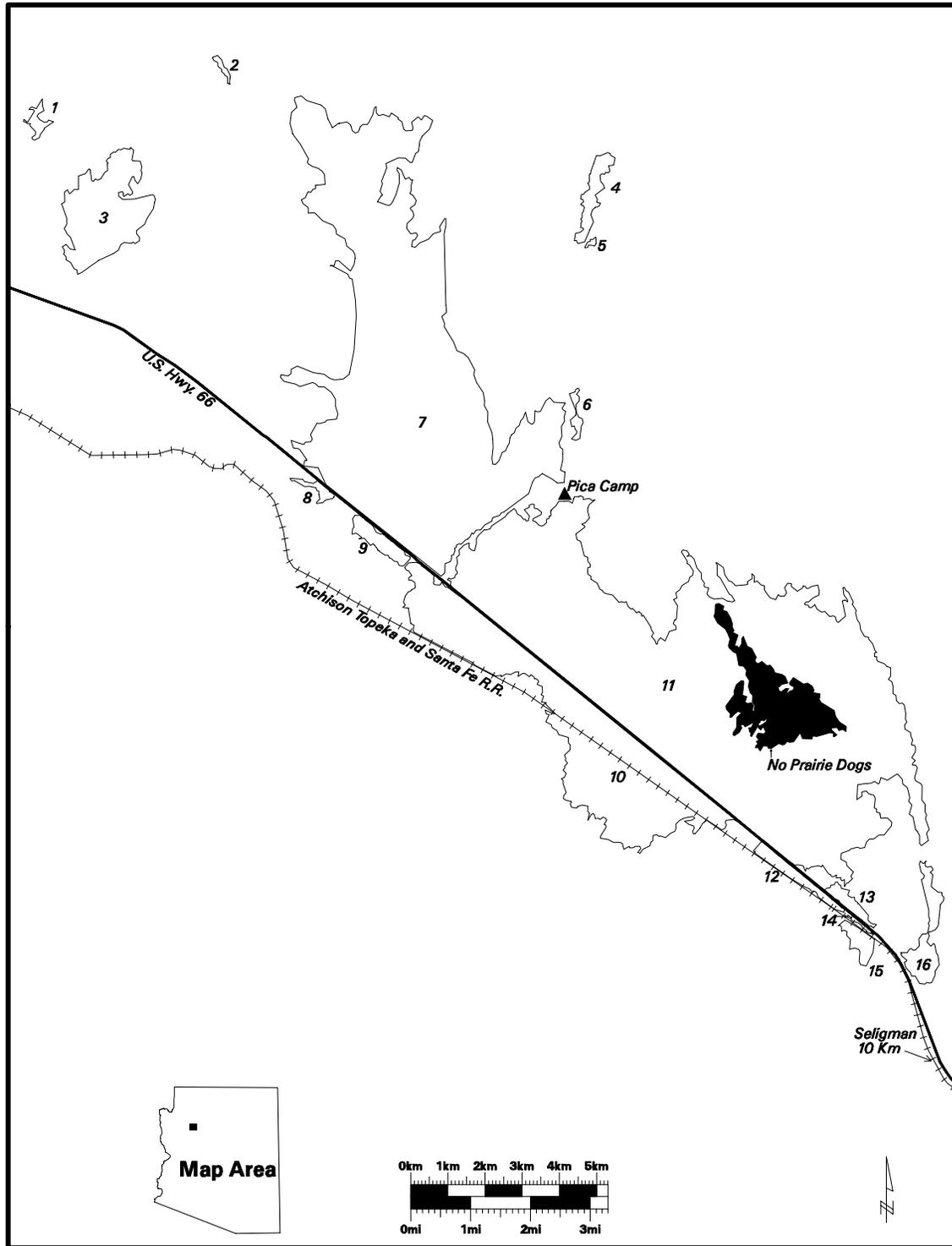
In 1999, the USFWS requested reintroduction proponents to identify and describe a subcomplex in which ferrets will be placed using a modified 1.5-km circumscription rule. For the AVC, this eliminates towns 1 through 5 from the subcomplex evaluation. The Aubrey Valley Subcomplex (AVSC) is comprised of 11 towns, towns 6 through 16, encompassing 11,391 ha (28,147 ac). Two primary towns, Pica Camp and North Audley, encompass the highest quality of habitat in the valley and make up 83% of the AVSC.

Between May and August 1999, prairie dog activity and burrow density were sampled at 64 established transect blocks located throughout the AVEPA (Tables 1, 2, and 3). We ran 354 transects, with 61% of completed transects being classified as good ferret habitat. Active burrow densities ranged from 0 to 126 per hectare, with an overall mean of 33.

Using burrow densities, prairie dog density estimates for AVEPA ranged from 5.24 to 10.72 prairie dogs per hectare (mean = 7.43). Estimated prairie dog density was used to determine black-footed ferret carrying capacity. Carrying capacity is reported in terms of black-footed ferret families. A ferret family is defined by Biggins et al. (1993) as 1 female, 3.3 young and 0.5 male. The 1999 ferret family estimate for AVEPA is 75 families.

## PRAIRIE DOG TRAPPING AND QUARANTINE

In 1997, a prairie dog quarantine facility was constructed on Arizona Department of Transportation property in Seligman and held 11 cages made from hardware cloth. Each cage, measuring 24 inches deep by 18 inches high by 96 inches in length, was divided into three sections. Cages are suspended from the ceiling and are at least 24 inches apart and 36 inches from the floor. In 1998, four identical cages in a second room were added. Because cages in this room are less than 24 inches apart, all prairie dogs here are treated as being in a single cage and are subject to a concurrent quarantine period.



1. Reservation	5. Owl track	9. Mission	13. North Caterpillar
2. Prairie Hills	6. Valley	10. South Audley	14. Streamline
3. Grand Canyon	7. Pica Camp	11. North Audley	15. Railroad Corner
4. Cliff	8. Devil Horn	12. Tin Shack	16. South Caterpillar

Figure 2. Prairie dog town distribution within the Aubrey Valley Complex.

Location	Active Burrows Per Hectare (Transects completed)							Site #
	1993	1994	1995	1996	1997	1998	1999	
T24N R7W SEC 15	6 (8)	1 (10)	11 (5)	2 (5)	7 (5)	28 (6)	2 (7)	8
SEC 16	5 (10)	4 (8)	6 (5)	3 (5)	19 (5)	9 (6)	1 (6)	9
SEC 20	25 (5)	23 (5)	42 (4)	41 (5)	46 (5)	41 (6)	81 (6)	10
SEC 22	59 (8)	31 (10)	32 (5)	7 (5)	13 (5)	44 (6)	27 (6)	7
SEC 26	39 (10)	22 (10)	33 (5)	11 (5)	53 (5)	34 (6)	49 (7)	6
SEC 29	31 (8)	31 (10)	33 (5)	2 (5)	1 (5)	7 (6)	7 (6)	11
SEC 30	55 (8)	56 (8)	32 (4)	33 (5)	51 (5)	48 (6)	33 (6)	20
SEC 31	60 (19)	59 (20)	21 (5)	25 (5)	9 (5)	23 (6)	27 (6)	18
SEC 31	63 (5)	51 (5)	20 (5)	16 (4)	27 (5)	32 (6)	64 (6)	17
SEC 32	42 (33)	36 (20)	33 (5)	5 (5)	7 (5)	23 (6)	25 (6)	12
SEC 32	42 (7)	69 (10)	46 (5)	34 (5)	15 (5)	44 (6)	39 (6)	13
SEC 35	35 (10)	24 (10)	24 (5)	15 (5)	21 (5)	18 (6)	19 (6)	5
R8W SEC 12	51 (5)	72 (5)	17 (5)	37 (5)	17 (5)	36 (6)	8 (6)	25
SEC 11	31 (5)	27 (5)	19 (4)	39 (5)	14 (5)	42 (6)	17 (4)	61
SEC 14	50 (5)	57 (5)	14 (5)	33 (5)	21 (5)	34 (6)	37 (6)	62
SEC 13	17 (4)	82 (5)	47 (5)	51 (5)	20 (5)	34 (6)	27 (6)	24
SEC 22	47 (5)	43 (5)	- (0)	17 (5)	- (0)	6 (6)	45 (6)	52
SEC 23	42 (10)	26 (8)	21 (5)	29 (5)	11 (5)	42 (6)	44 (6)	23
SEC 24	80 (8)	86 (10)	16 (5)	26 (5)	15 (5)	29 (6)	44 (6)	22
SEC 25	68 (8)	40 (10)	22 (4)	50 (5)	47 (5)	114 (6)	100 (6)	21
SEC 36	27 (10)	24 (10)	18 (5)	40 (5)	13 (5)	15 (6)	39 (6)	19
T23N R7W SEC 03	32 (8)	35 (8)	35 (5)	11 (5)	19 (5)	38 (6)	53 (6)	4
SEC 03	28 (13)	23 (10)	21 (5)	11 (5)	9 (5)	9 (6)	1 (6)	1
SEC 03, 04	55 (8)	54 (10)	25 (5)	29 (5)	22 (5)	49 (6)	41 (6)	2
SEC 04	24 (14)	40 (20)	27 (5)	36 (5)	51 (5)	41 (6)	40 (6)	3
SEC 05	30 (10)	15 (10)	20 (5)	0 (5)	1 (5)	2 (6)	0 (6)	14
SEC 05	63 (5)	26 (5)	60 (5)	12 (5)	34 (5)	22 (6)	43 (6)	16
SEC 06	40 (15)	14 (20)	14 (5)	7 (5)	9 (5)	18 (6)	20 (6)	15
Totals	41 (264)	38 (262)	26 (131)	23 (139)	21 (135)	32 (174)	33 (168)	28

Table 2. Completed prairie dog transects – Pica Camp, Aubrey Valley, Arizona.								
Location	Active Burrows Per Hectare (Transects completed)							Site #
	1993	1994	1995	1996	1997	1998	1999	
T24N R8W SEC 03	19 (10)	50 (10)	15 (6)	7 (5)	14 (5)	- (0)	29 (6)	27
SEC 03	10 (8)	9 (8)	19 (5)	11 (5)	16 (5)	25 (6)	13 (6)	26
SEC 03	10 (8)	54 (10)	1 (5)	34 (5)	43 (5)	66 (6)	31 (6)	45
SEC 04	11 (10)	9 (8)	52 (5)	47 (5)	43 (5)	50 (6)	31 (6)	39
SEC 04	44 (10)	15 (10)	100 (6)	69 (5)	62 (5)	47 (6)	59 (6)	38
SEC 04	16 (10)	61 (10)	31 (5)	27 (5)	31 (5)	69 (6)	25 (6)	40
SEC 05	40 (10)	23 (10)	26 (5)	41 (5)	40 (5)	54 (6)	47 (6)	36
SEC 05	68 (8)	21 (10)	41 (6)	18 (5)	60 (5)	86 (6)	76 (6)	37
SEC 09	106 (8)	19 (10)	39 (5)	57 (5)	26 (5)	59 (6)	126 (6)	42
SEC 09	60 (10)	35 (10)	32 (5)	26 (5)	32 (5)	76 (6)	49 (6)	43
SEC 09	33 (10)	102 (10)	31 (5)	20 (5)	17 (5)	73 (6)	19 (6)	41
SEC 10	41 (10)	56 (10)	31 (5)	54 (5)	36 (5)	56 (6)	45 (6)	44
T25N R8W SEC 21	12 (7)	29 (10)	20 (4)	27 (5)	22 (5)	19 (6)	7 (6)	33
SEC 28	12 (6)	56 (10)	36 (5)	42 (5)	34 (5)	43 (6)	64 (6)	32
SEC 33	56 (7)	78 (10)	27 (6)	15 (5)	26 (5)	24 (6)	40 (6)	31
SEC 34	22 (20)	66 (20)	73 (6)	39 (5)	47 (5)	121 (6)	80 (6)	30
SEC 05	26 (5)	29 (5)	2 (5)	25 (5)	17 (5)	33 (6)	45 (6)	47
SEC 15	5 (6)	2 (10)	12 (6)	15 (5)	2 (5)	5 (6)	9 (6)	35
SEC 21	12 (5)	6 (5)	26 (5)	20 (5)	12 (5)	12 (6)	5 (6)	60
SEC 22	16 (6)	10 (10)	20 (5)	14 (5)	16 (5)	7 (6)	25 (6)	34
SEC 34	32 (10)	16 (10)	70 (5)	31 (5)	31 (5)	41 (6)	69 (6)	29
SEC 35	16 (5)	30 (5)	12 (5)	27 (5)	28 (5)	64 (6)	40 (6)	28
Totals	30 (189)	35 (211)	33 (115)	30 (110)	30 (110)	49 (126)	42 (132)	22

Location	Active Burrows Per Hectare (Transects completed)							Site #
	1993	1994	1995	1996	1997	1998	1999	
T23N R7W SEC 10	40 (9)	41 (5)	14 (5)	16 (5)	9 (5)	9 (6)	40 (6)	55
SEC 10	23 (9)	24 (5)	18 (5)	7 (5)	35 (5)	31 (6)	63 (6)	54
T24N R7W SEC 14	30 (18)	6 (5)	18 (4)	17 (5)	57 (5)	64 (6)	34 (6)	56
SEC 6	11 (5)	18 (5)	10 (5)	6 (4)	1 (5)	1 (6)	1 (6)	58
SEC 6	7 (4)	9 (5)	2 (6)	2 (4)	0 (5)	0 (6)	4 (2)	59
SEC 7	5 (5)	40 (5)	12 (6)	1 (5)	3 (5)	17 (6)	1 (6)	57
R8W SEC 8	42 (18)	26 (10)	- (0)	2 (5)	9 (5)	2 (6)	22 (6)	51
T25NR8W SEC 36	21 (8)	23 (10)	22 (5)	0 (5)	4 (5)	3 (6)	4 (6)	53
R9W SEC 4	- (0)	29 (5)	10 (6)	- (0)	3 (5)	3 (6)	27 (6)	46
SEC 21	38 (5)	35 (5)	14 (6)	0 (5)	0 (5)	0 (6)	0 (6)	48
SEC 14	- (0)	18 (5)	4 (5)	4 (5)	11 (5)	16 (6)	40 (6)	63
SEC 15	- (0)	53 (5)	1 (5)	7 (5)	14 (5)	45 (6)	37 (6)	64
SEC 22	65 (5)	106 (10)	3 (6)	0 (5)	0 (5)	0 (6)	0 (6)	49
SEC 26	36 (5)	23 (5)	0 (4)	0 (5)	1 (5)	0 (6)	0 (6)	50
Totals	27 (91)	32 (85)	10 (68)	5 (63)	11 (70)	14 (84)	20 (80)	14

In 1999, an additional room was constructed and holds six new cages (each consisting of four heavy wire rabbit hutches). Also, the original 11 cages were replaced with rabbit hutches purchased at an estate auction. The heavy wire in these cages should be more resistant to chewing by prairie dogs, reducing escapes and repair needs. Current holding capacity is 500 Gunnison's prairie dogs or 670 black-tailed prairie dogs (*C. ludovicianus*).

Prairie dogs are live-trapped using Tomahawk traps baited with sunflower seeds. Trap lines have been established in high-density areas in Flagstaff and Williams (70 and 40 miles east of Seligman, respectively). Traps are opened in the morning and checked twice daily. Black-tailed prairie dogs were collected using a vacuum truck in Colorado by the company *Dog Gone* and donated to the project. Captured prairie dogs are transported back to the quarantine facility and transferred to a cage for the 14-day quarantine period. After completing a 14-day quarantine period, prairie dogs were euthanized using CO<sub>2</sub> and processed at the facility or were used live for feeding ferrets.

In 1999, 1280 prairie dogs were used by the reintroduction project, of which 566 (44%) were black-tailed prairie dogs were received from *Dog Gone* during July, August and November. We sent 93 prairie dogs to Sybille for distribution within the black-footed ferret captive-breeding program. Of the 1280 animals put into quarantine, 1115 prairie dogs were quarantined (87%), 31 escaped (2%), and 134 died (mostly young juveniles)(10%). Out of the 1115 prairie dogs, 153 (14%) were fed live to ferrets in pre-conditioning pens for imprinting kits and training adults to hunt and kill them. In 1999, we used approximately 1,071 kg of food, primarily prairie dog (573 kg) and domestic rabbits (477 kg) to maintain ferrets on-site.

#### DISEASE MONITORING

Carnivore sampling for canine distemper and plague occurs within a 25-mile radius of the release sites, with a majority of the specimens collected within the AVEPA. In 1999, 20 coyotes and two gray foxes were collected as part of the distemper and plague monitoring effort. Collection periods occurred in March, April, May, and September.

The Arizona Health Services has monitored plague activity in Arizona since 1974. Documenting human cases, testing carnivore blood samples for titers, and testing flea pools collected from prairie dog burrows monitors outbreaks. To date, fleas collected from Aubrey Valley have tested negative for plague, but titer samples from carnivores collected within and adjacent to the AVEPA have tested positive. In 1999, 19 predator blood samples were tested for plague and two (10%) tested positive (Table 4). As observed in past surveys, plague is active in the Seligman area, but no recent activity has been observed within Aubrey Valley.

Canine distemper has been monitored in the Aubrey Valley area by AGFD since 1993. Blood samples and coyote specimens were sent to the University of Arizona for analysis and histological interpretation. In 1999, 14 predators blood samples were submitted for analysis and four (29%) tested positive (Table 4). Canine distemper was probably not active in 1999, because no viral inclusions were observed in any tissues.

One prairie dog submitted for necropsy in May and three submitted in August were negative for plague, distemper, tularemia, and rabies.

#### FERRET ALLOCATION

In 1999, 158 ferrets were involved in the Arizona reintroduction effort (Table 5). We started the year with 26 ferrets, four were received between August 15 and November 14, 1997 (held a median of 571 days) and 22 received between June 6 and November 10, 1998 (held a median of 398 days).

Table 4. Results of the 1999 predator disease monitoring effort in Aubrey Valley, Arizona.					
Collection Date	Species	Sex	Age	Canine Distemper	Sylvatic Plague

03/06/99	Coyote	M	A	<4	256
03/07/99	Coyote	M	A	16, 64 <sup>1</sup>	Negative
04/17/99	Coyote	F	A	16	Negative
04/17/99	Coyote	F	A	32	Non-specific reactivity
04/18/99	Coyote	F	A	16	Negative
04/19/99	Coyote	F	A	4	Negative
04/19/99	Coyote	F	A	4	Negative
04/20/99	Coyote	F	A	32	Negative
04/20/99	Coyote	F	A	8	Negative
04/24/99	Coyote	F	A	512	Negative
05/04/99	Coyote	M	A	No sample	Negative
05/05/99	Coyote	M	A	No sample	512
09/22/99	Gray fox	F	A	4	128
09/22/99	Gray fox	M	A	No sample	128
09/22/99	Coyote	M	A	<4	No sample
09/22/99	Coyote	M	A	32	No sample
09/24/99	Coyote	M	J	<4	No sample
09/24/99	Coyote	M	J	<4	No sample
09/24/99	Coyote	F	A	16	No sample
09/24/99	Coyote	F	A	8	No sample
09/25/99	Coyote	F	J	<4	No sample
09/25/99	Coyote	M	A	128	No sample
Coyote Juvenile/Total 3/20	Negative-1:64			17	10
	Positive (1:128-1:4096)			2	4
	No samples			3	8
	Grand Totals			22	22

<sup>1</sup> Canine distemper report has two results for this specimen number.

Year	Held Over	Allocated	Births	Releases	Escapes	Missing	Deaths	Transfers	Year End Total
1996		83	0	35	5	12	10	1	20
1997	20	33	0	0	1	15	5	0	32
1998	32	38	26	26	11	13	17	3	26
1999	26	69	63	52	7	9	62	0	28
Sum		223	89	113	24	49	94	4	

Sixty-nine ferrets (22 adults, 47 kits) were newly allocated in 1999 and shipments of ferrets occurred on April 13, August 9, September 23, October 5, October 13, October 15, and

November 15. Arizona held them for a median of 45 days. On-site breeding was successful and produced 63 ferrets.

In 1999, 62 mortalities were documented including 52 of 63 kits produced on-site (83%). Of ferrets submitted for necropsy, two males were diagnosed as having renal amyloidosis (i.e., kidneys impaired by protein fibrils resulting in organ failure), one female died from peritonitis due to mixed bacterial infection from an unknown origin, and one female died from *Salmonella* septicemia. The cause of death for two other females was undetermined due to postmortem decomposition. In addition, a road-killed animal was found on Highway 66 in November, but was unidentifiable due to a crushed transponder chip.

A second ferret was injured by a vehicle a few days later and was captured for treatment. It was then transferred to the Phoenix Zoo for recovery, and if possible, breeding. In June 2000, this animal was returned to AVEPA with her two kits.

Seven ferrets escaped and nine are missing-in-action (MIA). Missing-in-action is defined as not being able to determine if ferrets died underground, were killed, or escaped. One female escaped with her four kits about 46 days after whelping. She was recaptured, but released after attempts to trap the kits failed. A male, originally classified as MIA, was found during spotlight surveys approximately 53 days after he was last seen in his pen. The skeleton of a female originally classified as MIA in October 1999 was dug up in May 2000 by a prairie dog refurbishing burrows inside a pen section.

In 1999, Arizona released 52 ferrets (13 adults, 39 kits) into Aubrey Valley. Releases occurred during August to mid-November. We used a hard release technique on 32 ferrets (62%), while the remainder was allowed to passively leave pre-conditioning pens.

The remaining 28 animals were maintained in the acclimation pens at the release site for breeding. However, in early 2000, three animals died (two males, one female), two were transferred to zoos (both female), and one became MIA (female). Therefore, 22 animals are currently held in Aubrey Valley.

#### PRE-CONDITIONING

The release technique implemented by Arizona employs the use of on-site, acclimation pens. Each pen encloses one acre of prairie dog habitat and is divided into four separate sections. Each section accommodates one adult ferret or family unit. Pre-conditioning allows the ferrets to become accustomed to using prairie dog burrows.

In 1999, 20 ferrets were released using a "soft release" method that allows them to leave on their own accord through tubes inserted into acclimation pens. On the average, each ferret released this way was given seven live prairie dogs and pre-conditioned for 165 days (Appendix A).

Thirty-two other animals were released using a "hard release" method, which is a new component to Arizona reintroduction efforts. Ferrets were released from transport boxes into a burrow within high-density prairie dog towns (as indicated by annual surveys). Most were released during daylight hours the day after they arrived in Aubrey Valley from a facility that had pre-conditioned them. However, seven were released this way after they would not leave pre-conditioning pens on their own accord.

ON-SITE REPRODUCTION

Seven males were used to breed 18 females, with the first pairing of ferrets occurring on April 23 and the last on May 21 (Table 6). Sixteen females were successfully bred, one missed her due date, and one died 10 days after pairing. Sixteen litters, ranging in size from one to six, were produced.

Of the 63 kits born, 41 survived the first two weeks of life and were released from nest boxes into acclimation pens. Although survival rates in nest boxes were similar in 1998 and 1999 (69 and 65%, respectively), survival to weaning age was poor for kits taken into burrows within acclimation pens in 1999. Only 11 (27%) were alive post-weaning. This is down from 69% in 1998.

We plan to use prairie dogs when they become available (early to mid-March) for burrow maintenance and construction within pen sections. Kit mortality in 1999 may have been high because some burrows became unsuitable for kit rearing from excessive waste accumulation. By adding prairie dogs to pens when females are being held in nest boxes for breeding, additional burrows should be available and existing burrows should be in better condition when females move their litters from nest boxes.

We plan to make changes in the nest box setup to address temperature concerns that inevitably affect kit survival. Nest boxes will be buried deeper, so that the bottom of the box sits at approximately 30 inches below the surface (current depth is approximately 16 inches). Other modifications may include using insulation at the surface and placing ice blocks on top of the nest box during the warmest days. The intent will be to keep the nest box temperature below 80 degrees. If temperatures can be kept within an acceptable range, then dams and kits need not be released from the nest box early (as some were last year). Perhaps this will reduce mortalities that occur when a dam moves her litter to a burrow.

Table 6. Summary of 1999 ferret breeding efforts.						
Dam, Sire	Pairing Date	Birth Date	Litter Size	Kit (# and sex)		Comments
				Deaths	Survivors	
1494, 2585	04/23/99	06/04/99	4		4U	Kits escaped with dam.

2535, 2147	04/23/99	06/04/99	6	5	1F	
1273, P10	04/27/99	06/09/99	1	1		
1437, 2509	04/27/99	-				
1358, 2510	04/27/99	06/08/99	4	4		
1257, 2039	04/27/99	06/08/99	4	4		
1905, 2485	04/27/99	06/09/99	3	3		
1303, 2585	04/30/99	06/12/99	4	3	1F	
2475, 2147	04/30/99	06/12/99	5	5		
2550, 2485	05/04/99	06/15/99	5	3	2F	
P12, 2509	05/04/99	06/15/99	6	6		
1368, 2510	05/04/99	06/17/99	1	1		
1302, 2039	05/04/99	06/17/99	1	1		
2549, P10	05/04/99	06/17/99	5	3	1M, 1F	
1492, 2147	05/07/99	06/19/99	3	2	1M	
P15, 2585	05/07/99	06/19/99	6	6		
1437, P10	05/17/99	06/27/99	5	5		
1546, 2509	05/21/99	-				Died before whelping.
Sum			63	52	11	

FERRET MONITORING

Presently, the primary technique used to determine short and long term survival is nocturnal searches using spotlights. In 1999, spotlight surveys were conducted in blocks of 3 consecutive nights during July through October. Post-release surveys were conducted in blocks of 3 consecutive nights during November. These surveys totaled 952 person-hours, including 18 hours of backpack surveying. An additional 68 hours of incidental spotlighting occurred from August to December. There were 11 confirmed black-footed ferret sightings (Table 7) and two sightings of ferrets without confirmation of identity. There were also 3 possible sightings. A possible sighting is defined as green eyeshine close to the ground and displaying ferret movements.

DISCUSSION

Raptor protection measures continue to be very successful. Raptor mortalities occurred only when snow broke or stretched the monofilament fishing line covering the top of acclimation pens. Older lines are replaced when they weaken from exposure to sun and wind for several months.

Studbook	Sex	Age	Release Date	Last Observation	Days Known Alive
1303	F	4	10/17	10/26	10

1368	F	4	08/05	08/09	5
1437	F	4	08/03	08/09	7
1494	F	4	07/20 (escaped)	08/02	14
1610	F	3	11/16	11/19	4
3004	M	K	09/01 (escaped)	09/03	3
3035	M	K	09/07 (escaped)	10/30	54
P36	F	K	11/03	11/03	1
P76	M	K	10/29	10/31	3
P112	M	K	10/06	10/22	17
P113	M	K	10/06	10/24	19

Replacement line (50-pound test) stretches less than previously used lighter line. We will investigate ways to provide more support within the center of acclimation pens.

We demonstrated that ferrets could be held for extended periods of time for acclimation and breeding. Modifications to pen electric fence systems reduced escapes when ferrets are free-roaming within acclimation pens.

Our breeding protocol enabled us to successfully produce kits on-site in Aubrey Valley two years in a row. The methodology allowed optimal pairing of ferrets to occur, monitoring of dam and kits with minimal disturbance, and unhampered release into acclimation pens. In 2000, on-site breeding will continue using the same protocol. However, nest boxes will be buried deeper and burrows will be refurbished by prairie dogs prior to release of dams and litters into acclimation pens.

We were able to release ferrets into Aubrey Valley using two different release strategies. Some were released after pre-conditioning in acclimation pens, but most were released soon after arrival from other pre-conditioning sites. Releases included seven animals that were produced on-site. The rearing and release of these kits supplements ferrets received from outside sources. Arizona was able to have a large release of young animals for the first time.

Numerous ferrets were observed and short-term survival in the wild was documented. Getting sufficient manpower to conduct spotlighting surveys continues to be difficult and was improved with schedule changes. In 2000, spotlighting will again occur primarily on weekend nights having the brightest moon illumination.

#### RECOMMENDATIONS

- 1) Continue on-site breeding of ferrets to enhance releases of allocated ferrets.

- 2) Continue acclimation pen modifications to reduce escapes and predation. This could include installation of supports for monofilament lines used as raptor deterrents.
- 3) Continue replacement of electric fence with barbed wire fence where livestock may damage acclimation pens.
- 4) Install additional solar fence chargers and isolate electric fence components to minimize concurrent loss of power to entire pens.
- 5) Test feasibility of internal radio transmitters as a monitoring tool for released ferrets. Tests may include signal range determinations of transmitters above and below ground, suitability of various locations for the receiver, and the degree of signal attenuation after a transmitter is implanted in an animal.
- 6) Release some ferrets with radio collars to monitor dispersal and survival.

LITERATURE CITED

- Arizona Game and Fish Department. 1988. Threatened native wildlife in Arizona. Arizona Game and Fish Department, Phoenix, Arizona.
- Belitsky D.W., K.A. Kime, and W.E. Van Pelt. 1994. Evaluation of a potential black-footed ferret reintroduction site in the Aubrey Valley, Coconino County, Arizona. Unpublished AGFD report to the U.S. Fish and Wildlife Service. Phoenix, Arizona. 21 pp.
- Biggins, D., B. Miller, L. Hanebury, B. Oakleaf, A. Farmer, R. Crete, and A. Dood. 1993. A technique for evaluating black-footed ferret habitat. Pages 73-88 in Proceedings of the symposium on the management of prairie dog complexes for the reintroduction of the black-footed ferret. U.S. Fish and Wildlife Service Biological Report 13, Washington D.C.
- Brown, D.E. (ed.). 1982. Biotic communities of the American Southwest-United States and Mexico. Desert Plants 4(1-4): 1-342. University of Arizona Press, Tucson.
- Clark, T.W., T.M. Campbell III, M.H. Schroeder, and L. Richardson. 1984. Handbook of methods for locating black-footed ferrets. Wyoming BLM Wildlife Technical Bulletin No. 1. 55 pp.
- Harder, J.D., and R.L. Kirkpatrick. 1994. Physiological methods in wildlife research. Pages 275-306 in T. A. Bookhout, editor. Research and management techniques for wildlife and habitats. The Wildlife Society, Bethesda, Maryland.
- Pizzimenti, J.J. 1975. Evolution of the prairie dog genus *Cynomys*. Museum of Natural History Papers 39. 60 pp.
- U.S. Fish and Wildlife Service. 1995. Endangered and threatened wildlife and plants: Proposed establishment of a nonessential experimental population of black-footed ferrets in Aubrey Valley, Arizona. Federal Register 60(220):57387-57396.
- U.S. Fish and Wildlife Service. 1996. Endangered and threatened wildlife and plants: Establishment of a nonessential experimental population of black-footed ferrets in Aubrey Valley, Arizona. Federal Register 61(55):11320-11335.
- Van Pelt, W.E. 1995. Assessment of potential black-footed ferret habitat in northern Arizona. Nongame and Endangered Wildlife Program Technical Report 79. Arizona Game and Fish Department, Phoenix, Arizona.
- Van Pelt, W.E. 1996. The 1996 black-footed ferret release protocol for Aubrey Valley, Arizona. Nongame and Endangered Wildlife Program Technical Report 99. Arizona Game and Fish Department, Phoenix, Arizona.

- Van Pelt, W.E. and M.E. Brennan. 1997. Results of the 1996 black-footed ferret release effort in Aubrey Valley, Arizona. Nongame and Endangered Wildlife Program Technical Report 120. Arizona Game and Fish Department, Phoenix, Arizona.
- Van Pelt, W.E., A. McIntire, R. Simonson, J. Bright, and J. Sneva. 1998a. The 1998 black-footed ferret allocation proposal for Aubrey Valley, Arizona. Arizona Game and Fish Department, Phoenix, Arizona.
- Van Pelt, W.E., R.J. Simonson, A.L. McIntire, J.L. Sneva, and J.L. Bright. 1998b. Results of the 1997 black-footed ferret release effort in Aubrey Valley, Arizona. Nongame and Endangered Wildlife Program Technical Report 129. Arizona Game and Fish Department, Phoenix, Arizona.
- Williams, E.S. 1991. Survey for diseases of carnivores in the Conata Basin Badlands, South Dakota. Report to South Dakota Game and Fish and Parks.
- Yarchin, J.C., G.C. Dickens, R.L. Glinski, and R.B. Spicer. 1988. An investigation of prairie dog populations and associated sensitive predators in the Little Colorado River Basin: Black-footed ferret, ferruginous hawk, and Swainson's hawk. Unpublished AGFD report to U.S. Bureau of Land Management, Phoenix District Office, Phoenix, Arizona.

Appendix A. Status of ferrets in Aubrey Valley, 1999.

Studbook	Sex	Date Received	Last Age	Days held	Live Prairie Dogs Fed	Status
1143	F	10/21/97	4.7	451	0	Mortality 01/15/99.
1257	F	08/24/98	4.4	399	2	4 kit mortalities. Mortality 09/27/99.
1273	F	09/10/98	4.5	395	6	1 kit mortality. Hard released 10/10/99.
1302	F	09/10/98	4.6	477	6	1 kit mortality. Not releasable. In pen 12/31/99.
1303	F	08/24/98	4.4	419	12	3 kit mortalities. Released 10/17/99.
P49	F	06/12/99	Kit	133	0	Born on-site. Released 10/23/99.
1319	F	09/23/99	4.4	5	1	Released 09/28/99.
1358	F	08/24/98	4.4	404	3	4 kit mortalities. Released 10/02/99.
1368	F	08/24/98	4.1	346	7	1 kit mortality. Released 08/05/99.
1369	F	10/05/99	4.4	1	0	Hard released 10/06/99.
1436	F	09/23/99	4.6	99	1	Not releasable. In pen 12/31/99.
1437	F	11/14/97	4.2	627	6	5 kit mortalities. Released 08/03/99.
1485	F	09/10/98	4.3	370	1	Mortality 09/15/99.
1492	F	09/15/98	4.3	371	7	2 kit mortalities. Mortality 09/21/99.
P76	M	06/19/99	Kit	132	4	Born on-site. Released 10/29/99.
1494	F	09/10/98	4.1	313	2	Escaped 07/20/99 with 4 kits.
1517	F	10/05/99	4.3	1	0	Hard released 10/06/99.
1546	F	09/10/98	3.8	264	0	Mortality 06/01/99.
1601	F	10/13/99	3.5	13	0	MIA 10/26/99.
1604	F	11/15/99	3.5	1	0	Hard released 11/16/99.
1610	F	11/15/99	3.5	1	0	Hard released 11/16/99.
1614	M	11/14/97	2.9	512	0	Mortality 04/10/99.
1615	F	10/15/99	3.4	11	0	MIA 10/26/99.
1619	M	11/10/98	2.8	113	0	Mortality 03/03/99.
1645	F	10/15/99	3.6	77	0	In pen 12/31/99.
1660	F	10/13/99	3.6	79	0	In pen 12/31/99.
1666	F	10/15/99	3.4	2	0	Hard released 10/17/99.
1796	F	10/13/99	3.7	79	0	In pen 12/31/99.
1815	F	10/15/99	3.5	77	0	In pen 12/31/99.
1842	F	11/15/99	3.7	46	0	In pen 12/31/99.
1905	F	08/15/97	2.7	868	1	3 kit mortalities. In pen 12/31/99.
1994	F	11/15/99	2.6	46	0	In pen 12/31/99.
2039	M	04/13/99	2.0	50	0	Mortality 06/02/99.
2084	F	10/13/99	2.7	79	0	In pen 12/31/99.
2115	F	10/15/99	2.6	77	0	In pen 12/31/99.
2147	M	04/13/99	2.0	79	0	MIA 07/01/99.
2406	M	09/23/99	1.3	5	1	Released 09/28/99.
2444	F	11/10/98	Kit	63	0	Mortality 01/12/99.
2475	F	11/10/98	1.3	277	0	5 kit mortalities. MIA 08/14/99.
2485	M	11/10/98	1.2	259	0	MIA 07/27/99.
2509	M	11/10/98	1.5	416	1	In pen 12/31/99.
2510	M	11/10/98	1.5	416	1	In pen 12/31/99.
2535	F	08/24/98	1.6	494	6	5 kit mortalities. In pen 12/31/99.

Studbook	Sex	Date Received	Last Age	Days held	Live Prairie Dogs Fed	Status
P36	F	06/04/99	Kit	152	3	Born on-site. Hard released 11/03/99.
2549	F	11/10/98	1.6	416	6	3 kit mortalities. In pen 12/31/99.
P71	M	06/17/99	Kit	139	2	Born on-site. Hard released 11/03/99.
P72	F	06/17/99	Kit	139	2	Born on-site. Hard released 11/03/99.
2550	F	11/10/98	1.6	416	9	3 kit mortalities. In pen 12/31/99.
P59	F	06/15/99	Kit	143	3	Born on-site. Hard released 11/05/99.
P60	F	06/15/99	Kit	142	3	Born on-site. Released 11/04/99.
2585	M	04/13/99	1.7	262	0	In pen 12/31/99.
2630	M	09/23/99	1.2	5	1	Released 09/28/99.
2784	M	11/15/99	Kit	46	0	In pen 12/31/99.
2797	M	10/15/99	Kit	77	0	In pen 12/31/99.
2850	M	11/15/99	Kit	46	0	In pen 12/31/99.
2853	M	11/15/99	Kit	46	0	In pen 12/31/99.
2857	M	11/15/99	Kit	46	0	In pen 12/31/99.
2956	F	11/15/99	Kit	46	0	In pen 12/31/99.
3001	F	10/13/99	Kit	79	0	In pen 12/31/99.
3002	F	08/09/99	Kit	41	4	MIA 09/19/99.
3003	F	08/09/99	Kit	60	3	Released 10/08/99.
3004	M	08/09/99	Kit	23	1	Escaped 09/01/99.
3005	F	08/09/99	Kit	61	6	Hard released 10/09/99.
3006	F	08/09/99	Kit	58	4	Released 10/06/99.
3007	F	08/09/99	Kit	39	1	MIA 09/17/99.
3008	M	08/09/99	Kit	57	4	Released 10/05/99.
3009	M	08/09/99	Kit	57	2	Released 10/05/99.
3010	F	08/09/99	Kit	55	3	Released 10/03/99.
3011	F	08/09/99	Kit	55	3	Released 10/03/99.
3012	F	08/09/99	Kit	60	5	Released 10/08/99.
3013	M	10/13/99	Kit	79	0	In pen 12/31/99.
3030	M	08/09/99	Kit	39	3	MIA 09/17/99.
3031	M	08/09/99	Kit	59	3	Released 10/07/99.
3033	M	08/09/99	Kit	59	4	Released 10/07/99.
3034	M	08/09/99	Kit	41	2	MIA 09/19/99.
3035	M	08/09/99	Kit	29	0	Escaped 09/07/99.
3036	F	10/13/99	Kit	79	0	In pen 12/31/99.
3055	M	11/15/99	Kit	1	0	Hard released 11/16/99.
3056	F	11/15/99	Kit	1	0	Hard released 11/16/99.
3057	F	11/15/99	Kit	1	0	Hard released 11/16/99.
3065	M	11/15/99	Kit	1	0	Hard released 11/16/99.
3066	F	11/15/99	Kit	1	0	Hard released 11/16/99.
3067	F	11/15/99	Kit	1	0	Hard released 11/16/99.
3068	F	11/15/99	Kit	1	0	Hard released 11/16/99.
P10	M	06/06/98	1.3	474	0	Born on-site 1998. MIA 09/23/99.
P12	F	06/06/98	1.6	573	1	Born on-site 1998. 6 kit mortalities. In pen 12/31/99.
P15	F	06/09/98	1.6	570	4	Born on-site 1998. 6 kit mortalities. In pen 12/31/99.

P96	M	10/05/99	Kit	1	0	Hard released 10/06/99.
P97	M	10/05/99	Kit	1	0	Hard released 10/06/99.
P99	M	10/05/99	Kit	1	0	Hard released 10/06/99.
P100	M	10/05/99	Kit	1	0	Hard released 10/06/99.
Studbook	Sex	Date Received	Last Age	Days held	Live Prairie Dogs Fed	Status
P101	M	10/05/99	Kit	1	0	Hard released 10/06/99.
P102	F	10/05/99	Kit	1	0	Hard released 10/06/99.
P103	F	10/05/99	Kit	1	0	Hard released 10/06/99.
P104	F	10/05/99	Kit	1	0	Hard released 10/06/99.
P106	M	09/23/99	Kit	29	3	Released 10/22/99.
P110	M	10/05/99	Kit	1	0	Hard released 10/06/99.
P111	F	10/05/99	Kit	1	0	Hard released 10/06/99.
P112	M	10/05/99	Kit	1	0	Hard released 10/06/99.
P113	M	10/05/99	Kit	1	0	Hard released 10/06/99.
P114	F	10/05/99	Kit	1	0	Hard released 10/06/99.
P115	F	10/05/99	Kit	1	0	Hard released 10/06/99.

Appendix B. U.S. Fish and Wildlife Annual Report Form

Reintroduction Site: Aubrey Valley, Arizona

Date Submitted: January 7, 2000

Submitted by (name/title): Richard Winstead, Nongame Specialist, and Angie McIntire, Wildlife Specialist, Arizona Game and Fish  
 Department-Region III

Studbook /Site No.	Transponder Number	M /F	Date Rec.	Date Re/Tr	Pre. Treat	Last Obs.	How ID	Stat	Kits Prod	Comments
1143	020847820	F	10/21/97		PS			D		Dead 01/15/99. Had been non-releasable for health reasons.
1257	013367259	F	08/24/98		PS	09/27/99		D	1.2.1	
1273	012868095	F	09/10/98	10/10/99	PS	10/10/99			0.1.0	
1302	116247760	F	09/10/98		PS			AC	0.0.1	Non-releasable for health reasons.
1303	011526102 124822391*	F	08/24/98	10/17/99	PS	10/26/99	O		0.2.2	*New transponder on 10/26/99.
1319	028617605 017882531	F	09/23/99	09/28/99	PO	09/28/99				
1358	013377548	F	08/24/98	10/02/99	PS	10/02/99			3.1.0	
1368	015819575	F	08/24/98	08/05/99	PS	08/09/99	T		0.0.1	
1369	028782881 028631279	F	10/05/99	10/06/99	PO	10/06/99				
1436	029078265 029105830	F	09/23/99		PO			AC		Non-releasable for health reasons.
1437	116338471	F	11/14/97	08/03/99	PS	08/09/99	T			
1485	025890042	F	09/10/98		PS			D	0.0.5	Dead 09/15/99. Health had been declining, tooth problems, found dead in burrow.
1492	019822514	F	09/15/98		PS			D	3.0.0	Dead 09/21/99 from Salmonella.
1494	020258783	F	09/10/98	07/20/99	PS	08/02/99	T		2.2.0	Escaped 07/20/99 with kits; recaptured but attempts to trap kits unsuccessful; released in area of kits.

Studbook /Site No.	Transponder Number	M /F	Date Rec.	Date Re/Tr	Pre. Treat	Last Obs.	How ID	Stat	Kits Prod	Comments
1517	116244662 029083872	F	10/05/99	10/06/99	PO	10/06/99				
1546	010371635	F	09/10/98		PS			D		Dead 06/01/99 from E. coli.
1601	021116309 032628608	F	10/13/99		U					MIA 10/26/99.
1604	017872889 035603861	F	11/15/99	11/16/99	U	11/16/99				
1610	016334115	F	11/15/99	11/16/99	U	11/19/99	T	AC		Injured by vehicle, transferred to Phoenix Zoo for breeding.
1614	017628256	M	11/14/97		PS			D		Dead 04/10/99.
1615	017519568 035627001	F	10/15/99		U					MIA 10/26/99.
1619	018011566	M	11/10/98		PS			D		Dead 03/03/99.
1645	036370056 036312557	F	10/15/99		PS			AP		
1660	020847076 032619037	F	10/13/99		PS			AP		
1666	021113117 036375280	F	10/15/99	10/17/99	U	10/17/99				
1796	020846840 032629256	F	10/13/99		PS			AP		
1815	021332109 036331893	F	10/15/99		PS			AP		
1842	027019382 036311367	F	11/15/99		PS			AP		
1905	017383512	F	08/15/97		PS			AP	1.2.0	
1994	017581057A 028617864A	F	11/15/99		PS			AP		
2039	021258015	M	04/13/99		PS			D		Dead 06/02/99.
2084	021102065	F	10/13/99		PS			AP		

Studbook /Site No.	Transponder Number	M /F	Date Rec.	Date Re/Tr	Pre. Treat	Last Obs.	How ID	Stat	Kits Prod	Comments
2115	116274777	F	10/15/99		PS			AP		
2147	116269270	M	04/13/99		PS					MIA 07/01/99.
2406	029115540 029072011	M	09/23/99	09/28/99	PO	09/28/99				
2444	116238125	F	11/10/98		PS			D		Dead 01/12/99.
2475	116337347	F	11/10/98		PS				0.0.5	MIA 08/14/99.
2485	116349761	M	11/10/98		PS					MIA 07/27/99.
2509	010368775	M	11/10/98		PS			AP		
2510	011039106	M	11/10/98		PS			AP		
2535	028768073 028624333	F	08/24/98		PS			AP	5.1.0	
2549	115665580	F	11/10/98		PS			AP	1.3.1	
2550	115767243	F	11/10/98		PS			AP	1.2.2	
2585	029073828	M	04/13/99		PS			AP		
2630	116335334 029062112	M	09/23/99	09/28/99	PO	09/28/99				
2784	029037613 031063288	M	11/15/99		PS			AP		
2797	032632572 032628563	M	10/15/99		PS			AP		
2850	122544767A 036322259	M	11/15/99		PS			AP		
2853	036373515 036371548	M	11/15/99		PS			AP		
2857	031078807 036328363	M	11/15/99		PS			AP		
2956	032612307 122928666A	F	11/15/99		PS			AP		
3001	032630361 032619826	F	10/13/99		PS			AP		

Studbook /Site No.	Transponder Number	M /F	Date Rec.	Date Re/Tr	Pre. Treat	Last Obs.	How ID	Stat	Kits Prod	Comments
3002	032628015 032625284	F	08/09/99		PS					MIA 09/19/99.
3003	032628023 032629857	F	08/09/99	10/08/99	PS	10/08/99				
3004	032620883 032619020	M	08/09/99		PS	09/03/99	T			Escaped 09/01/99.
3005	032624085 032613860	F	08/09/99	10/09/99	PS	10/09/99				
3006	032614569 032621086	F	08/09/99	10/06/99	PS	10/06/99				
3007	032622080 032619013	F	08/09/99		PS					MIA 09/17/99.
3008	032632530 032632618	M	08/09/99	10/05/99	PS	10/05/99				
3009	032632114 032629060	M	08/09/99	10/05/99	PS	10/05/99				
3010	032623809 032632571	F	08/09/99	10/03/99	PS	10/03/99				
3011	032612575 032621375	F	08/09/99	10/03/99	PS	10/03/99				
3012	032632088 032626771	F	08/09/99	10/08/99	PS	10/08/99				
3013	032625101 032619797	M	10/13/99		PS			AP		
3030	032623349 032618861	M	08/09/99		PS					MIA 09/17/99.
3031	032632546 032628524	M	08/09/99	10/07/99	PS	10/07/99				
3033	032630061 032633122	M	08/09/99	10/07/99	PS	10/07/99				

Studbook /Site No.	Transponder Number	M /F	Date Rec.	Date Re/Tr	Pre. Treat	Last Obs.	How ID	Stat	Kits Prod	Comments
3034	032625776 032611023	M	08/09/99		PS					MIA 09/19/99.
3035	032632331 032615328	M	08/09/99	09/07/99	PS	10/30/99	T			Escaped 09/07/99.
3036	032631531 032617794	F	10/13/99		PS			AP		
3055	032615566 032611616	M	11/15/99	11/16/99	PO	11/16/99				
3056	032611119 032632367	F	11/15/99	11/16/99	PO	11/16/99				
3057	032620893 032611595	F	11/15/99	11/16/99	PO	11/16/99				
3065	032618372 032628320	M	11/15/99	11/16/99	PO	11/16/99				
3066	032631043 114938096A	F	11/15/99	11/16/99	PO	11/16/99				
3067	032620592 032619194	F	11/15/99	11/16/99	PO	11/16/99				
3068	032615303 032631037	F	11/15/99	11/16/99	PO	11/16/99				
NON-SSP ANIMALS										
P10	029591104	M	06/06/98		PBS					MIA 09/23/99. Dam 1437, sire 1285. AKA 1SE98M1.
P12	029589585	F	06/06/98		PBS			AP	0.0.6	Dam 1437, sire 1285. AKA 1SE98F1
P15	029592574	F	06/09/98		PBS			AP	4.2.0	Dam 1200, sire 1614. AKA 5SE98F2
P36	029539610	F	06/04/99	11/03/99	PBS	11/03/99	T			Dam 2535, sire 2147. AKA 6NW99F1.

Studbook/ Site No.	Transponder Number	M /F	Date Rec.	Date Re/Tr	Pre. Treat	Last Obs.	How ID	Stat	Kits Prod	Comments
P49	829635004	F	06/12/99	10/23/99	PBS	10/23/99				Dam 1303, sire 2585. AKA 7NW99F1
P59	029788315	F	06/15/99	11/05/99	PBS	11/05/99				Dam 2550, sire 2485. AKA 7SE99F1
P60	029787075	F	06/15/99	11/04/99	PBS	11/04/99				Dam 2550, sire 2485. AKA 7SE99F2
P71	029769122	M	06/17/99	11/03/99	PBS	11/03/99				Dam 2549, sire P10. AKA 6NE99M1
P72	029630577	F	06/17/99	11/03/99	PBS	11/03/99				Dam 2549, sire P10. AKA 6NE99F1.
P76	029819892	M	06/19/99	10/29/99	PBS	10/31/99	T			Dam 1492, sire 2147. AKA 4NE99M1.
P96	124435767	M	10/05/99	10/06/99	PBO	10/06/99				
P97	124752590	M	10/05/99	10/06/99	PBO	10/06/99				
P99	029770533	M	10/05/99	10/06/99	PBO	10/06/99				
P100	124822393	M	10/05/99	10/06/99	PBO	10/06/99				
P101	124427222	M	10/05/99	10/06/99	PBO	10/06/99				
P102	029772317	F	10/05/99	10/06/99	PBO	10/06/99				
P103	029603083	F	10/05/99	10/06/99	PBO	10/06/99				
P104	124575217	F	10/05/99	10/06/99	PBO	10/06/99				
P106	029635381	M	09/23/99	10/22/99	PBO	10/22/99				
P110	124619545	M	10/05/99	10/06/99	PBO	10/06/99				
P111	124564530	F	10/05/99	10/06/99	PBO	10/06/99				
P112	029818374	M	10/05/99	10/06/99	PBO	10/22/99	T			
P113	029589259	M	10/05/99	10/06/99	PBO	10/24/99	T			
P114	029596581	F	10/05/99	10/06/99	PBO	10/06/99				
P115	029593363	F	10/05/99	10/06/99	PBO	10/06/99				

M = Male  
 F = Female

T = Transponder chip reading

Pretreatment -

PBS = Pen born, pens on or near reintroduction area  
 PBO = Pen born, breeding facilities away from reintroduction area  
 PS = Preconditioned in pens on or near reintroduction site  
 PO = Preconditioned in pens away from reintroduction site  
 U = Unknown

Status -

AC = Alive, being held in captivity  
 AP = Alive, being held in on-site pens for breeding purposes  
 D = Dead, body/parts recovered