

**RESULTS OF THE 2001  
BLACK-FOOTED FERRET RELEASE EFFORT  
IN AUBREY VALLEY, ARIZONA**

Richard A. Winstead, Regional Nongame Specialist  
Angela L. McIntire, Wildlife Specialist  
Thomas D. Silvia, Wildlife Specialist  
Tiffany A. Volz, Wildlife Assistant  
William E. Van Pelt<sup>1</sup>, Nongame Mammals Program Manager

Region III, Field Operations Division  
<sup>1</sup>Nongame Branch, Wildlife Management Division



Technical Report 202  
Nongame and Endangered Wildlife Program  
Program Chief: Terry B. Johnson  
Arizona Game and Fish Department  
2221 West Greenway Road  
Phoenix, Arizona 85023-4399

May 2002

## CIVIL RIGHTS AND DIVERSITY COMPLIANCE

The Arizona Game and Fish Commission receives federal financial assistance in Sport Fish and Wildlife Restoration. Under Title VI of the 1964 Civil Rights Act, Section 504 of the Rehabilitation Act of 1973, Title II of the American with Disabilities Act of 1990, the Age Discrimination Act of 1975, Title IX of the Education Amendments of 1972, the U.S. Department of the Interior prohibits discrimination on the basis of race, color, religion, national origin, age, sex, or disability. If you believe you have been discriminated against in any program, activity, or facility as described above, or if you desire further information please write to:

Arizona Game and Fish Department  
Office of the Deputy Director, DOHQ  
2221 West Greenway Road  
Phoenix, Arizona 85023-4399

and

The Office for Diversity and Civil Rights  
U.S. Fish and Wildlife Service  
4040 North Fairfax Drive, Room 300  
Arlington, Virginia 22203

## AMERICANS WITH DISABILITIES ACT COMPLIANCE

The Arizona Game and Fish Department complies with all provisions of the American with Disabilities Act. This document is available in alternative format by contacting the Arizona Game and Fish Department, Office of the Deputy Director at the address above or by calling (602) 789-3290 or TTY 1-800-367-8939.

## RECOMMENDED CITATION

Winstead, R.A., A.L. McIntire, T.D. Silvia, T.A. Volz, and W.E. Van Pelt. 2002. Results of the 2001 black-footed ferret release effort in Aubrey Valley, Arizona. Nongame and Endangered Wildlife Program Technical Report 202. Arizona Game and Fish Department, Phoenix, Arizona.

## ACKNOWLEDGMENTS

We acknowledge the efforts of the following people, whose assistance is greatly appreciated: Duane Aubuchon, Dave Boyd, Basil Coffman, Terry Johnson, John Koehler, John Strocchio, and Jim Witham, Arizona Game and Fish Department; Mike Fink and Craig Levy, Arizona Department of Health Services; Steve Williams, Arizona State Lands Department; Larry Leist, Cholla Cattle Company; Kerry Christensen, Hualapai Nation; Dave Mikesic and Gloria Tom, Navajo Nation; Jerry Brown, The Phoenix Zoo; Earl Carter and Gino Fornara, USDA Wildlife Services; Bill Austin, Mike Lockhart, and Paul Marinara, U.S. Fish and Wildlife Service; Drs. T. H. Noon, Robert Glock, and Carlos Reggiardo, University of Arizona; Arizona Department of Transportation for allowing the prairie dog quarantine facility to occur in their Seligman yard; and all volunteers who spotlighted in hopes of seeing the fabled green eyeshine. Cover photo by George Andrejko (Arizona Game and Fish Department).

## PROJECT FUNDING

Funding for this project was provided by: voluntary contributions to Arizona's Nongame Wildlife Checkoff; Arizona Game and Fish Department's Heritage Fund; Project W-95-M under the Federal Aid in Wildlife Restoration Act (Pittman-Robertson Act), and Title VI of the Endangered Species Act (Project E-5, Job 29).

TABLE OF CONTENTS

Introduction..... 1  
Background..... 1  
Methods..... 2  
Results..... 4  
    Pen Design ..... 4  
    Pen Integrity..... 4  
    Prairie Dog Monitoring..... 5  
    Prairie Dog Trapping and Quarantine..... 9  
    Disease Monitoring..... 10  
    Ferret Allocation ..... 10  
    Pre-conditioning..... 11  
    On-site Reproduction ..... 12  
    Ferret Monitoring..... 12  
Discussion..... 15  
Recommendations..... 16  
Literature Cited..... 17

FIGURES

Figure 1. Delineation of the Aubrey Valley Experimental Population Area..... 3  
Figure 2. Prairie dog towns within the Aubrey Valley Complex. .... 6  
Figure 3. Observation times for all classes of ferret observations during 2001. .... 14

TABLES

Table 1. Completed prairie dog transects - North and South Audley, Aubrey Valley, Arizona. ... 7  
Table 2. Completed prairie dog transects - Pica Camp, Aubrey Valley, Arizona. .... 8  
Table 3. Prairie dog transects completed in satellite prairie dog towns found within  
    Aubrey Valley, Arizona. .... 9  
Table 4. Results of the 2001 predator disease monitoring effort in Aubrey Valley, Arizona. .... 11  
Table 5. Status of ferrets held in Aubrey Valley, 1996-2001. .... 11  
Table 6. Summary of 2001 breeding efforts. .... 13  
Table 7. Ferrets observed during spotlight surveys in Aubrey Valley, 2001. .... 14  
Table 8. Telemetered ferrets detected during surveys in Aubrey Valley, 2001. .... 15

APPENDICES

Appendix A. Status of ferrets in Aubrey Valley, 2001..... 19  
Appendix B. U.S. Fish and Wildlife Service Annual Report Form..... 20

# RESULTS OF THE 2001 BLACK-FOOTED FERRET RELEASE EFFORT IN AUBREY VALLEY, ARIZONA

Richard A. Winstead, Angela L. McIntire, Thomas D. Silvia,  
Tiffany A. Volz, and William E. Van Pelt

## 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 2001. Field activities included prairie dog density surveys; monitoring of diseases 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; 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 implementing field activities.

AGFD's ferret reintroduction activities are evaluated on an annual basis to help ensure that objectives outlined in the release protocol are being accomplished (Van Pelt 1996). 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 by USFWS as endangered on March 11, 1967. It was also included in *Threatened Native Wildlife in Arizona* (AGFD 1988) and *Wildlife of Special Concern in Arizona* (1996) 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 (Figure 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 breeding and pre-conditioning of release candidates. Pens were originally constructed in 1996 and are still in use, although various modifications and enhancements have been made through time.

Breeding protocols, developed in 1998, include confinement of females in a buried nest box connected by an artificial tube to an above ground cage. Biologists are then able to confirm whelping and monitor the status of kit development. Changes in testicular and vulval size and condition are monitored to determine reproductive condition and cytological samples taken from females are used to predict onset of estrus (Harder and Kirkpatrick 1994). AGFD biologists stain the samples and interpret results. Pairing occurs when observed cornified epithelial cells approach 90% of all cells counted. A pairing is considered successful if samples taken after pairing showed a decrease in these epithelial cells. Biologists also look for orange saliva staining on the back of the female ferret's neck.

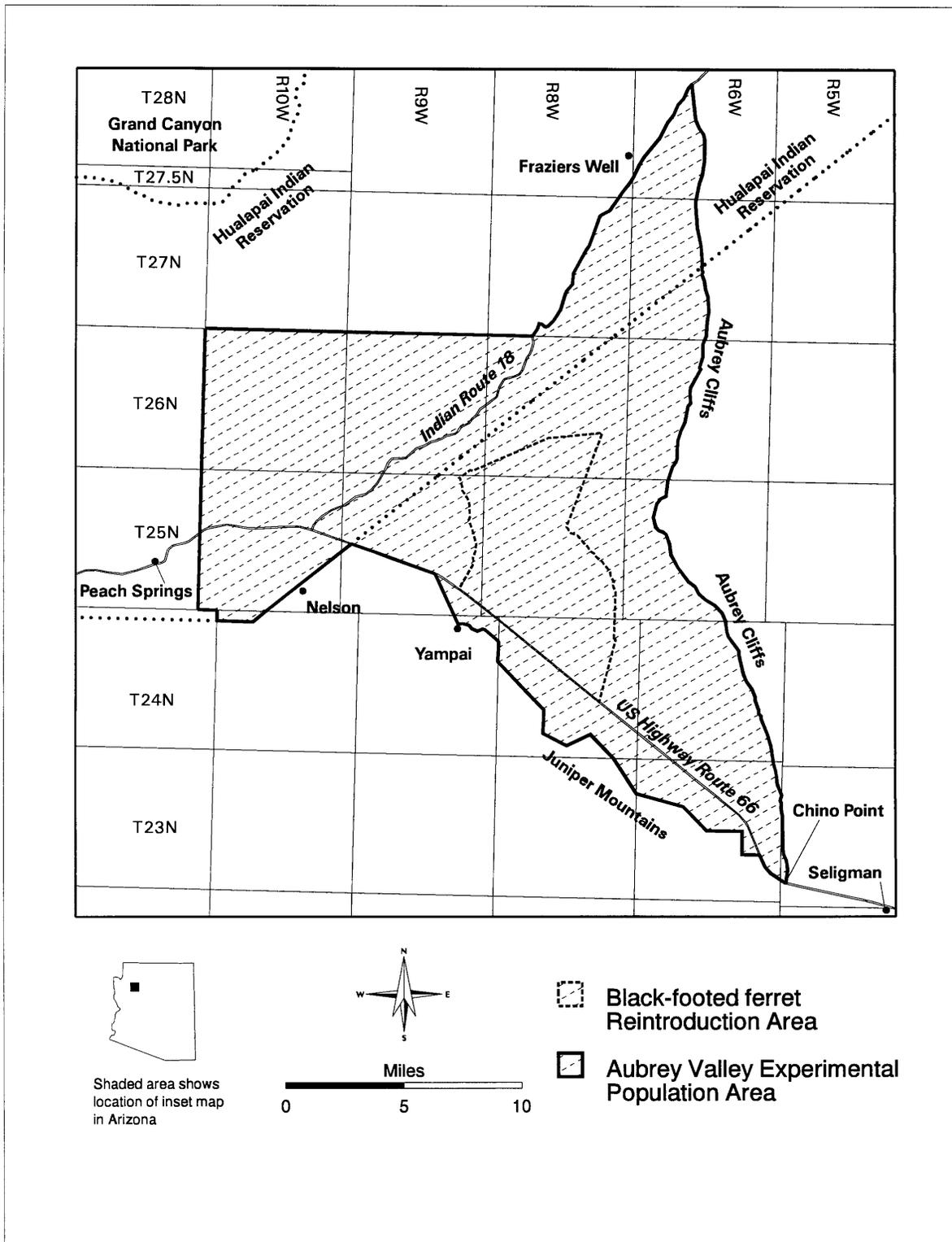


Figure 1. Delineation of the Aubrey Valley Experimental Population Area.

This technique proved successful and produced 26 kits in 1998 (Winstead et al. 1999), 63 kits in 1999 (Winstead et al. 2000), and 29 kits in 2000 (Winstead et al. 2002). The same method was used again in 2001.

In addition to breeding efforts, previously established monitoring programs were continued in 2001. 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 also continued in 2001 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

Nine 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 four 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 with chicken wire.

No significant improvements were made to pens in 2001. However, maintenance occurred to keep pens secure for captive ferrets and to repair damage from severe weather. Activities included fixing shorts in electric fencing, weed removal, replacement of monofilament line, tightening perimeter fencing, adding structural support, and reattaching or replacing flashing.

### PEN INTEGRITY

The pens have continued to be successful at keeping terrestrial predators out. However, prairie dogs sometimes dig under the fencing. 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 chicken wire and back-filled. To prevent further digging into pens, all prairie dogs within approximately 10 m of the pens are trapped and removed when necessary.

Pen modifications were effective until late 2000 when raptor attacks resulted in the death of two ferrets and the wounding of another ferret. In January 2001, a ferruginous hawk (*Buteo regalis*) was observed inside a pen section. It was perched on the mound of a burrow used by one of the resident kits (unharmd). A different ferruginous hawk was observed a few days later circling a different pen. An adult female ferret was subsequently found dead as a result of raptor attack.

Considerable effort went into modifying or replacing the monofilament stretched across pen sections. Gaps between adjacent lines were decreased to  $\leq 18$  inches and to date no additional

ferrets have been lost to raptors. The USFWS, notified of the situation, approved take of offending hawks in January 2001, but none have been removed.

The original intent of the acclimation pens was to hold animals for three months pending release. We have been quite successful at holding animals for this period of time, and 179 animals (75%) in the last six 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. Only one out of 21 animals escaped during 2001.

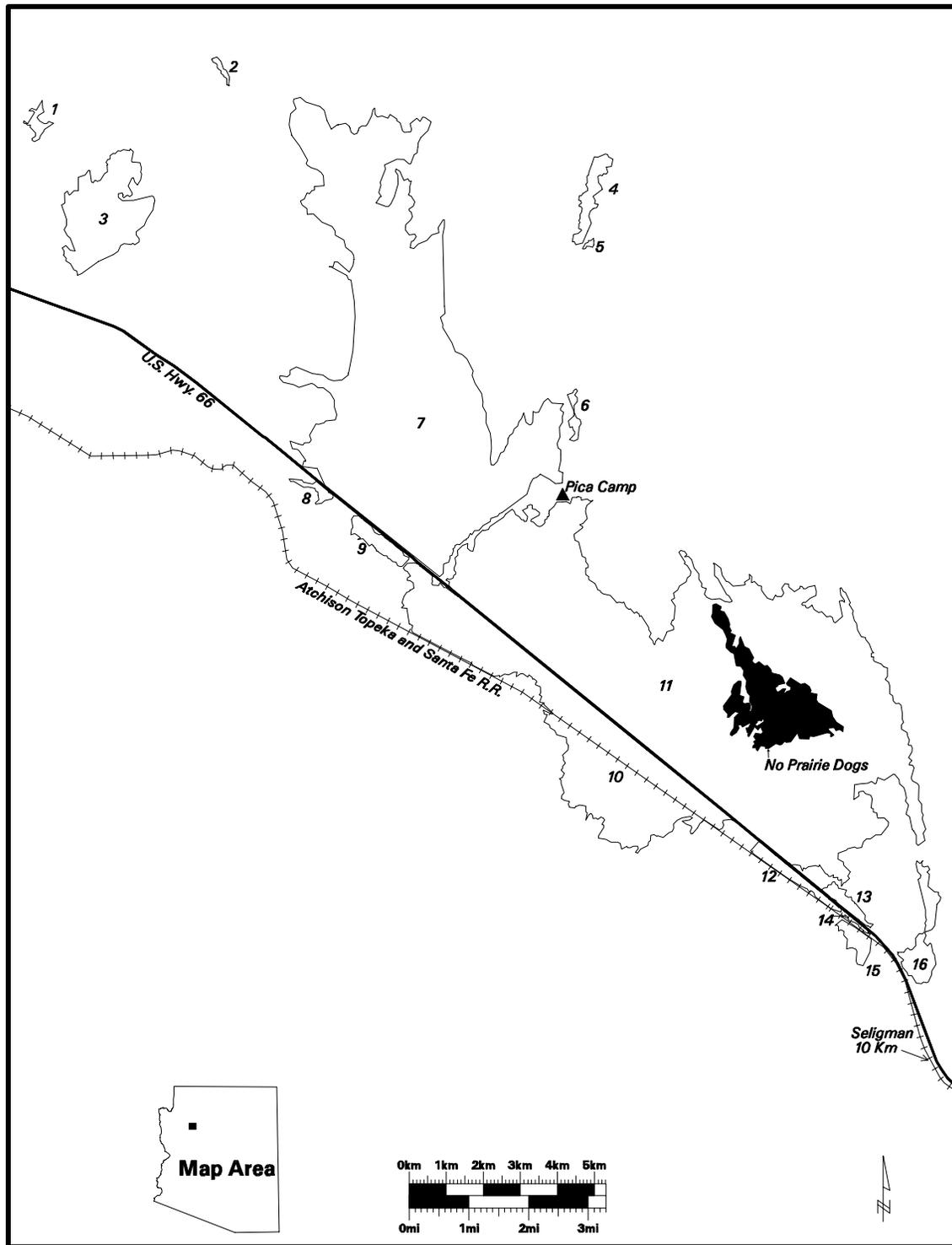
#### PRAIRIE DOG MONITORING

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.

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 one through five 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. The total prairie dog acreage in Aubrey Valley was estimated to be 29,653 acres (12,001 ha) when mapped in 1997 (Figure 2).

During June, July, and August 2001, prairie dog activity and burrow density were sampled at 64 established transect blocks located throughout the AVEPA (Tables 1, 2, and 3). We ran 384 transects, with 33% of completed transects being classified as good ferret habitat. Active burrow densities ranged from 0 to 153 per hectare, with an overall mean of 23 per hectare.

Using burrow densities, prairie dog density estimates for AVEPA ranged from 0 to 11.21 prairie dogs per hectare (mean = 5.76). Estimated prairie dog density was used to determine black-footed ferret carrying capacity, 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 2001 ferret family estimate for AVEPA is 47 families, which is well above the 30 breeding adult threshold outlined in the Black-footed Ferret Recovery Plan (USFWS 1988). Since 1990, the ferret family rating for the AVEPA has ranged from 24 to 79 ferret families.



|                  |               |                  |                       |
|------------------|---------------|------------------|-----------------------|
| 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 towns within the Aubrey Valley Complex.

| Table 1. Completed prairie dog transects - North and South Audley, Aubrey Valley, Arizona. |  |          |          |          |          |          |          |          |
|--|--|----------|----------|----------|----------|----------|----------|----------|
| Site Number  | Active Burrows Per Hectare (Transects completed) |          |          |          |          |          |          |          |
|  | 1994   | 1995     | 1996     | 1997     | 1998     | 1999     | 2000     | 2001     |
| 1  | 23 (10)  | 21 (5)   | 11 (5)   | 9 (5)    | 9 (6)    | 1 (6)    | 1 (6)    | 1 (6)    |
| 2  | 54 (10)  | 25 (5)   | 29 (5)   | 22 (5)   | 49 (6)   | 41 (6)   | 47 (6)   | 35 (6)   |
| 3  | 40 (20)  | 27 (5)   | 36 (5)   | 51 (5)   | 41 (6)   | 40 (6)   | 8 (6)    | 32 (6)   |
| 4  | 35 (8)   | 35 (5)   | 11 (5)   | 19 (5)   | 38 (6)   | 53 (6)   | 5 (6)    | 22 (6)   |
| 5  | 24 (10)  | 24 (5)   | 15 (5)   | 21 (5)   | 18 (6)   | 19 (6)   | 7 (6)    | 9 (6)    |
| 6  | 22 (10)  | 33 (5)   | 11 (5)   | 53 (5)   | 34 (6)   | 49 (7)   | 21 (6)   | 5 (6)    |
| 7  | 31 (10)  | 32 (5)   | 7 (5)    | 13 (5)   | 44 (6)   | 27 (6)   | 12 (6)   | 9 (6)    |
| 8  | 1 (10)   | 11 (5)   | 2 (5)    | 7 (5)    | 28 (6)   | 2 (7)    | 1 (6)    | 2 (6)    |
| 9  | 4 (8)  | 6 (5)    | 3 (5)    | 19 (5)   | 9 (6)    | 1 (6)    | 0 (6)    | 0 (6)    |
| 10   | 23 (5)   | 42 (4)   | 41 (5)   | 46 (5)   | 41 (6)   | 81 (6)   | 46 (6)   | 27 (6)   |
| 11   | 31 (10)  | 33 (5)   | 2 (5)    | 1 (5)    | 7 (6)    | 7 (6)    | 3 (6)    | 3 (6)    |
| 12   | 36 (20)  | 33 (5)   | 5 (5)    | 7 (5)    | 23 (6)   | 25 (6)   | 24 (6)   | 12 (6)   |
| 13   | 69 (10)  | 46 (5)   | 34 (5)   | 15 (5)   | 44 (6)   | 39 (6)   | 57 (6)   | 22 (6)   |
| 14   | 15 (10)  | 20 (5)   | 0 (5)    | 1 (5)    | 2 (6)    | 0 (6)    | 3 (6)    | 0 (6)    |
| 15   | 14 (20)  | 14 (5)   | 7 (5)    | 9 (5)    | 18 (6)   | 20 (6)   | 22 (6)   | 41 (6)   |
| 16   | 26 (5)   | 60 (5)   | 12 (5)   | 34 (5)   | 22 (6)   | 43 (6)   | 59 (6)   | 122 (6)  |
| 17   | 51 (5)   | 20 (5)   | 16 (4)   | 27 (5)   | 32 (6)   | 64 (6)   | 58 (6)   | 56 (6)   |
| 18   | 59 (20)  | 21 (5)   | 25 (5)   | 9 (5)    | 23 (6)   | 27 (6)   | 46 (6)   | 38 (6)   |
| 19   | 24 (10)  | 18 (5)   | 40 (5)   | 13 (5)   | 15 (6)   | 39 (6)   | 38 (6)   | 55 (6)   |
| 20   | 56 (8)   | 32 (4)   | 33 (5)   | 51 (5)   | 48 (6)   | 33 (6)   | 44 (6)   | 67 (6)   |
| 21   | 40 (10)  | 22 (4)   | 50 (5)   | 47 (5)   | 114 (6)  | 100 (6)  | 77 (6)   | 86 (6)   |
| 22   | 86 (10)  | 16 (5)   | 26 (5)   | 15 (5)   | 29 (6)   | 44 (6)   | 24 (6)   | 36 (6)   |
| 23   | 26 (8)   | 21 (5)   | 29 (5)   | 11 (5)   | 42 (6)   | 44 (6)   | 51 (6)   | 33 (6)   |
| 24   | 82 (5)   | 47 (5)   | 51 (5)   | 20 (5)   | 34 (6)   | 27 (6)   | 32 (6)   | 17 (6)   |
| 25   | 72 (5)   | 17 (5)   | 37 (5)   | 17 (5)   | 36 (6)   | 8 (6)    | 2 (5)    | 2 (6)    |
| 52   | 43 (5)   | - (0)    | 17 (5)   | - (0)    | 6 (6)    | 45 (6)   | 74 (6)   | 76 (6)   |
| 61   | 27 (5)   | 19 (4)   | 39 (5)   | 14 (5)   | 42 (6)   | 17 (4)   | 20 (6)   | 16 (6)   |
| 62   | 57 (5)   | 14 (5)   | 33 (5)   | 21 (5)   | 34 (6)   | 37 (6)   | 29 (6)   | 10 (6)   |
| N=28   | 38 (262)   | 26 (131) | 23 (139) | 21 (135) | 32 (168) | 32 (168) | 29 (167) | 30 (168) |

| Table 2. Completed prairie dog transects - Pica Camp, Aubrey Valley, Arizona. |  |          |          |          |          |          |          |          |
|---|--|----------|----------|----------|----------|----------|----------|----------|
| Site Number   | Active Burrows Per Hectare (Transects completed) |          |          |          |          |          |          |          |
|   | 1994   | 1995     | 1996     | 1997     | 1998     | 1999     | 2000     | 2001     |
| 26  | 9 (8)  | 19 (5)   | 11 (5)   | 16 (5)   | 25 (6)   | 13 (6)   | 10 (6)   | 2 (6)    |
| 27  | 50 (10)  | 15 (6)   | 7 (5)    | 14 (5)   | - (0)    | 29 (6)   | 11 (6)   | 13 (6)   |
| 28  | 30 (5)   | 12 (5)   | 27 (5)   | 28 (5)   | 64 (6)   | 40 (6)   | 19 (6)   | 5 (6)    |
| 29  | 16 (10)  | 70 (5)   | 31 (5)   | 31 (5)   | 41 (6)   | 69 (6)   | 67 (6)   | 7 (6)    |
| 30  | 66 (20)  | 73 (6)   | 39 (5)   | 47 (5)   | 121 (6)  | 80 (6)   | 54 (12)  | 57 (6)   |
| 31  | 78 (10)  | 27 (6)   | 15 (5)   | 26 (5)   | 24 (6)   | 40 (6)   | 57 (6)   | 23 (6)   |
| 32  | 56 (10)  | 36 (5)   | 42 (5)   | 34 (5)   | 43 (6)   | 64 (6)   | 48 (6)   | 15 (6)   |
| 33  | 29 (10)  | 20 (4)   | 27 (5)   | 22 (5)   | 19 (6)   | 7 (6)    | 68 (6)   | 28 (6)   |
| 34  | 10 (10)  | 20 (5)   | 14 (5)   | 16 (5)   | 7 (6)    | 25 (6)   | 14 (6)   | 1 (6)    |
| 35  | 2 (10)   | 12 (6)   | 15 (5)   | 2 (5)    | 5 (6)    | 9 (6)    | 7 (6)    | 4 (6)    |
| 36  | 23 (10)  | 26 (5)   | 41 (5)   | 40 (5)   | 54 (6)   | 47 (6)   | 29 (6)   | 12 (6)   |
| 37  | 21 (10)  | 41 (6)   | 18 (5)   | 60 (5)   | 86 (6)   | 76 (6)   | 52 (6)   | 16 (6)   |
| 38  | 15 (10)  | 100 (6)  | 69 (5)   | 62 (5)   | 47 (6)   | 59 (6)   | 40 (6)   | 4 (6)    |
| 39  | 9 (8)  | 52 (5)   | 47 (5)   | 43 (5)   | 50 (6)   | 31 (6)   | 33 (6)   | 5 (6)    |
| 40  | 61 (10)  | 31 (5)   | 27 (5)   | 31 (5)   | 69 (6)   | 25 (6)   | 57 (6)   | 19 (6)   |
| 41  | 102 (10)   | 31 (5)   | 20 (5)   | 17 (5)   | 73 (6)   | 19 (6)   | 55 (6)   | 7 (6)    |
| 42  | 19 (10)  | 39 (5)   | 57 (5)   | 26 (5)   | 59 (6)   | 126 (6)  | 86 (6)   | 81 (6)   |
| 43  | 35 (10)  | 32 (5)   | 26 (5)   | 32 (5)   | 76 (6)   | 49 (6)   | 81 (6)   | 85 (6)   |
| 44  | 56 (10)  | 31 (5)   | 54 (5)   | 36 (5)   | 56 (6)   | 45 (6)   | 48 (6)   | 50 (6)   |
| 45  | 54 (10)  | 1 (5)    | 34 (5)   | 43 (5)   | 66 (6)   | 31 (6)   | 47 (6)   | 4 (6)    |
| 47  | 29 (5)   | 2 (5)    | 25 (5)   | 17 (5)   | 33 (6)   | 45 (6)   | 46 (6)   | 3 (6)    |
| 60  | 6 (5)  | 26 (5)   | 20 (5)   | 12 (5)   | 12 (6)   | 5 (6)    | 1 (6)    | 2 (6)    |
| N=22  | 35 (211)   | 33 (115) | 30 (110) | 30 (110) | 49 (126) | 42 (132) | 44 (138) | 20 (138) |

As with any site, prairie dog numbers are expected to fluctuate yearly as a result of climatic events. Extreme drought conditions likely caused the reduced numbers of prairie dogs observed across most of the area. Pica Camp showed a significant decline in rating when compared to last year (64%). The other primary town, North Audley, also showed a decline (18%). Four towns, Mission, South Audley, Tin Shack and South Caterpillar, received ratings higher in 2001 than in 2000 (increasing 50% when combined). North Caterpillar, a town in poorer habitat, declined from a rating of 0.2 to 0.

| Table 3. Prairie dog transects completed in satellite prairie dog towns found within Aubrey Valley, Arizona. |  |         |        |         |         |         |         |         |
|--|--|---------|--------|---------|---------|---------|---------|---------|
| Site Number  | Active Burrows Per Hectare (Transects completed) |         |        |         |         |         |         |         |
|  | 1994   | 1995    | 1996   | 1997    | 1998    | 1999    | 2000    | 2001    |
| 46   | 29 (5)   | 10 (6)  | - (0)  | 3 (5)   | 3 (6)   | 27 (6)  | 31 (6)  | 2 (6)   |
| 48   | 35 (5)   | 14 (6)  | 0 (5)  | 0 (5)   | 0 (6)   | 0 (6)   | 0 (6)   | 0 (6)   |
| 49   | 106 (10)   | 3 (6)   | 0 (5)  | 0 (5)   | 0 (6)   | 0 (6)   | 0 (6)   | 0 (6)   |
| 50   | 23 (5)   | 0 (4)   | 0 (5)  | 1 (5)   | 0 (6)   | 0 (6)   | 0 (0)   | 0 (6)   |
| 51   | 26 (10)  | - (0)   | 2 (5)  | 9 (5)   | 2 (6)   | 22 (6)  | 16 (6)  | 34 (6)  |
| 53   | 23 (10)  | 22 (5)  | 0 (5)  | 4 (5)   | 3 (6)   | 4 (6)   | 1 (6)   | 12 (6)  |
| 54   | 24 (5)   | 18 (5)  | 7 (5)  | 35 (5)  | 31 (6)  | 63 (6)  | 49 (6)  | 63 (6)  |
| 55   | 41 (5)   | 14 (5)  | 16 (5) | 9 (5)   | 9 (6)   | 40 (6)  | 29 (6)  | 14 (6)  |
| 56   | 6 (5)  | 18 (4)  | 17 (5) | 57 (5)  | 64 (6)  | 34 (6)  | 12 (6)  | 35 (6)  |
| 57   | 40 (5)   | 12 (6)  | 1 (5)  | 3 (5)   | 17 (6)  | 1 (6)   | 2 (6)   | 2 (6)   |
| 58   | 18 (5)   | 10 (5)  | 6 (4)  | 1 (5)   | 1 (6)   | 1 (6)   | 1 (6)   | 2 (6)   |
| 59   | 9 (5)  | 2 (6)   | 2 (4)  | 0 (5)   | 0 (6)   | 4 (2)   | 4 (6)   | 1 (6)   |
| 63   | 18 (5)   | 4 (5)   | 4 (5)  | 11 (5)  | 16 (6)  | 40 (6)  | 58 (6)  | 12 (6)  |
| 64   | 53 (5)   | 1 (5)   | 7 (5)  | 14 (5)  | 45 (6)  | 37 (6)  | 46 (6)  | 14 (6)  |
| N=14   | 32 (85)  | 10 (68) | 5 (63) | 11 (70) | 14 (84) | 19 (80) | 18 (84) | 14 (84) |

Because Pica Camp data yielded a family rating lower than expected, searches were conducted for evidence of a disease outbreak that may have reduced prairie dog numbers. However, nothing indicated that a die-off had occurred. Transects within this town were re-sampled in September and October and results were just slightly higher than those derived from the original data set (family rating of 12.4 and 11.8, respectively).

#### PRAIRIE DOG TRAPPING AND QUARANTINE

In 1997, a quarantine facility was constructed on Arizona Department of Transportation property in Seligman and expanded in 1998 and 1999. Current holding capacity is 500 Gunnison's prairie dogs or 670 black-tailed prairie dogs (*C. ludovicianus*).

In 2001, a total of 565 prairie dogs were quarantined. Dog Gone, a private pest control company located in Colorado, donated all animals. Captured prairie dogs were transported to the quarantine facility and transferred to a cage for a 14-day quarantine period. After the quarantine period, prairie dogs were euthanized using CO<sub>2</sub> and processed at the facility. We also received 44 frozen prairie dogs from the Colorado/Utah ferret project and one fresh carcass from a hunter in Aubrey Valley bringing the total number of prairie dogs used to 610.

In order to maintain ferrets on-site in 2001, we used approximately 182 kg of food, primarily prairie dog (158 kg) and domestic rabbit (24 kg). No prairie dogs were fed live to ferrets in pre-conditioning pens because none were available prior to ferret releases in late spring. Approximately 200 frozen prairie dogs were held to compensate the SSP for ferrets allocated in 2002.

#### 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. Twelve coyotes, one gray fox, and one badger were collected as part of the distemper and plague monitoring effort in 2001. Collection occurred during August and September.

The VZD 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. Fleas have not been collected recently from the Aubrey Valley and serology of carnivores collected within and adjacent to the AVEPA has shown a low incidence of positive results. In 2001, 14 predator blood samples were tested for plague and none tested positive (Table 4). As observed in the past, plague is active in Coconino and Yavapai Counties, but not within Aubrey Valley.

Canine distemper has been monitored in the Aubrey Valley area by AGFD since 1993. Blood samples and fixed tissues were sent to the University of Arizona for analysis and histological interpretation. In 2001, 14 predator blood and tissue samples were submitted for analysis. However, due to moving the laboratory the canine distemper results were not available for this report.

#### FERRET ALLOCATION

In 2001, 21 ferrets were involved in the Arizona recovery effort (Table 5). No new allocations were received so all animals were those held over from the previous years. Two had been received between August 24 and November 10, 1998 and were held a median of 887 days. Six had been received between October 13 and November 15, 1999 and were held a median of 481 days. Two had been received on October 13 or 15, 1999 and were held a median of 337 days. The remaining animals had been born in Aubrey Valley. One on June 9, 1998 (held for 1068 days) and 6 between June 1 and 16, 2000 (held a median of 337 days).

In 2001, three mortalities were documented, all adult females. Two (2550, 3001) were killed by raptors and not submitted for necropsy. The third ferret (2115) had been in poor health and was transported to the field station for rehabilitation. She died shortly afterwards and was submitted for necropsy. Results showed she had suppurative inflammation in the cavities surrounding the heart and lungs and endogenous lipid pneumonia. She also had severe deposition of glycoproteins (amyloidosis) in the kidneys and spleen.

Four ferrets were missing-in-action. Only one ferret escaped in 2001. Missing-in-action is defined as not being able to determine if ferrets died underground, were killed, or escaped.

| Collection Date                  | Species                 | Sex | Age | Canine Distemper | Sylvatic Plague |
|----------------------------------|-------------------------|-----|-----|------------------|-----------------|
| 8/28/01                          | Coyote                  | F   | A   | -                | <32             |
| 8/29/01                          | Coyote                  | F   | A   | -                | <32             |
| 8/30/01                          | Coyote                  | M   | J   | -                | <32             |
| 8/30/01                          | Coyote                  | F   | A   | -                | <32             |
| 9/2/01                           | Coyote                  | M   | A   | -                | <32             |
| 9/2/01                           | Coyote                  | F   | A   | -                | <32             |
| 9/4/01                           | Gray fox                | F   | A   | -                | <32             |
| 9/4/01                           | Coyote                  | F   | J   | -                | <32             |
| 9/4/01                           | Coyote                  | F   | A   | -                | <32             |
| 9/5/01                           | Coyote                  | M   | A   | -                | <32             |
| 9/5/01                           | Coyote                  | F   | A   | -                | <32             |
| 9/6/01                           | Badger                  | M   | A   | -                | <32             |
| 9/6/01                           | Coyote                  | F   | A   | -                | <32             |
| 9/7/01                           | Coyote                  | M   | A   | -                | <32             |
| Coyote<br>Juvenile/Total<br>2/12 | Negative-1:64           |     |     | -                | 14              |
|                                  | Positive (1:128-1:4096) |     |     | -                | 0               |
|                                  | No sample               |     |     | -                | 0               |
|                                  | Grand Totals            |     |     | 14               | 14              |

| Year | Held Over | Allocated | Births | Releases | Escapes | Missing | Deaths | Transfers | Year End Total |
|------|-----------|-----------|--------|----------|---------|---------|--------|-----------|----------------|
| 1996 | 0         | 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             |
| 2000 | 28        | 17*       | 29     | 19       | 1       | 9       | 22     | 2         | 21             |
| 2001 | 21        | 0         | 0      | 12       | 1       | 4       | 3      | 1         | 0              |
| SUM  |           | 240       | 118    | 144      | 26      | 62      | 119    | 7         |                |

\* Includes one female from 1999 that was released, injured, recaptured, and transferred to Phoenix Zoo where she recovered. She was returned to Aubrey Valley in 2000.

Arizona released 12 ferrets (3 adults, 9 kits) into Aubrey Valley in 2001. Releases occurred during May when prairie dogs activity and numbers increase in the area. One adult female ferret could not be released due to health concerns and was transferred to The Phoenix Zoo for display purposes.

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 2001, 11 animals were released using a hard-release method, a component new to Arizona reintroduction efforts in 1999. Ferrets were released from transport boxes into a burrow within high-density prairie dog towns (as indicated by annual surveys). Nine of these animals were fitted with radio collars and were released during the evening of the same day they were collared. On average, each ferret released this way was pre-conditioned for 415 days.

One female ferret was released using a soft-release method that allowed it to leave on its own accord through tubes inserted into its acclimation pen. This ferret was pre-conditioned for 983 days.

#### ON-SITE REPRODUCTION

Using protocols developed in 1998, Arizona personnel used three males to breed four females prior to their release (Table 6). The first pairing of ferrets occurred on April 23, with the last pairing occurring on May 9. The other five females were not close enough to ovulation for breeding prior to their release. A pairing was considered successful if cytological samples taken after pairing showed a decrease in cornified epithelial cells. Personnel also looked for orange saliva staining on the back of the female ferret's neck.

Instead of confining females in nest boxes as normally done, they were released two to 15 days following pairing and allowed to whelp in the wild. Releases coincided with increased prairie dog activity and prey populations due to birth of pups. The females that did not come into estrus were released near males to improve chances that mating would occur in the wild.

#### FERRET MONITORING

Presently, the primary technique used to determine short and long term survival is nocturnal searches using spotlights. In 2001, formal spotlight surveys were conducted in blocks of consecutive nights during July, August, September, October, and November. Incidental surveys occurred during March, May, June, and December. These surveys totaled 1,513.5 person-hours, including 137.5 hours of backpack surveying.

Fourteen transects, 1 to 2 km in length (16-km total length), were established within high- and low-density prairie dog areas throughout Aubrey Valley. A conservative estimate of land area surveyed per kilometer of transect is 80 ha (198 ac). Areas were delineated using ArcView and based on median prairie dog density from 2000 survey data. High-density areas contain survey blocks with prairie dog densities above the median and low-density areas contain blocks below the median. Transects were equal between high and low areas.

Tests showed that flags with reflective tape attached could be seen 400 m away with the naked eye, but transects were marked at 200-m intervals (end points were double flagged) to ensure the line could be easily located and followed. Most of the backpack survey hours (121.5 hr) were expended on these transects, but no ferrets were observed along transects.

| Dam, Sire  | Pairing Date | Dam Released | Days Post-breeding | Sire Released |
|------------|--------------|--------------|--------------------|---------------|
| 2535, 3013 | 04/23        | 05/02        | 9                  | 05/11         |
| P139, P149 | 04/28        | 05/10        | 12                 | 05/11         |
| 3158, P137 | 04/28        | 05/13        | 15                 | 05/10         |
| P146, 3013 | 05/09        | 05/11        | 2                  | 05/11         |

Overall there were 20 confirmed black-footed ferret sightings and 30 sightings of ferrets without confirmation of identity. There were also 20 possible sightings. Seventy-three percent of these observations occurred between 10 PM and three AM (Figure 3) and 54% occurred during bright moonlit nights ( $\geq 50\%$  illumination). Forty percent of observation occurred when the moon was set and 6 % during dim moonlit night ( $< 50\%$  illumination). Furthermore, the public reported ferret sightings five times during 2001.

Seven wild born ferrets (3 males, 4 females) in at least two litters were first discovered in October and observed multiple times during subsequent surveys (Table 7). A male ferret (3299) that had been released in October 2000 was observed twice in 2001. Both times he was about 0.5 mile from his release location. Last observed in August he had survived in the wild for 317 days. A female (P156), released in May with a radio collar, was found close to her release site in late October. She had survived in the wild for 171 days.

Because spotlighting has not sufficiently documented ferret survival, radio collars were attached to nine ferrets (3 males, 6 females) that were released into the wild. One female that lost her collar inside a transport box and two other female ferrets were released without radio collars.

Two data loggers, capable of scanning five programmed frequencies at once, were set up to automate data collection. One location was on a hillside 400 feet above the valley floor and was used from May 11 to June 16 (35 days). It used a 5-element Yagi antenna that was mounted on an 8-foot PVC pipe attached to a juniper tree. The other unit was mobile and used at two different locations, south of Highway 66 from May 12 to May 24 (24 days) and north of Highway 66 from May 24 to June 4 (10 days). This unit used an omni-directional antenna that was mounted to an 8-foot PVC pipe that was attached to a camper shell on a pickup truck. Both data loggers used big game transmitters along Highway 66 as beacons, were checked frequently, and had data downloaded every other day. Data loggers detected ferrets 161 times, each lasting one to 46 minutes (Table 8). The hillside and south side setup was functional 90 and 88 percent of the time, respectively (determined by beacon strength recordings). However, the north side setup failed to detect any ferret and was functional only six percent of the time.

Ground searches using hand-held telemetry equipment were conducted as often as possible through mid-June. Also an aircraft flying transects approximately 1/3 mile apart was used for two hours on May 25 and one hour on June 22 to search for radioed animals. Signals were detected 1.5 to 2 miles away from the air. However, only three animals were located two or three times using ground or aerial searches. Eventually collars worn by these animals were recovered. A raptor had killed one (3013) and its collar was still attached to the carcass. Two other collars were recovered after ferrets had lost them. One (3157) was above ground and the other (P149) in a shallow burrow.

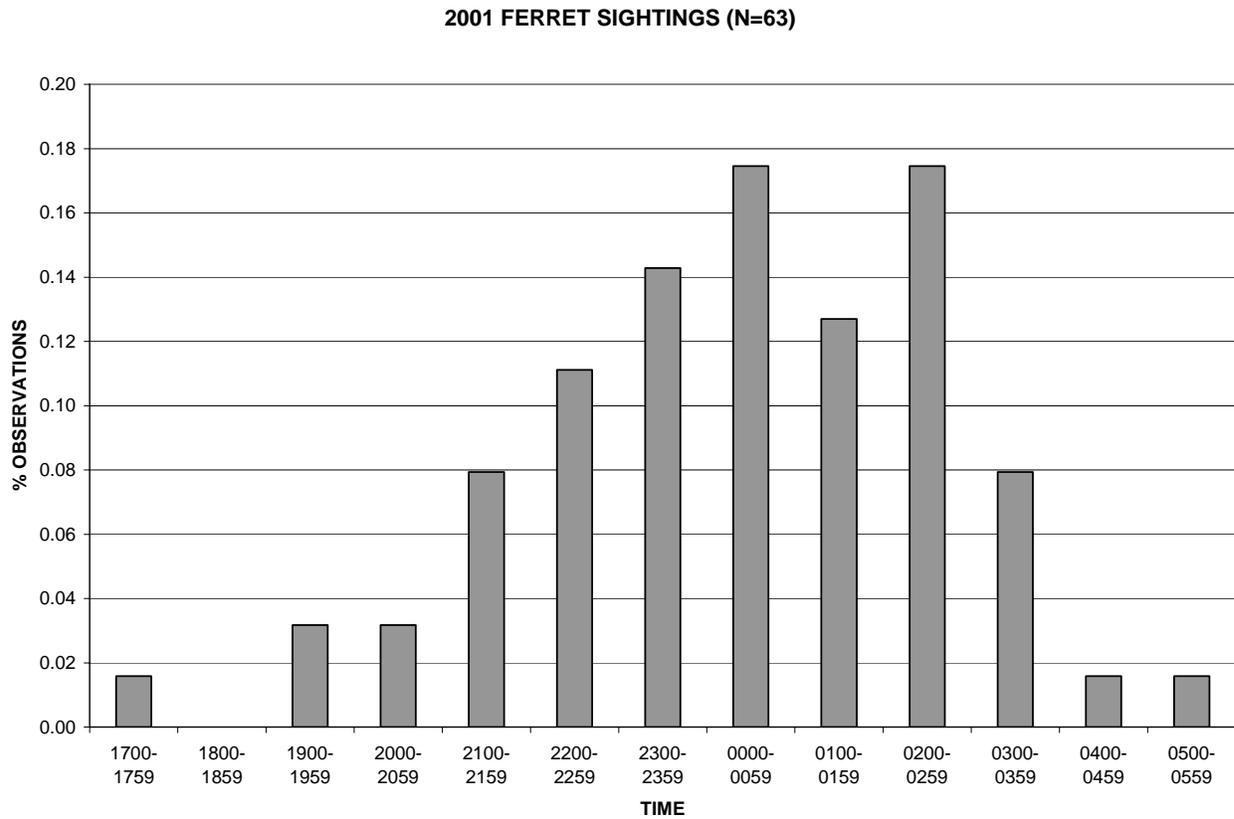


Figure 3. Observation times for all classes of ferret observations during 2001.

| Studbook | Sex | Age | Release or Discovery Date | Last Observation | Days Known Alive |
|----------|-----|-----|---------------------------|------------------|------------------|
| 3299     | M   | A   | 10/09/00                  | 08/22/01         | 317              |
| P156     | F   | A   | 05/11/01                  | 10/29/01         | 171              |
| WB01A    | M   | K   | 10/27/01                  | 11/09/01         | 13               |
| WB01B    | F   | K   | 10/29/01                  | 10/29/01         | -                |
| WB01C    | M   | K   | 10/30/01                  | 11/08/01         | 9                |
| WB01D    | F   | K   | 11/03/01                  | 12/31/01         | 58               |
| WB01E    | F   | K   | 11/10/01                  | 12/02/01         | 22               |
| WB01F    | F   | K   | 11/10/01                  | 11/10/01         | -                |
| WB01G    | M   | K   | 11/17/01                  | 11/17/01         | -                |

| Table 8. Telemetered ferrets detected during surveys in Aubrey Valley, 2001. |     |     |              |                                      |                           |  |
|--|-----|-----|--------------|--------------------------------------|---------------------------|--|
| Studbook   | Sex | Age | Release Date | # Datalogger Detections (Total Time) | Last Ground/Air Detection | Comments   |
| P137   | M   | A   | 05/10        | 14<br>(14 min)                       | 05/11                     |  |
| P147   | F   | A   | 05/10        | 13<br>(13 min)                       | 05/10                     |  |
| 3013   | M   | A   | 05/11        | 14<br>(96 min)                       | 05/25*                    | Raptor mortality. Collar and head recovered 06/01.   |
| P15  | F   | A   | 05/11        | 1<br>(1 min)                         | 05/11                     |  |
| P146   | F   | A   | 05/11        | 5<br>(5 min)                         | 05/11                     |  |
| P149   | M   | A   | 05/11        | 43<br>(165 min)                      | 05/17*                    | Visual. Slipped collar recovered 06/03 below ground. |
| P156   | F   | A   | 05/11        | 69<br>(955 min)                      | 10/27                     | Visual. Found by spotlighting. Collar gone.          |
| 3157   | F   | A   | 05/13        | -                                    | 05/17*                    | Slipped collar recovered 05/28 on surface.           |
| 3158   | F   | A   | 05/13        | 3<br>(3 min)                         | 05/13                     |  |
| *No apparent movement after this date.                                       |     |     |              |                                      |                           |  |

Track plates were constructed in late 2001 and testing planned for early 2002. If successful in tests, we plan to use track plates throughout the valley to detect the presence of ferrets in a manner similar to those used to detect other Mustelids with low-density populations (Zielinski and Kucera 1995). Spotlighting surveys can then be directed towards areas occupied by ferrets.

#### DISCUSSION

Estimates of prairie dog numbers and the resulting ferret family rating were lower than the previous year. However, the rating still falls within the historical values for Aubrey Valley and is above the minimum threshold established by the Black-footed Ferret Recovery Plan. No disease event was documented and drought conditions likely caused the decline in the prairie dog population.

Monitoring efforts in 2001 were increased. Spotlighting surveys exceeded past annual efforts by far (twice that of 2000) and yielded numerous observations of ferrets. For the first time, wild born ferrets were found in Aubrey Valley. Seven individuals from two or more litters were seen repeatedly after their discovery in late October. Two adults, including a female that had been

released about six months earlier with a radio collar, were found. A male was found alive nearly a year after his release in 2000.

Telemetry was not as productive as hoped, but did yield usable information. Three collars were recovered from nine ferrets released in Aubrey Valley during May. Only one radioed ferret was found dead. Arizona will continue to evaluate these techniques and try to develop efficient and effective methods for monitoring ferrets in Aubrey Valley. Preliminary work has begun to evaluate track plates as a method to detect ferrets.

Early summer releases of ferrets seem a viable alternative to the traditional fall releases. Available prey for ferrets and their predators are increasing at that time of year as prairie dogs produce their offspring and should enhance survival of ferrets. Although wild born ferrets were discovered for the first time following this type of release, it is not clear whether they were produced by ferret's bred in the wild or in a preconditioning pen prior to release. Further evaluation is required.

#### RECOMMENDATIONS

- 1) Continue releases of suitable ferrets in early summer to coincide with prairie dog births as a means to enhance survival rates of ferrets.
- 2) Continue attempts to use radio collars to monitor ferret dispersal and survival.
- 3) Evaluate the suitability of track plates to detect free-roaming ferrets.
- 4) Continue enhancement of existing pre-conditioning pens as a means to protect ferrets from raptors and to reduce manpower requirements for maintenance.

LITERATURE CITED

- Arizona Game and Fish Department. 1988. Threatened native wildlife in Arizona. Arizona Game and Fish Department, Phoenix, Arizona. 32 pp.
- Arizona Game and Fish Department. In prep. Wildlife of special concern in Arizona. Arizona Game and Fish Department, Phoenix, Arizona. 32 pp.
- 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. 1988. Black-footed ferret recovery plan. Denver, Colorado. 154 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. 15 pp.

- 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. 25 pp.
- 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.
- Winstead, R.A., A.L. McIntire, and W.E. Van Pelt. 1999. Results of the 1998 black-footed ferret release effort in Aubrey Valley, Arizona. Nongame and Endangered Wildlife Program Technical Report 148. Arizona Game and Fish Department, Phoenix, Arizona. 22 pp.
- Winstead, R.A., A.L. McIntire, T.D. Silvia, and W.E. Van Pelt. 2000. Results of the 1999 black-footed ferret release effort in Aubrey Valley, Arizona. Nongame and Endangered Wildlife Program Technical Report 163. Arizona Game and Fish Department, Phoenix, Arizona. 27 pp.
- Winstead, R.A., A.L. McIntire, T.D. Silvia, and W.E. Van Pelt. 2002. Results of the 2000 black-footed ferret release effort in Aubrey Valley, Arizona. Nongame and Endangered Wildlife Program Technical Report 197. Arizona Game and Fish Department, Phoenix, Arizona. 25 pp.
- 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.
- Zielinski, W. J., and T. E. Kucera. 1995. American marten, fisher, lynx, and wolverine: survey methods for their detection. General Technical Report PSW-GTR-157. U.S. Forest Service Pacific Southwest Research Station, Albany, California. 163 pp.

Appendix A. Status of ferrets in Aubrey Valley, 2001.

| Studbook | Sex | Date Received | Last Age | Days held | Status  |
|----------|-----|---------------|----------|-----------|---|
| 1842     | F   | 11/15/99      | 4.8      | 478       | Not releasable. Transfer to Phoenix Zoo 03/06/01. |
| 2115     | F   | 10/15/99      | 3.7      | 474       | Dead 01/30/01.                                    |
| 2535     | F   | 08/24/98      | 3.0      | 983       | Released 05/02/01.                                |
| 2550     | F   | 11/10/98      | 2.6      | 790       | Dead 01/07/01.                                    |
| 2784     | M   | 11/15/99      | 1.8      | 480       | MIA 03/08/01.                                     |
| 2857     | M   | 11/15/99      | 1.7      | 499       | MIA 03/27/01.                                     |
| 3001     | F   | 10/13/99      | 1.8      | 481       | Dead 02/04/01.                                    |
| 3013     | M   | 10/13/99      | 2.0      | 577       | Released 05/11/01.                                |
| 3157     | F   | 08/16/00      | 1.0      | 271       | Released 05/13/01.                                |
| 3158     | F   | 08/16/00      | 1.0      | 271       | Released 05/13/01.                                |
| P15      | F   | 06/09/98      | 2.9      | 1,068     | Born on-site 1998. Released 05/11/01.             |
| P137     | M   | 06/01/00      | Kit      | 344       | Born on-site 2000. Released 05/10/01.             |
| P138     | M   | 06/01/00      | Kit      | 215       | Born on-site 2000. MIA 01/01/01.                  |
| P139     | F   | 06/01/00      | Kit      | 344       | Born on-site 2000. Released 05/10/01.             |
| P142     | M   | 06/01/00      | Kit      | 242       | Born on-site 2000. Escaped 01/28/01.              |
| P146     | F   | 06/02/00      | Kit      | 344       | Born on-site 2000. Released 05/11/01.             |
| P147     | F   | 06/02/00      | Kit      | 343       | Born on-site 2000. Released 05/10/01.             |
| P149     | M   | 06/11/00      | Kit      | 335       | Born on-site 2000. Released 05/11/01.             |
| P150     | F   | 06/11/00      | Kit      | 338       | Born on-site 2000. Released 05/14/01.             |
| P155     | F   | 06/16/00      | Kit      | 250       | Born on-site 2000. MIA 02/20/01.                  |
| P156     | F   | 06/16/00      | Kit      | 330       | Born on-site 2000. Released 05/11/01.             |

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

Reintroduction Site: Aubrey Valley, Arizona

Date Submitted: January 18, 2002

Submitted by (name/title): Richard Winstead, Nongame Specialist, Arizona Game and Fish  
 Department-Region 3

| Studbook/<br>Site No. | Transponder<br>Number  | M/<br>F | Date Rec.  | Date<br>Re/Tr | Pre.<br>Treat | Last Obs. | How<br>ID | Status | Kits<br>Prod |
|-----------------------|------------------------|---------|--|---------------|---------------|-----------|-----------|--------|--------------|
| 1842                  | 027019382<br>036311367 | F       | 11/15/99   |               | PS            | 03/06/01  | T         | AC     |              |
|                       |                        |         | Transferred to Phoenix Zoo.  |               |               |           |           |        |              |
| 2115                  | 116274777              | F       | 10/15/99   |               | PS            | 01/30/01  | T         | D      |              |
|                       |                        |         | Brought in for rehabilitation. Died at field station. Submitted<br>for necropsy. |               |               |           |           |        |              |
| 2535                  | 028624333<br>028768073 | F       | 08/24/98   | 05/02/01      | PS            | 05/02/01  |           |        |              |
|                       |                        |         |  |               |               |           |           |        |              |
| 2550                  | 115767243              | F       | 11/10/98   |               | PS            | 01/07/01  | T         | D      |              |
|                       |                        |         | Raptor death in pen.   |               |               |           |           |        |              |
| 2784                  | 029037613<br>031063288 | M       | 11/15/99   |               | PS            | 03/08/01  | O         |        |              |
|                       |                        |         | MIA in pen.  |               |               |           |           |        |              |
| 2857                  | 031078807<br>036328363 | M       | 11/15/99   |               | PS            | 03/27/01  | O         |        |              |
|                       |                        |         | MIA in pen.  |               |               |           |           |        |              |
| 3001                  | 032619826<br>032630361 | F       | 10/13/99   |               | PS            | 02/04/01  | T         | D      |              |
|                       |                        |         | Raptor death in pen.   |               |               |           |           |        |              |
| 3013                  | 032619797<br>032625101 | M       | 10/13/99   | 05/11/01      | PS            | 06/01/01  | R         | D      |              |
|                       |                        |         | Radio 148.525. Raptor death. Collar recovered.                                   |               |               |           |           |        |              |
| 3157                  | 039071315<br>039111771 | F       | 08/16/00   | 05/13/01      | PS            | 05/17/01  | R         | AW     |              |
|                       |                        |         | Radio 148.023. Slipped collar recovered 05/28.                                   |               |               |           |           |        |              |
| 3158                  | 039063885<br>039109782 | F       | 08/16/00   | 05/13/01      | PS            | 05/13/01  |           |        |              |
|                       |                        |         | Radio 148.076.   |               |               |           |           |        |              |
| 3299                  | 039064298<br>039062623 | M       | 08/08/00   | 10/09/00      | PS            | 08/21/01  | T         | AW     |              |
|                       |                        |         |  |               |               |           |           |        |              |
| NON-SSP ANIMALS       |                        |         |  |               |               |           |           |        |              |
| P15                   | 029592574              | F       | 06/09/98   | 05/11/01      | PBS           | 05/11/01  |           |        |              |
|                       |                        |         | Radio 148.776.   |               |               |           |           |        |              |
| P137                  | 043288834              | M       | 06/01/00   | 05/10/01      | PBS           | 05/10/01  |           |        |              |
|                       |                        |         | Radio 148.124.   |               |               |           |           |        |              |
| P138                  | 043124879              | M       | 06/01/00   |               | PBS           | 01/01/01  | O         |        |              |
|                       |                        |         | MIA in pen.  |               |               |           |           |        |              |
| P139                  | 043270856              | F       | 06/01/00   | 05/10/01      | PBS           | 05/10/01  |           |        |              |
|                       |                        |         |  |               |               |           |           |        |              |
| P142                  | 043017352              | M       | 06/01/00   |               | PBS           | 01/28/01  | O         |        |              |
|                       |                        |         | Escaped from pen.  |               |               |           |           |        |              |

Appendix B. (Cont.).

| Studbook/<br>Site No.                             | Transponder<br>Number | M/<br>F | Date Rec. | Date<br>Re/Tr | Pre.<br>Treat | Last Obs. | How<br>ID | Status | Kits<br>Prod |
|---|-----------------------|---------|-----------|---------------|---------------|-----------|-----------|--------|--------------|
| P146  | 043061321             | F       | 06/02/00  | 05/11/01      | PBS           | 05/11/01  |           |        |              |
| Radio 148.476.                                    |                       |         |           |               |               |           |           |        |              |
| P147  | 043306562             | F       | 06/02/00  | 05/10/01      | PBS           | 05/10/01  |           |        |              |
| Radio 148.975.                                    |                       |         |           |               |               |           |           |        |              |
| P149  | 042881545             | M       | 06/11/00  | 05/11/01      | PBS           | 05/17/01  | R         | AW     |              |
| Radio 148.174. Slipped collar recovered 06/03/01. |                       |         |           |               |               |           |           |        |              |
| P150  | 042625355             | F       | 06/11/00  | 05/14/01      | PBS           | 05/14/01  |           |        |              |
| P155  | 043096583             | F       | 06/16/00  |               | PBS           | 02/20/01  | O         |        |              |
| MIA in pen.                                       |                       |         |           |               |               |           |           |        |              |
| P156  | 043041035             | F       | 06/16/00  | 05/11/01      | PBS           | 10/27/01  | T         | AW     |              |
| Radio 149.026.                                    |                       |         |           |               |               |           |           |        |              |
| WB01A   | 042780841             | M       |           | 10/27/01      |               | 11/09/01  | T         | AW     |              |
| Wild-born.  |                       |         |           |               |               |           |           |        |              |
| WB01B   | 043075329             | F       |           | 10/29/01      |               | 11/01/01  | T         | AW     |              |
| Wild-born.  |                       |         |           |               |               |           |           |        |              |
| WB01C   | 034118022             | M       |           | 10/30/01      |               | 11/08/01  | T         | AW     |              |
| Wild-born.  |                       |         |           |               |               |           |           |        |              |
| WB01D   | 043068059             | F       |           | 11/02/01      |               | 12/31/01  | T         | AW     |              |
| Wild-born.  |                       |         |           |               |               |           |           |        |              |
| WB01E   | 042618113             | F       |           | 11/10/01      |               | 12/02/01  | T         | AW     |              |
| Wild-born.  |                       |         |           |               |               |           |           |        |              |
| WB01F   | 043023577             | F       |           | 11/10/01      |               | 11/13/01  | T         | AW     |              |
| Wild-born.  |                       |         |           |               |               |           |           |        |              |