

Wyoming Black-footed Ferret Management Plan



Photo credit: Mark Gocke, WGFD

Prepared by
Wyoming Game and Fish Department
and
Wyoming Black-footed Ferret Working Group

Approved by
Wyoming Game and Fish Commission
November 14, 2018

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INTRODUCTION

The recovery and conservation of the black-footed ferret (hereafter ‘ferret’; *Mustela nigripes*) shares a unique history with Wyoming, as the state represents the home of both the rediscovery of the species, thought to be extinct as recently as 1981, and the first and longest surviving reintroduction site. For over 3 decades, the Wyoming Game and Fish Department (hereafter ‘Department’) has worked in collaboration with the U.S. Fish and Wildlife Service (hereafter ‘Service’) and other state and federal agencies and private landowners to ensure that populations of ferrets continue to succeed in the wild, both in Wyoming and throughout the historical distribution of the species. The Department and the State of Wyoming remain committed to the recovery and conservation of the ferret, and efforts continue today within the state toward the ultimate goal of recovering this native species.

The ferret was first listed as endangered under the Endangered Species Preservation Act in 1967 (USFWS 1967), and recovery of the species is under the jurisdiction of the Service in collaboration with the 12 western and midwestern states within the historical distribution of the species (Arizona, Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah, and Wyoming). The *Recovery Plan for the Black-footed Ferret* (hereafter ‘Recovery Plan’) developed by the Service outlines the conditions that must be met in order for the species to be considered recovered and eligible for downlisting or delisting (Linder et al. 1978). This plan has been revised twice since first drafted in 1978 (USFWS 1988, 2013). In the most recent Recovery Plan, the Service recommends that each of the 12 states initiate or maintain:

- One or more large size ferret reintroduction sites with the potential for >100 adult breeding ferrets,
- One or more medium size ferret reintroduction sites with the potential for 50-100 adult breeding ferrets, and
- One or more small size ferret reintroduction sites with the potential for 30-50 adult breeding ferrets

To this end, the 2013 Recovery Plan also outlines state-specific population targets for minimum numbers of breeding adult ferrets and a minimum acreage of prairie dog (*Cynomys* spp.) occupied habitat that would result in the range-wide recovery of the species (see Population Objectives, page 8).

As of 2017, 2 populations of ferrets have been re-established in Wyoming: the Shirley Basin/Medicine Bow Reintroduction Site and the Meeteetse Reintroduction Site. Both of these populations contribute toward the recommendations and state-specific population targets for Wyoming set forth by the Service in the 2013 Recovery Plan (see Current Black-footed Ferret Reintroduction Sites, page 12). In addition, site-specific management plans have been created outlining the Department’s strategies and goals specific to each reintroduction site (WGFD 1991, 2016).

Management Plan Goal

The purpose of this document is to create a statewide management plan for ferrets to guide decision and management actions undertaken with the goal of promoting the recovery and conservation of the species in Wyoming. In accordance with the Department's commitment toward recovery of the species range-wide, management of ferrets in Wyoming is intended to reflect the recovery objectives developed by the Service in the 2013 Recovery Plan (USFWS 2013). Specific objectives of this statewide management plan are to:

1. Establish recovery and management goals for ferrets in Wyoming,
2. Define a process by which ferret reintroduction sites are initiated and maintained throughout Wyoming in a manner that achieves recovery and management goals, and
3. Outline a framework for ferret management that allows for adaptive changes to species recovery throughout the state.

Although the Department, in collaboration with the Service, will take the lead on implementing this plan, developing and maintaining partnerships will continue to be critical to its success. The Wyoming Black-footed Ferret Working Group (hereafter 'Working Group'), whose purpose is to advise and assist the Department and the Service with ferret recovery efforts in Wyoming, was instrumental to the development of this plan. When this plan was developed, the Working Group included members from the Department, Service, U.S. Department of Agriculture APHIS - Wildlife Services, Bureau of Land Management (BLM), U.S. Forest Service, Natural Resources Conservation Service, Wyoming Department of Agriculture, Defenders of Wildlife, Friends of Ferrets, Thunder Basin Grasslands Prairie Ecosystem Association, Wyoming Association of Conservation Districts, Wyoming Office of State Lands and Investments, and the Wyoming Weed and Pest Council. In addition, private landowners and land managers have been and will remain major players in ferret recovery and management efforts in Wyoming. The Department will continue to collaborate as well as foster new collaborations with organizations and individuals interested in participating in ferret recovery efforts.

This plan is divided into 3 sections:

1. History of ferrets in Wyoming and reintroduction efforts to date;
2. Population objectives and management areas, including the mechanism by which new reintroduction sites are evaluated and designated; and
3. Conservation and management strategies to achieve recovery and management goals.

HISTORY OF BLACK-FOOTED FERRETS IN WYOMING

Early History

The ferret was first described by John James Audubon and John Bachmann in 1851 from a single specimen collected from Goshen County, Wyoming (Audubon and Bachmann 1851). By the mid 1900s, historical eradication campaigns, diseases, and habitat loss through cropland conversion had drastically reduced populations of prairie dogs, the primary prey species for ferrets (USFWS

2013). As prairie dogs declined, ferrets were predicted to be near extinction. In 1967, the ferret was federally listed as Endangered throughout its range in Wyoming and 11 other western and midwestern states under the Endangered Species Act (ESA; USFWS 1967). Within 1 year of this designation, all wild ferrets from the last known population in Mellette County, South Dakota died, and by 1979 the last ferret in captivity also perished (USFWS 1988). Despite nearly a decade (1973-1981) of targeted searches throughout Wyoming and adjacent states, no other populations were found, leading many to believe the ferret was extinct (USFWS 1988).

Discovery of Black-footed Ferrets in Wyoming

In 1981, a fortuitous event occurred that irrefutably saved the ferret from extinction and initiated one of the most successful wildlife conservation stories in history. On 26 September 1981, a rancher's cattle dog brought the carcass of a weasel-like animal to the doorstep. A local taxidermist identified the species as a ferret, and soon thereafter biologists discovered a population of ferrets in the surrounding area. On the Lazy BV Ranch, 20 miles west of Meeteetse, Wyoming, the family of John and Lucille Hogg soon learned that their lands supported the last remaining population of ferrets in the world. This discovery forever linked the conservation and recovery of this rare species to Wyoming.

As word of this remarkable find spread, biologists from multiple wildlife agencies and organizations convened at Meeteetse to study the newly discovered population. Efforts were led primarily by the Department and the Service. In 1982, population estimates suggested that at least 61 ferrets were distributed on the Lazy BV and neighboring ranches, including the Pitchfork and 91 Ranches (WGFD 1987). By 1984, the population reached 129 individuals. In May 1985, the Department and the Service decided to capture a subset of the population to place into a captive breeding program to propagate the species. Six individuals were captured and placed into captivity at this time (WGFD 1987).

Problems with the Meeteetse Population

Unfortunately, outbreaks of 2 virulent diseases were documented in the Meeteetse prairie dog complex in June of 1985: sylvatic plague and canine distemper. Despite a massive plague control effort conducted by the Department and the Service, prairie dog densities experienced drastic shifts in apparent response to plague (Menkens and Anderson 1987, Abbate et al. 1988). Within the same year, surveys suggested that the combination of the reduction in prairie dogs as a result of plague as well as the direct mortalities to ferrets as a result of the canine distemper epizootic had drastically reduced the ferret population to 58 individuals (WGFD 1987). In 1986, fewer than 20 individuals were located, and the population was deemed to be at high risk of extinction (WGFD 1987).

Captive Breeding Program for Black-footed Ferrets in Wyoming

Starting in 1985, the first 6 ferrets taken into captivity from the wild were housed at the Sybille Wildlife Research Unit where efforts to establish a successful breeding program were led by the Department and the Service. By October of that year, canine distemper was documented in 2 of the captive ferrets, and subsequently all 6 died of the disease before breeding (WGFD 1987). In

1986, all of the remaining wild ferrets ($n=18$) in Meeteetse were captured and placed into the captive breeding program. Following these captures, the future of the entire species depended on these 18 individuals.

Fortunately, in 1987, 2 litters were born, marking the first successful propagation of the species in captivity and laying the foundation for the captive breeding program that has since been essential to recovery efforts for ferrets (USFWS 1988). Several other facilities partnered with the Sybille Wildlife Research Unit to grow the captive breeding program. Within 2 years, the numbers of ferrets born in captivity had increased at a faster rate than anticipated, to a total population size of 58 individuals (Biggins and Crew 1989). The success of the captive breeding program at this time enabled plans to begin for the reintroduction of captive-bred ferrets back into the wild in a soon as 1991.

Establishing a Reintroduction Site for Black-footed Ferrets

In 1990, the Black-footed Ferret Advisory Team (BFAT) drafted management plans to establish reintroduction sites for ferrets at 2 locations in Wyoming: Meeteetse, where ferrets had most recently been found, and the Shirley Basin/Medicine Bow area located in parts of Natrona, Carbon, and Albany Counties. Meeteetse was designated as the first choice for reintroduction since the site was the most recent to support a ferret population and was therefore thought to contain the conditions needed to establish a reintroduced population (WGFD 1990). The Shirley Basin/Medicine Bow area was considered as an alternative site because, at the time, the area contained >150,000 acres of prairie dog colonies and was predicted to be capable of supporting a population of 530 ferrets (WGFD 1991). Unfortunately, leading up to the planned reintroduction in 1991, prairie dog numbers in Meeteetse were deemed incapable of supporting ferrets. The Shirley Basin/Medicine Bow area was thus selected for reintroduction (WGFD 1991).

Preceding the releases of ferrets at the Shirley Basin/Medicine Bow Reintroduction Site, the BFAT recommended, and the Service approved, that the population be designated as a nonessential experimental population (as prescribed in Section 10(j) of the ESA of 1973, as amended). Under this designation, also known as the “10(j) rule” after the associated clause in the ESA, the Service is able to relax otherwise prohibited actions, including take resulting from an otherwise lawful activity, when doing so advances conservation efforts. The 10(j) rule enabled private landowners and industries to continue current land management practices on lands that harbored ferrets, thus allowing these stakeholders to be active participants in and supporters of the conservation of ferrets. This designation was established to include any ferret within the proposed Shirley Basin/Medicine Bow Reintroduction Site and surrounding lands, including Albany County and the portions of Natrona and Carbon Counties east of the Platte River (USFWS 1991).

History of Shirley Basin

In 1991, the first reintroduction site for ferrets was established at the Shirley Basin/Medicine Bow Reintroduction Site (Figure 1). Between 1991 and 1994, 228 captive-bred ferrets were released (Grenier et al. 2007). Throughout the 1990s, epizootics of sylvatic plague and canine distemper challenged the newly established population and significantly decreased the abundance of white-tailed prairie dogs (*C. leucurus*) and ferrets throughout the reintroduction site (Luce et al. 1996,

1997; Grenier et al. 2007). During this period, the ferret population was characterized by slow population growth where few (i.e., ≤ 25) ferrets were located annually prior to 2000 (Grenier et al. 2007). However, spotlight surveys conducted between 2003 and 2006 estimated an annual growth rate of 35%, suggesting the population of ferrets within the Shirley Basin/Medicine Bow prairie dog complex was increasing (Grenier et al. 2006a, 2007). Since prairie dog distribution had increased in other portions of the reintroduction site where ferrets were believed to be absent, an additional 250 ferrets were released into areas north and south of the initial reintroduction locations during the fall and winter of 2005, 2006, and 2012 (Grenier et al. 2006b, Schell and Grenier 2007; Figure 1).

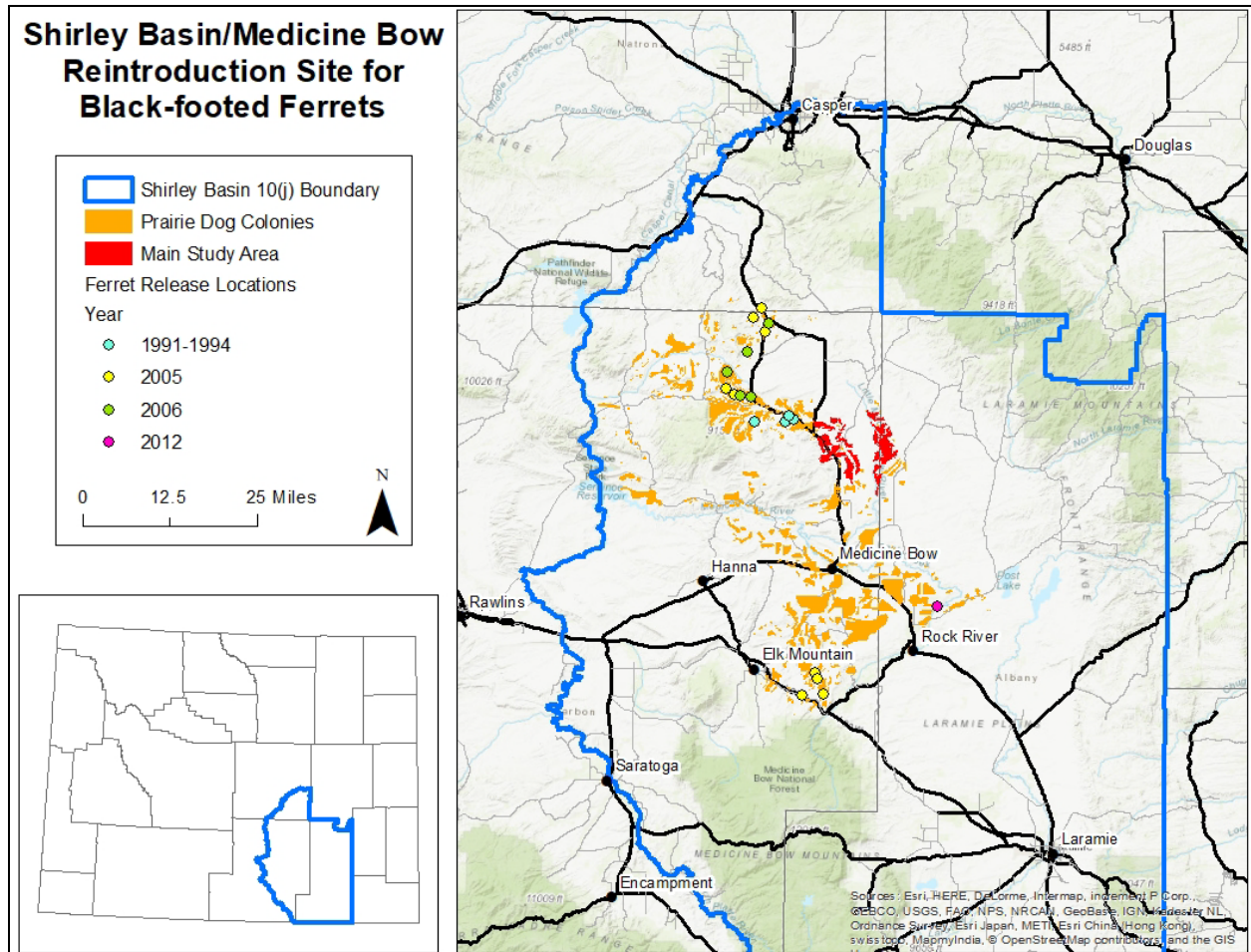


Figure 1. Overview of the Shirley Basin/Medicine Bow Reintroduction Site for black-footed ferrets (*Mustela nigripes*) located between Casper and Elk Mountain, Wyoming. The reintroduction site was first established with releases of captive-bred ferrets in 1991-1994, followed by subsequent releases in 2005, 2006, and 2012.

Due to the vast acreage of potential habitat within the greater Shirley Basin area, monitoring efforts within the reintroduction site have focused primarily on a portion of the prairie dog complex totaling about 50,000 acres where the highest ferret densities have been reported (hereafter “main study area”; Figure 1). By 2006, the population had grown rapidly within the main study area to 229 ferrets (95% CI: 169-289; Grenier et al. 2009). Estimates from 2008 (240; 95% CI: 176-303)

and 2010 (203; 95% CI: 137-270) suggested the population had begun to stabilize, and the rate of growth appeared to transition from an exponential to a logistical pattern (Van Fleet and Grenier 2009, 2011). However, surveys in 2013 suggested the population had declined dramatically to as few as 39 individuals (Boulerice and Grenier 2014). Although the Department expected that ferrets would recover following this decline (Boulerice and Grenier 2014), surveys were not conducted in 2014 due to financial limitations and personnel turnover. In 2015, a minimum of 45 individuals were observed during an exhaustive effort (>1,200 hours, >27,000 acres) to evaluate the status of ferrets within the larger Shirley Basin complex (≥ 43 individuals observed within the main study area), suggesting the population had not experienced a significant change since the decline observed in 2013 (Boulerice 2016b). In 2016, approximately 11,000 acres were surveyed within the main study area, during which 34 individuals were observed, representing a 36% increase in the number of ferrets observed since 2015 (Boulerice 2017c). This increase suggested the ferret population may have been increasing from the decline experienced in 2013-2015, although extrapolation of these estimates to portions of the reintroduction area that were not surveyed should be done cautiously (Boulerice 2017c). Continued monitoring at the reintroduction site will be necessary to confirm the population is recovering (see Shirley Basin/Medicine Bow Reintroduction Site, page 13).

Transition of the Captive Breeding Program to the Service

After successfully establishing a captive breeding program for ferrets that allowed for the establishment of reintroduction sites in Wyoming, Montana, and South Dakota (USFWS 2013), the Department passed the responsibility of managing the captive breeding program to the Service in 1995. From 1995 until 2005, the captive breeding program remained in Sybille until construction of the National Black-footed Ferret Conservation Center in northern Colorado was completed. Since 2005, the program has been based out of this location, with additional, smaller breeding centers maintained in collaboration with several partners throughout the U.S. As of 2005, the Sybille Wildlife Research Unit has no longer been involved with the ferret captive breeding program.

Statewide Nonessential Experimental Population for Black-footed Ferrets in Wyoming

Based on the success of the population in Shirley Basin and the ongoing need to establish additional ferret populations throughout the West in order to meet recovery goals set forth in the 2013 Recovery Plan (USFWS 2013), the Department and the Service engaged in efforts to expand the 10(j) rule for ferrets in order to encourage private landowner support of additional reintroduction sites in Wyoming. In 2015, a statewide 10(j) designation was approved, paving the way for the establishment of additional reintroduction sites (USFWS 2015).

Reintroduction in Meeteetse

Given the historical significance of Meeteetse and continued interest in returning ferrets to the area, efforts were reinvigorated to consider the site for reintroduction following the finalization of the statewide 10(j) rule. From 2013-2015, the Department had participated in a collaborative, multi-state project to evaluate the efficacy of a new vaccine for combating plague in prairie dogs (sylvatic plague vaccine; Rocke et al. 2010, Abbott et al. 2012), for which field trials were

conducted at the Pitchfork Ranch. Results from this project suggested that prairie dog populations appeared capable of supporting a ferret population (Boulerice 2016a). In addition, through the combination of the assurances granted under the recently approved statewide 10(j) and the development of positive relationships with the Department, the landowner support and enthusiasm necessary to move forward with reintroduction at the site was established. By the summer of 2016, the Department had mapped 5,900 active acres of prairie dog colonies within the Meeteetse area designated for reintroduction, incorporating sections of BLM and State lands as well as private lands on the Lazy BV and Pitchfork Ranches (Boulerice 2017a; Figure 2). In 2016, the Department drafted a site-specific management plan for Meeteetse (WGFD 2016), and the Service granted an allocation of 35 captive-bred ferrets from the National Black-footed Ferret Conservation Center to Wyoming for the purpose of reintroduction in Meeteetse.

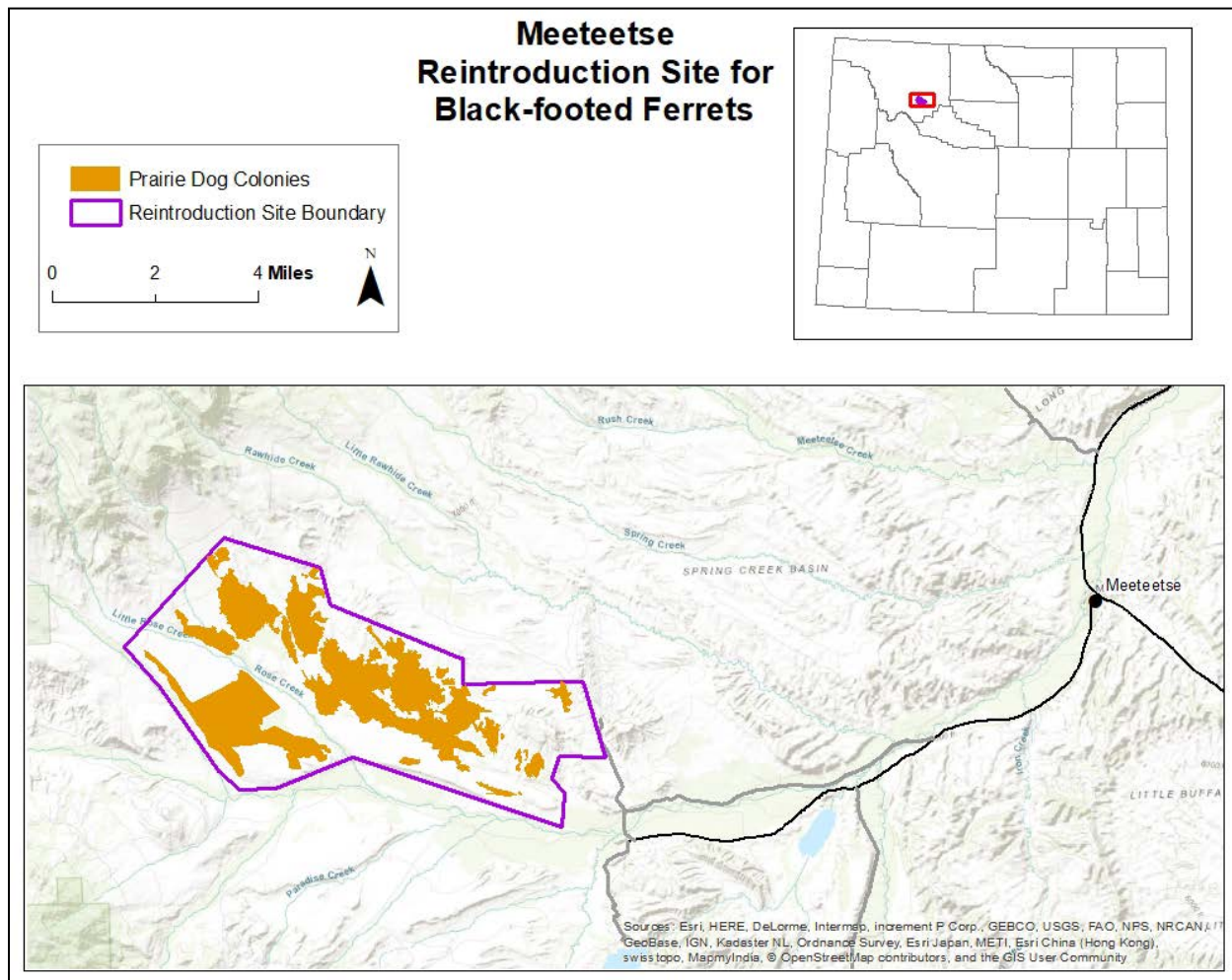


Figure 2. Overview of the Meeteetse Reintroduction Site for black-footed ferrets (*Mustela nigripes*) located approximately 15 miles west of Meeteetse, Wyoming. The reintroduction site was established in 2016 when 35 captive-bred ferrets were released on a 5,900-acre complex of white-tailed prairie dogs (*Cynomys leucurus*).

On 26 July 2016, 35 captive-bred ferrets were released at the Meeteetse Reintroduction Site, thus establishing the second reintroduction site for ferrets in Wyoming and returning ferrets to the same

ranches where the species was rediscovered 35 years earlier. Surveys in September of 2016 documented that at least 19 of the 35 ferrets survived the first month in the wild (Boulerice 2017a see Meeteetse Reintroduction Site, page 13).

POPULATION OBJECTIVES AND MANAGEMENT AREAS

Population Objectives

The 2013 Recovery Plan (USFWS 2013) provides guidelines for number of ferrets and occupied acres of prairie dog colonies needed per state to recover ferrets range-wide. Of the proposed 3,000 breeding adults needed for recovery and delisting, the 2013 Recovery Plan outlines Wyoming's contribution as 341 breeding adults and 70,000 acres of occupied habitat (i.e., active acres of prairie dogs occupied by ferrets). In addition to a minimum number of wild, free-ranging ferrets on the landscape, the 2013 Recovery Plan also outlines range-wide objectives pertaining to numbers, sizes, and locations of populations among states and prairie dog species. Accordingly, Wyoming objectives in this plan mirror those of the 2013 Recovery Plan and are based on what the Working Group felt was appropriate and achievable for recovery of ferrets in Wyoming given the current availability of habitat throughout the state. Specifically, population objectives for ferrets in Wyoming are:

1. Maintain a minimum of 341 breeding adults distributed among 5 or more populations statewide;
2. Maintain a minimum of 30 breeding adults in each population, with at least 2 populations containing a minimum of 100 breeding adults; and
3. Establish at least 2 populations within white-tailed prairie dog colonies AND at least 1 population within black-tailed prairie dog (*C. ludovicianus*) colonies, with remaining populations distributed among colonies of either prairie dog species.

Black-footed Ferret Management Areas

Wyoming contains 2 species of prairie dogs: black-tailed and white-tailed prairie dogs. Combined, the ranges of these species cover nearly all non-mountainous areas of the state. As such, potential reintroduction sites are likely plentiful in Wyoming, and there have been a number of previous attempts to identify and evaluate sites, which have varied in their potential to support ferrets (e.g., Luce 1989, Conway 1990, Grenier et al. 2003). Most recently, for example, Luce (2006) identified 10 potential reintroduction sites for ferrets in Wyoming that, with further evaluation, might contain enough habitat for reintroduction efforts. Although these attempts have identified specific locations, given the large number of potential sites as well as the need for more precise, on-the-ground evaluation of biological, social, political, and economic issues at these sites, the Working Group determined that designating specific *a priori* management areas for future reintroduction efforts is not feasible in Wyoming. Instead, because ferret management relies so heavily on prairie dog management, we focused our efforts on 2 management areas, which are designated by the range of each prairie dog species. Both species encompass unique aspects of biology, geography, land status, and management issues. Therefore, for the purposes of this

document, we discuss prairie dog species separately when evaluating their potential for ferret reintroduction.

Black-tailed Prairie Dogs

Black-tailed prairie dogs are found throughout the short- and mid-grass prairies of the eastern $\frac{1}{3}$ rd of Wyoming on flat or shallow slopes (Beauvais et al. 2017; Figure 3). The potential acreage of black-tailed prairie dogs in Wyoming is predominantly on private land (~74%), with the remainder on public land (state and federal; ~26%). Black-tailed prairie dogs are active year-round (Hoogland 1996).

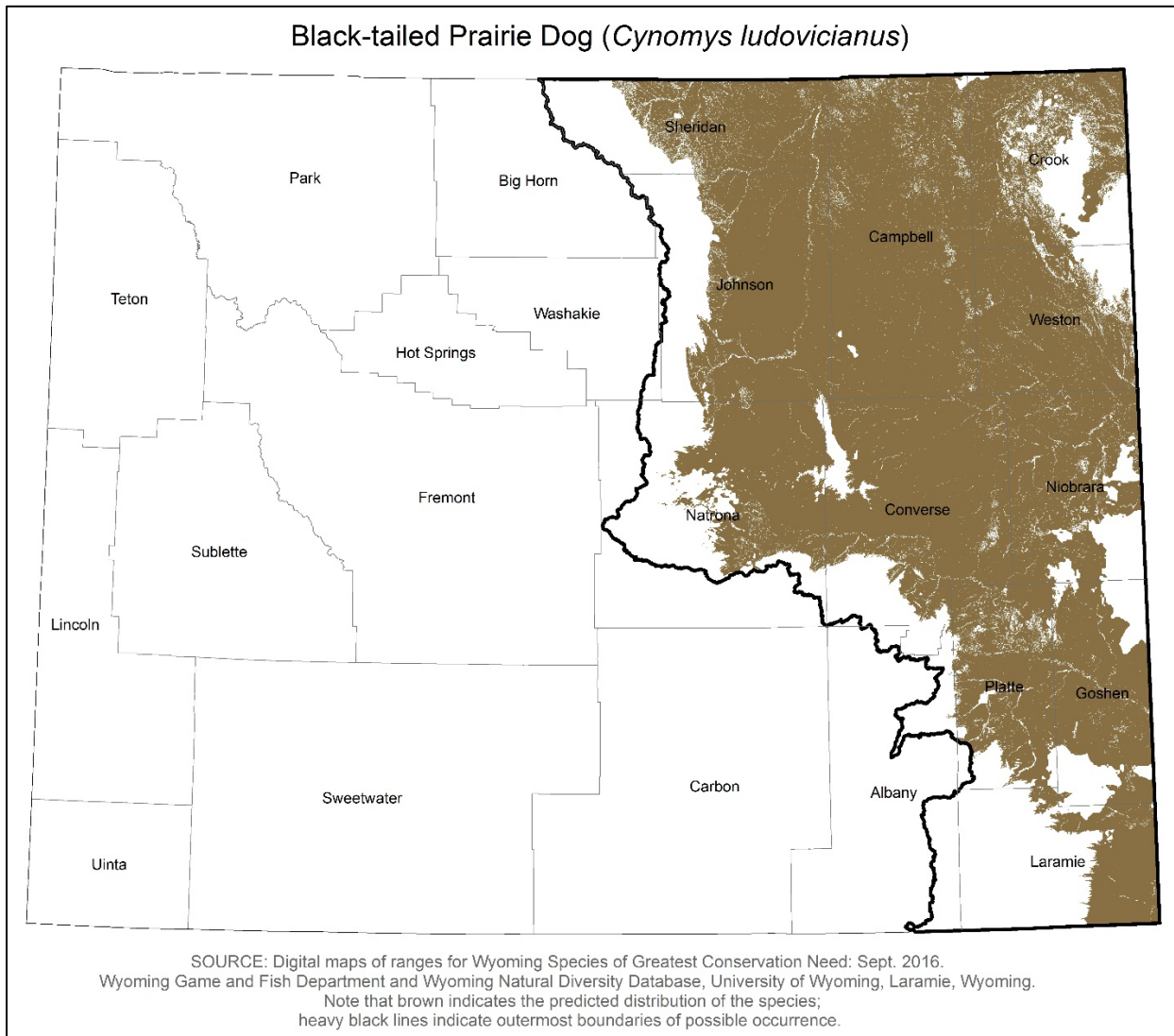


Figure 3. Range and predicted distribution of black-tailed prairie dogs (*Cynomys ludovicianus*) in Wyoming. Map reproduced from Beauvais et al. (2017).

Black-tailed prairie dogs are thought to have experienced a large decline from historic numbers and distribution, although the magnitude of this decline is debated (Knowles et al. 2002, Virchow and Hygnstrom 2002). In Wyoming, the species is still abundant, and a recent survey from 2012

NAIP imagery estimated a total of 2,505 active black-tailed prairie dog colonies, totaling 216,166 acres. Of those colonies, 18 were >1,000 acres and totaled 33,389 acres combined (McDonald et al. 2015).

Black-tailed prairie dogs are typically comprised of dense colonies, with densities up to 10 times that of white-tailed prairie dogs (Cully and Williams 2001). In fact, the species tends to contain the largest and most dense colonies of all prairie dog species (Hoogland 1996). Because of their high density and behavior of clipping grasses and shrubs, black-tailed prairie dogs can compete with cattle for forage where they overlap, which can create conflicts with ranching operations (Derner et al. 2006), although overall impacts may vary (Sierra-Corona et al. 2015). Consequently, poisoning efforts are more frequently used to control numbers and distribution of black-tailed prairie dogs than with white-tailed prairie dogs. Other management efforts are also more likely to be implemented to address conflict issues, including recreational and targeted shooting, although long-term impacts are often not as significant as poisoning. In general, boundary control efforts are likely to be particularly important for this species when assessing reintroduction sites for ferrets. However, the higher density of black-tailed prairie dogs also necessitates a smaller minimum area to reintroduce ferrets ($\geq 1,500$ active acres) than for white-tailed prairie dogs (USFWS 2015).

Plague can be especially virulent for black-tailed prairie dogs, with mortality rates over 90% in infected individuals and localized or even regional extirpation of colonies (Cully and Williams 2001). For example, black-tailed prairie dog colonies on Thunder Basin National Grassland have fluctuated in size from approximately 3,000 to 20,000 acres due to plague outbreaks; it is estimated the area is 100% impacted by plague (C. Painter, pers. comm.). For this reason, plague management may also be particularly important for reintroduction sites in black-tailed prairie dog complexes.

White-tailed Prairie Dogs

White-tailed prairie dogs are found throughout the basins of the western $\frac{2}{3}$ rd of Wyoming (Bjornlie et al. 2017; Figure 4), typically in semi-arid and arid grasslands, desert grasslands, and shrub-lands with low to moderate slopes between 4,265 and 7,546 ft in elevation. Colonies are found in areas with open plant communities and deep, well-drained soils (Seglund et al. 2004). The predicted distribution of white-tailed prairie dogs in Wyoming is predominantly on public land (state and federal; ~62%), with the remainder mostly located on private land (~34%) and a small portion on tribal land on the Wind River Indian Reservation (~5%).

White-tailed prairie dogs are thought to exist across most of their historic range but are now found in relatively smaller, more fragmented colonies than in the past (Seglund et al. 2004). In Wyoming, the species is still abundant, and estimates are generally assessed as area of occupied habitat (i.e., area containing active colonies). Estimates of occupied area in Wyoming have varied from roughly 460,000 acres to 2,893,000 acres (Pauli et al. 2006, Grenier and Filipi 2009, Cudworth et al. 2012). Most recently, a habitat suitability model identified roughly 21,780,000 acres of habitat. Occupancy surveys were then based on 62-acre cells that covered all potential habitat; results suggested that 21% of the cells in potential habitat in Wyoming were occupied (Ceradini et al. 2016).

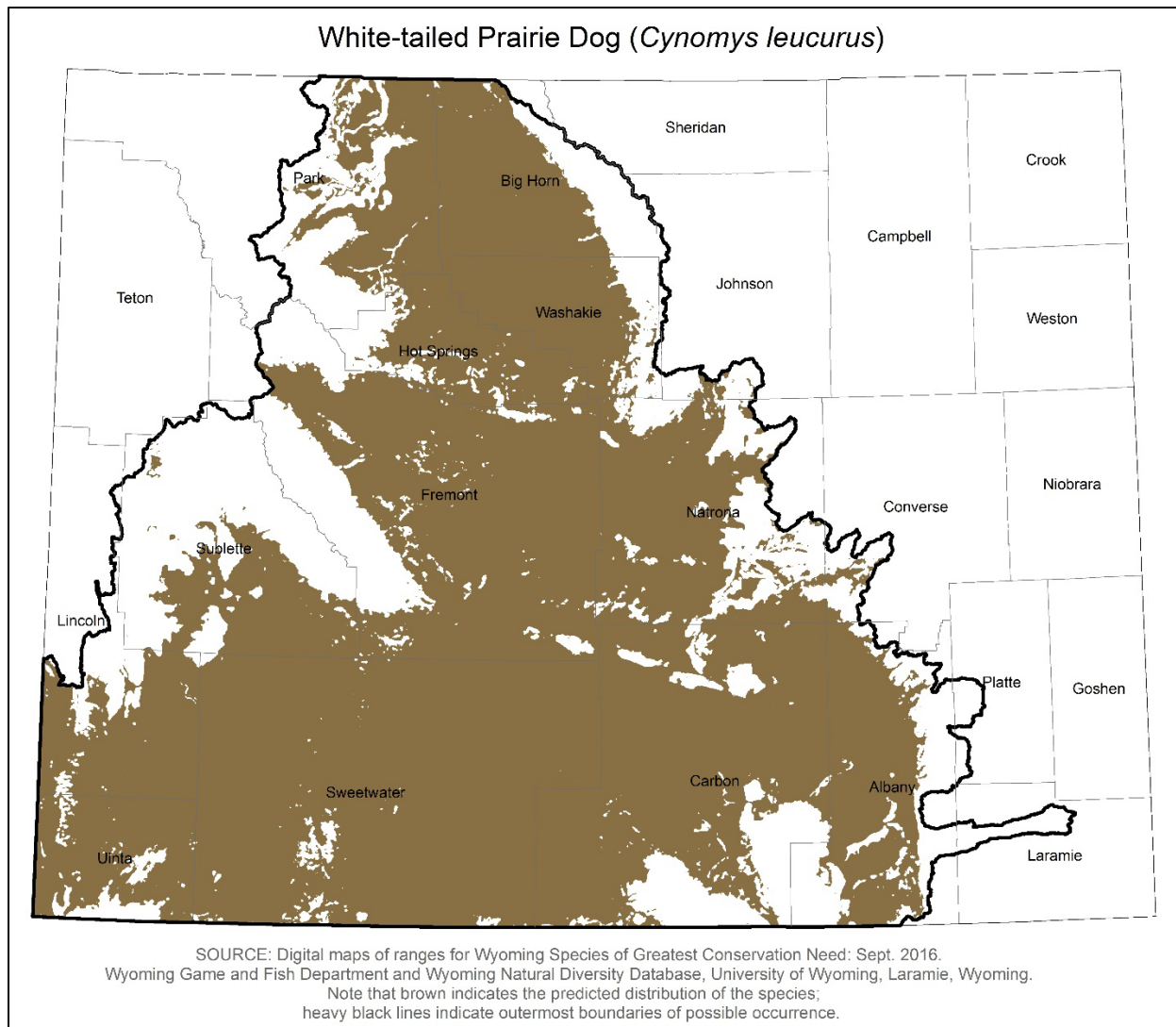


Figure 4. Range and predicted distribution of white-tailed prairie dogs (*Cynomys leucurus*) in Wyoming. Map reproduced from Bjornlie et al. (2017).

Because white-tailed prairie dogs are less colonial and therefore less dense, hibernate, do not clip vegetation, and are found throughout the western portion of the state where public land is more prevalent (Clark et al. 1971), boundary control issues are not as pressing compared to black-tailed prairie dogs. Additionally, both poisoning and shooting are likely utilized less often for white-tailed prairie dogs (Seglund et al. 2004). However, the lower density also necessitates a greater minimum area in order to reintroduce ferrets ($\geq 3,000$ active acres; USFWS 2015).

As with black-tailed prairie dogs, plague is an important issue, and both the Shirley Basin/Medicine Bow and Meeteetse Reintroduction Sites have been impacted by plague (see History of Black-footed Ferrets in Wyoming, page 2). Although populations can grow rapidly in the absence of a plague outbreak, the presence of epizootic plague can have a dramatic effect on populations. For example, a portion of the Meeteetse prairie dog population increased 4-fold from 2013 to 2015, but decreased significantly following a plague outbreak in 2016 (Boulerice 2017b; Figure 5). The application of a newly developed sylvatic plague vaccine for prairie dogs showed

some promise in lessening the decline (Boulerice 2017b, Rocke et al. 2017). It has also been suggested that the more widely spaced distribution of white-tailed prairie dog colonies may provide somewhat of a buffer to the spread of plague. Additional research is needed to evaluate the differences in the impact of plague between prairie dog species as well as the best approach for plague management activities (e.g., timing, type, and extent of application).

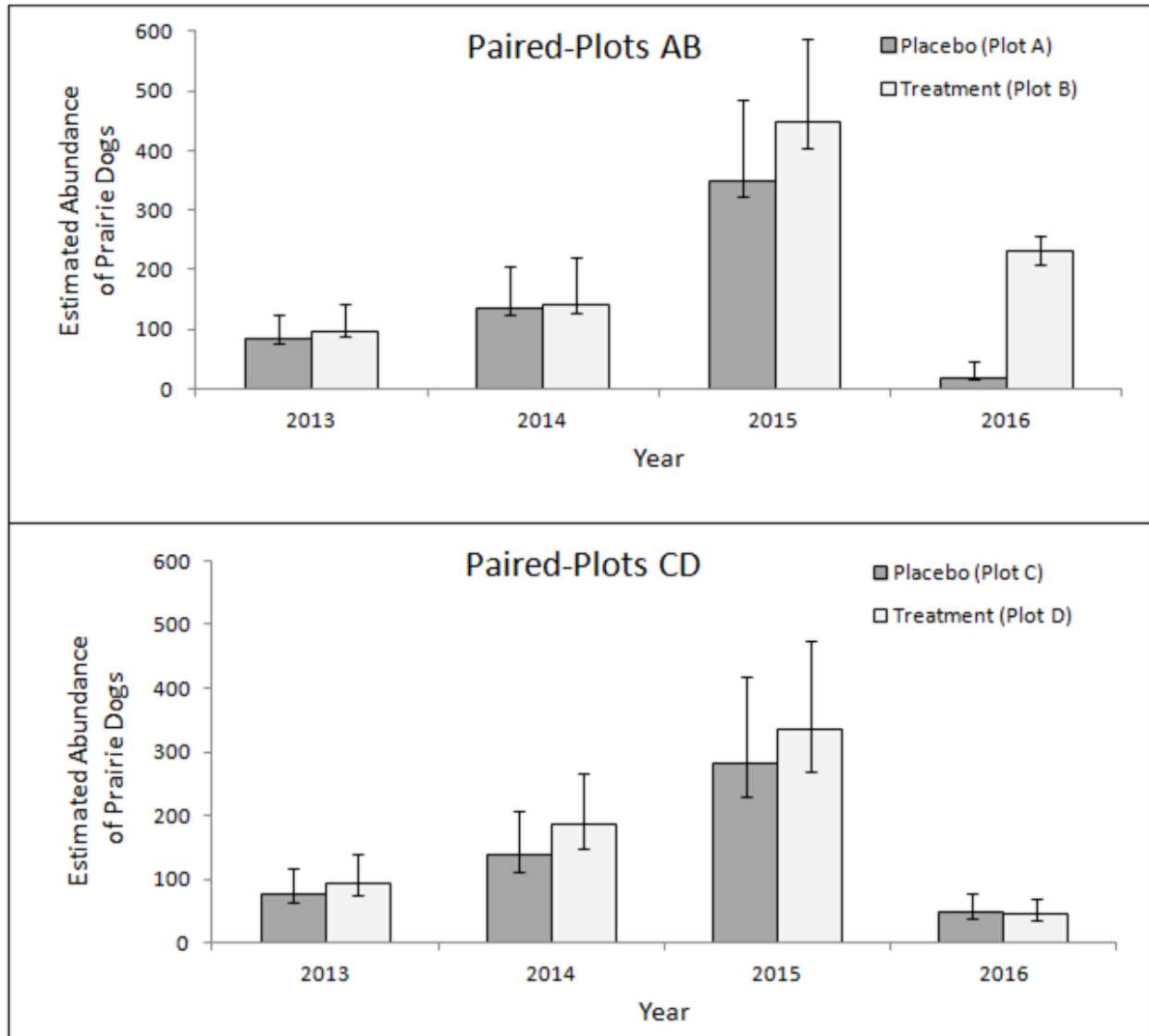


Figure 5. Estimates of abundance of white-tailed prairie dogs (*Cynomys leucurus*) within each of 4 plots to evaluate the efficacy of a sylvatic plague vaccine for prairie dogs at the Pitchfork Ranch, Meeteetse, June-August 2013-2016. The site experienced an epizootic plague outbreak in 2016. Figure reproduced from Boulerice (2017b).

Current Black-footed Ferret Reintroduction Sites

As of 2016, 2 reintroduction sites for ferrets have been established: the Shirley Basin/Medicine Bow Reintroduction Site and the Meeteetse Reintroduction Site. Both of these reintroduction sites contribute toward the recommendations and state-specific population targets for Wyoming set

forth in this plan and by the Service in the 2013 Recovery Plan (USFWS 2013; see Population Objectives, page 8).

Shirley Basin/Medicine Bow Reintroduction Site

The Shirley Basin/Medicine Bow Reintroduction Site currently contains approximately 20,000 acres of ferret habitat (i.e., active acres of white-tailed prairie dog colonies) within the main study area on which the Department conducts regular monitoring of the ferret population (Figure 1). During the most recent survey efforts to encompass the entire main study area in 2015, 43 unique ferrets, of which at least 16 were adults, were observed (Boulerice 2016b). In fall of 2017, approximately half of the main study area was surveyed, during which 16 unique ferrets were observed (Boulerice 2018b). Notably, the reintroduction site as a whole is thought to contain vast acreage of potential habitat (~150,000 acres total) that is surveyed infrequently and for which the distribution and status of prairie dog colonies and ferret occupancy are poorly understood. The Department fully expects that additional ferrets are currently occupying these lands, and, consequently, the population is likely substantially larger than the number of ferrets observed during surveys. Based on these regular monitoring efforts, the Shirley Basin/Medicine Bow Reintroduction Site currently contributes toward statewide recommendations by fulfilling the objective of 1 of 2 populations of ferrets located in white-tailed prairie dog colonies and likely contributes to 1 of 3 populations with a minimum of 30 breeding adults, although more comprehensive surveys of the reintroduction site as a whole are needed to confirm this. Additionally, each of these adults contributes toward the 341 breeding adults recommended for Wyoming in this plan and the 2013 Recovery Plan (USFWS 2013).

Meeteetse Reintroduction Site

The Meeteetse Reintroduction Site currently contains approximately 6,000 acres of ferret habitat (i.e., active acres of white-tailed prairie dog colonies; Figure 2). The Meeteetse Reintroduction Site was established in 2016 when 35 juvenile ferrets were released. In 2017, 1-year post-release surveys confirmed that at least 10 of the 35 ferrets released in 2016 had survived their first year in the wild (Boulerice 2018a). In addition, at least 7 wild-born kits were detected from 4 litters (Boulerice 2018a). Therefore, the Meeteetse Reintroduction Site currently contributes toward statewide recommendations by fulfilling the objective of 1 of 2 populations of ferrets located in white-tailed prairie dog colonies. However, survey results indicate there are fewer than 30 breeding adults at this site. Consequently, it does not currently contribute to the objective of 3 small populations (i.e., ≥ 30 breeding adults). In addition, because the reintroduction site is still being established, additional surveys are needed to confirm the success and continued persistence of ferrets in Meeteetse before individuals in this population can be counted toward the statewide objective of 341 breeding adults.

Evaluating and Designating New Recovery Sites

Wyoming contains substantial amounts of prairie dog acreage statewide, and therefore has the potential to support multiple recovery sites. Evaluating the potential of each of these sites, however, would be extremely time consuming and costly. Consequently, it is necessary to develop a strategy to evaluate and prioritize among potential sites in order to best allocate efforts to meet

recovery goals for Wyoming. The Working Group has developed a prioritization matrix that will allow personnel to evaluate a number of different criteria in order to prioritize new sites for reintroduction. This matrix includes:

1. Minimum requirements for allocating ferrets (e.g., minimum prairie dog acreage, landowner or land management agency support, capacity to fulfill ferret allocations, etc.);
2. Habitat suitability, stability, and management, including the funding and capacity to provide prairie dog boundary control where needed and desired;
3. Disease monitoring and management, with a particular emphasis on sylvatic plague;
4. Ability to address statewide objectives, including the ability to assess and monitor the status of ferret and prairie dog populations; and
5. Stakeholder support of reintroduction activities, with particular emphasis on local communities and landowners, including adjacent landowners and permittees / leasees.

Because specific details and the relative importance of each of these criteria may change as management efforts proceed, maintenance of this matrix as a living document that can be updated as needed is important. In order to ensure the matrix is kept current and relevant, the Working Group will meet annually prior to the upcoming field season to discuss and re-evaluate the prioritization matrix, make updates as necessary, and evaluate and prioritize new and existing management needs. However, it is unlikely that resources will be available to establish new reintroduction sites annually, so the Working Group will evaluate and prioritize new sites periodically as resources and personnel allow based on other, ongoing reintroduction efforts and existing management needs for established sites.

Once a new reintroduction site has been evaluated and preliminarily selected for reintroduction efforts, the Department will work with landowners, land management agencies, and permittees / leasees within the reintroduction site to develop a site-specific management plan. Additionally, the Department will collaborate with the Working Group to ensure all necessary pre-release monitoring and management needs are addressed (e.g., plague management, boundary control, etc.) prior to release. Once these objectives are met, the Department will work with the Service to develop an allocation of ferrets for the site and specific release strategies (BFFRIT 2016).

BLACK-FOOTED FERRET CONSERVATION AND MANAGEMENT STRATEGIES

Given the dependence of ferrets on prairie dog colonies for food and burrows, ferret conservation and management strategies also necessitate conservation and management strategies for prairie dogs at reintroduction sites. Consequently, it is important to incorporate both monitoring and management at each site for each species. Key objectives of each recovery site include ensuring a healthy and productive ferret population, maintaining an adequate prey base of prairie dogs for ferrets, and monitoring populations and health of both ferrets and prairie dogs.

Most management and monitoring strategies have already been developed for prairie dogs and ferrets at reintroduction sites; therefore, we only provide a brief overview here and refer readers to more comprehensive resources where appropriate. We provide more detail for strategies that may not be fully explored in other documents.

Reintroduction Techniques

Although the minimum active acreage of prairie dog colonies necessary for a reintroduction differs between black-tailed (1,500 acres) and white-tailed (3,000 acres) prairie dogs, reintroduction strategies are similar between species. Currently, the Service specifies that individuals should be released at least 932 ft apart, into as few colonies as possible to promote population connectivity, and at a density of 20 to 75 acres/ferret, depending on habitat quality (BFFRIT 2016).

Black-footed Ferret Population Monitoring and Management

Surveys to monitor ferret populations should be done between mid-August and mid-September to document reproduction in conjunction with estimating populations and take advantage of an increased probability of detection associated with emergence of kits (Eads et al. 2012, BFFRIT 2016). Currently, the best technique to detect ferrets is through the use of spotlight surveys throughout previously mapped prairie dog colonies (see Prairie Dog Population Monitoring and Management, page 15). Surveys should be conducted either on foot, by vehicle, or a combination thereof from 2000 – 2300 hours and 0130 – 0600 hours in blocks of 3 consecutive nights (Cudworth et al. 2013, Boulerice 2017c). Incorporating capture efforts allows for individual identification, the collection of demographic data and biological samples, application of sylvatic plague and canine distemper vaccines, and abundance estimation. Details on protocols for capture and handling are further discussed by Cudworth et al. (2013), BFFRIT (2016), and Boulerice (2017c). Although not regularly used at current reintroduction sites in Wyoming, snow tracking may provide another technique to document areas of ferret activity in the winter when conditions are appropriate (BFFRIT 2016).

Spotlight surveys as described above can be used to estimate either abundance or minimum number alive (MNA) for ferrets at reintroduction sites. When sample size is relatively large, spotlight surveys can be used in conjunction with capture efforts to employ a traditional mark-recapture approach to estimate abundance (Grenier et al. 2009). However, when sample size is limited (i.e., <30 individuals captured), which is typical at reintroduction sites, an estimate of MNA may be more appropriate. The MNA technique incorporates 2 types of data: 1) ferrets that have been captured and marked and can thus be uniquely counted and 2) ferrets that have been detected during surveys but not captured and marked. Using a formula that accounts for factors such as timing and distance between observations, capture record within a survey area, etc., ferrets that are detected but not captured and marked can be assigned as either a discrete individual or a repeat observation of a previously detected individual (see Appendix II in Grenier 2008). This technique has been used since 2005 to monitor the population trends for ferrets at the Shirley Basin/Medicine Bow Reintroduction Site.

Prairie Dog Population Monitoring and Management

The Service recommends mapping prairie dog colonies and estimating prairie dog density at reintroduction sites at a minimum of 3 year intervals (BFFRIT 2016). This includes circumscribing the colony on the ground, calculating the total area of each colony, and delineating complexes of prairie dog colonies (Biggins et al. 1993, 2006; Cudworth et al. 2013). Within each colony, density can be evaluated via burrow transects or visual counts. Because colony sizes and

prairie dog densities can vary widely among sites or prairie dog species, both are used to calculate a Ferret Family Rating, which allows for a rough estimate of carrying capacity (Biggins et al. 2006, BFFRIT 2016). Between mapping efforts, the Service recommends annual qualitative assessments of prairie dog colonies, such as repeated visual counts or windshield surveys, to allow for early detection of declines possibly indicative of a plague outbreak (BFFRIT 2016).

Disease Monitoring and Management

A number of techniques have been developed to monitor diseases, particularly plague, in prairie dogs. Visual counts or windshield surveys may provide early evidence of a population decline as a result of disease outbreak (BFFRIT 2016). However, confirming the presence of diseases affecting prairie dogs and ferrets (e.g., plague, canine distemper, etc.) within a reintroduction site typically requires disease testing. Testing can be achieved through collecting blood and/or fleas from live prairie dogs and other small mammals trapped during dedicated trapping efforts; collecting blood from other carnivores, such as coyotes (*Canis latrans*); collecting carcasses of dead individuals, particularly prairie dogs and other small mammals; and swabbing burrows to collect fleas (BFFRIT 2016). Disease management strategies at both the Meeteetse and Shirley Basin/Medicine Bow Reintroduction Sites have been outlined in each respective site-specific management plan (WGFD 1991, 2016). Future site-specific management plans for reintroduction sites developed under this state management plan will also include disease monitoring and management strategies.

Currently, one strategy for plague management is prevention through the use of insecticide dust. The most effective treatment is deltamethrin (DeltaDust – BFFRIT 2016). DeltaDust is applied with mechanical sprayers, either on foot or ATV, into every burrow within the treatment area, regardless of whether the burrow appears to be occupied or not (BFFRIT 2016). Although extremely effective at killing fleas, recent research has shown that deltamethrin may become less effective with repeated use (Boyer et al. 2014). Consequently, deltamethrin dust should be used wisely and preferably incorporated into an integrated pest management strategy with other management tools.

Adaptive Management

Each reintroduction site will likely represent a unique suite of challenges for the conservation and management of ferrets as well as prairie dogs. Consequently, it will be critical to adapt strategies to meet these differing challenges. At a minimum, the Working Group will meet annually to discuss the status of each reintroduction site, evaluate conservation and management needs for each site, and prioritize new reintroduction sites as appropriate. During this time, the Working Group will also evaluate the success of recovery efforts to date as they pertain to the population objectives outlined in this plan as well as update the prioritization matrix to evaluate new reintroduction sites as needed.

In addition to adapting existing conservation and management strategies as necessary at current reintroduction sites, the Department, in collaboration with the Service, will evaluate and utilize new techniques when appropriate. As an example, the newly developed sylvatic plague vaccine has shown some promise in dampening the decline of prairie dogs in the wake of a sylvatic plague

epizootic (Rocke et al. 2017; Figure 5). Consequently, the application of this vaccine may provide another tool to manage the impact of plague on both prairie dogs and ferrets. An additional technique that is being investigated is the use of scent-detection dogs to detect the presence of ferrets. Although this has been investigated in the past (Reindl-Thompson et al. 2006), it has received only brief attention. If successful, this technique could increase the efficiency and efficacy of monitoring at current and future reintroduction sites in Wyoming and throughout the entire recovery area. Should this detection technique prove effective and financially feasible, this may also become another tool to monitor presence and distribution of ferrets at and around reintroduction sites.

Finally, it is important to note that population objectives in this plan are based on recovery objectives identified in the 2013 Recovery Plan (USFWS 2013). Should these numbers or the metric used to evaluate recovery change at the national level, it will be important to re-evaluate the objectives outlined in this plan. Although the population objectives outlined here are believed to provide sufficient numbers to maintain viable populations in Wyoming, it will be important to ensure that state objectives are in line with national objectives in order to achieve recovery range-wide.

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