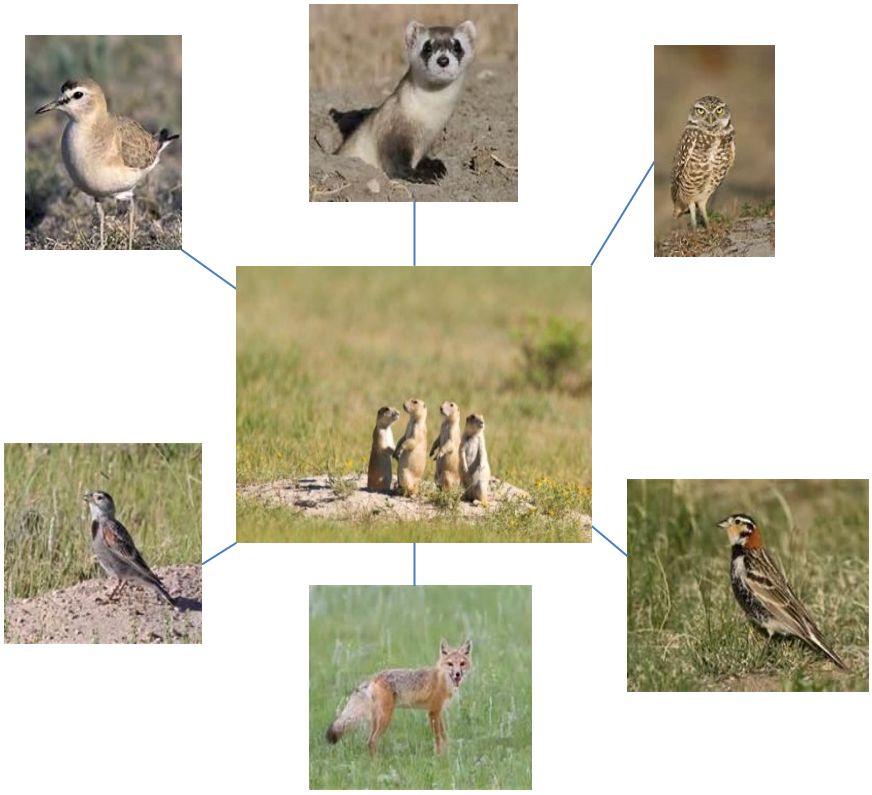
A REFERENCE GUIDE FOR THE BLACK-TAILED PRAIRIE DOG AND ASSOCIATED SPECIES FOR THUNDER BASIN NATIONAL GRASSLAND



PREPARED FOR THE MEDICINE BOW-ROUTT NATIONAL FORESTS AND THUNDER BASIN NATIONAL GRASSLAND

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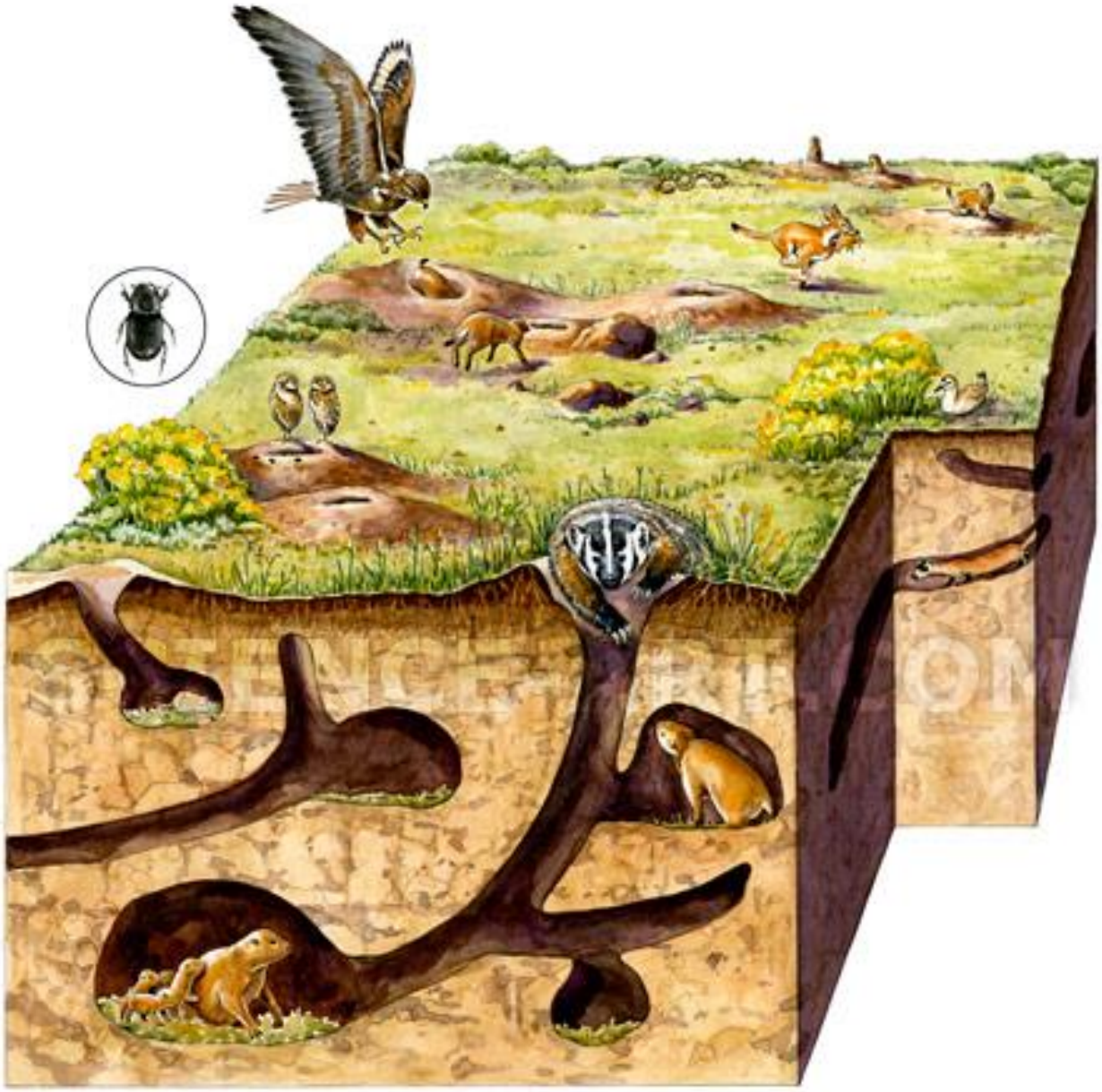
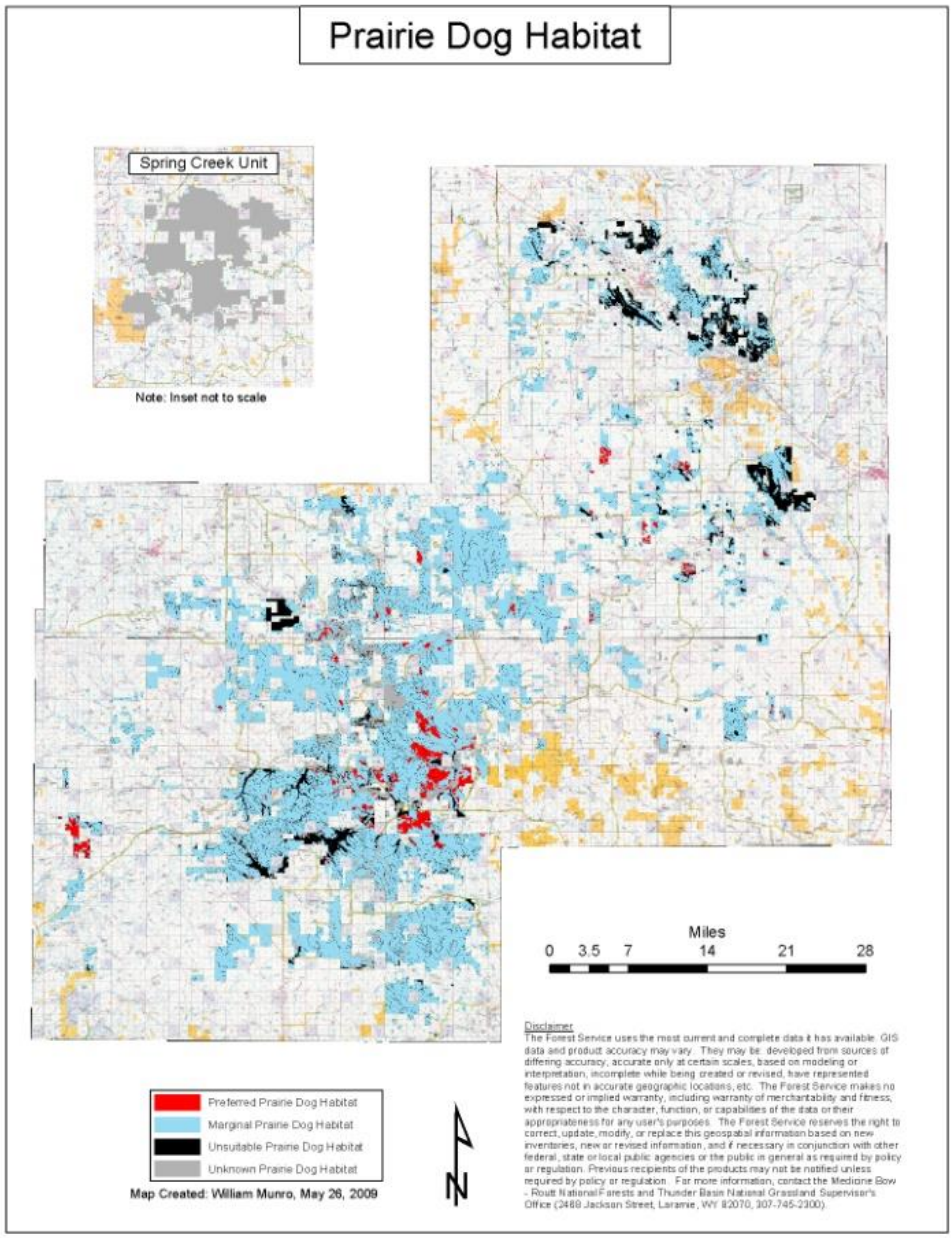


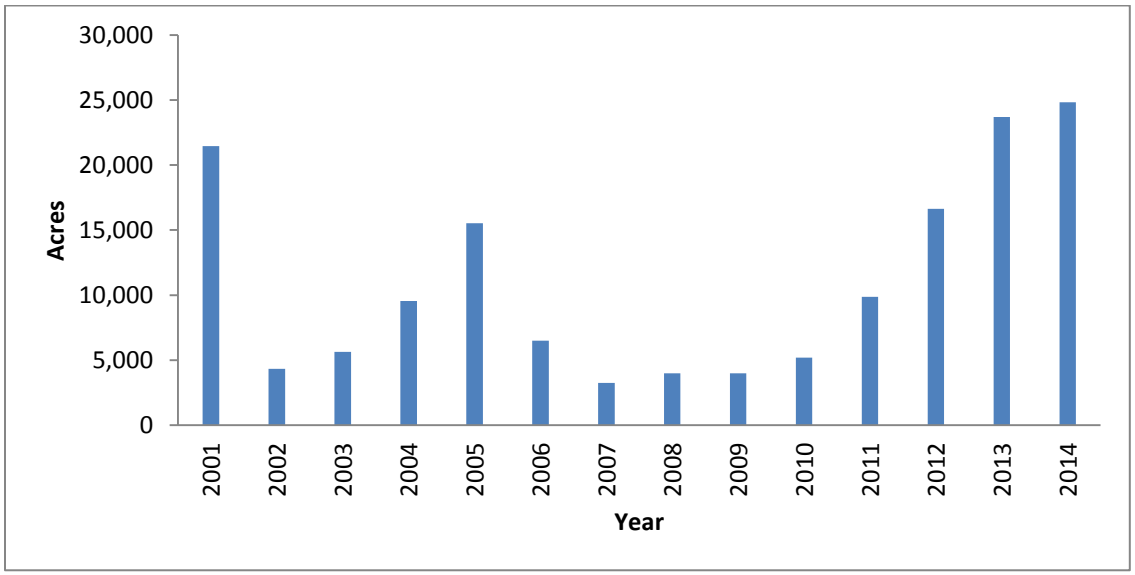
INFORMATION AND DATA FOR PRAIRIE DOGS AND ASSOCIATED SPECIES

TBNG Data

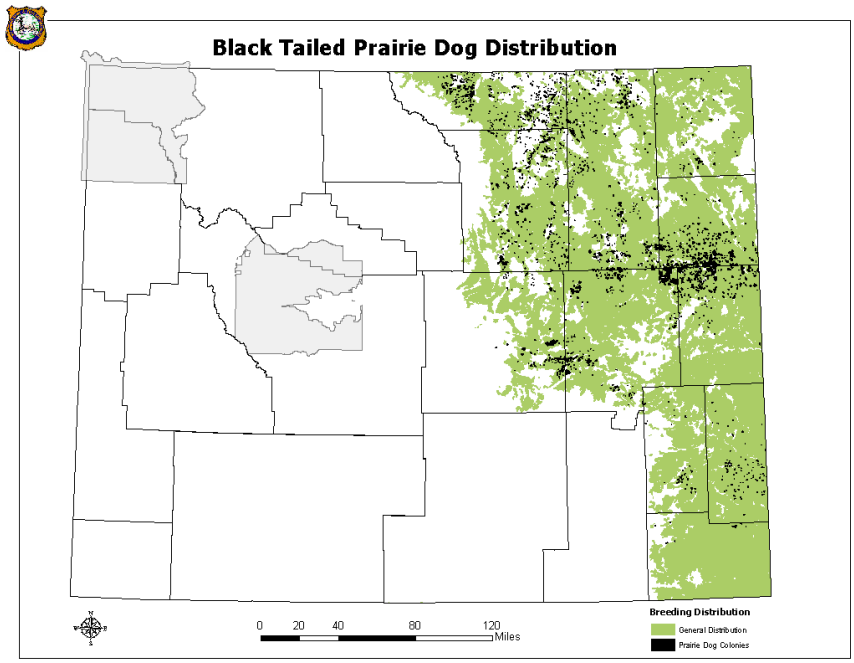
- Habitat mapped on TBNG, from LRMP. (A newer potential habitat mapping effort was completed in 2014, and will be provided in this document when available.)



- As of 2014, on TBNG there are 24,824 acres of active prairie dog colonies, which is approximately 4.5% of TBNG.



- Distribution of black-tailed prairie dogs in Wyoming (Wyoming Game and Fish, 2005)
    - Most current estimate of black-tailed prairie dogs in Wyoming is 229,607 acres (2006 data from USFWS, 2009)



Current Information about Prairie Dogs and Habitat

- The black-tailed prairie dog (BTPD) is one of five prairie dog species estimated to have once occupied up to 100 million ha or more in North America. The area occupied by BTPDs has declined to approximately 2% of its former range. Conversions of habitat to other land uses and widespread prairie dog eradication efforts combined with sylvatic plague, *Yersinia pestis*, have caused significant population reductions. Although, the species itself is not in imminent jeopardy of extinction, its unique ecosystem is jeopardized by continuing fragmentation and isolation (USFWS, 2009).

- Listing History (USFWS)
    - 1998 – Petitioned for listing by National Wildlife Federation
    - 2000 – Listed as Candidate
    - 2004 – Removed as Candidate
    - 2007 – Petitioned for listing (Wild Earth Guardians, Biodiversity Conservation Alliance, Center for Native Ecosystems, Rocky Mountain Animal Defense)
    - 2009 – Not warranted

- Before human intervention, prairie dogs only occupied 20% of available habitat (Luce, 2006).

- Native grasslands have been reduced by 33-37% across the prairie dog's distribution (Luce, 2006).

- As a result of poisoning and plague, the landscape mosaic of prairie dog colonies and off-colony grasslands has been destroyed. Only small isolated colonies of prairie dogs remain (Miller et al., 2000).

- Land ownership patterns on a national level inhabited by prairie dogs are as follows (Luce et al., 2006):
    - Private land – 87%
    - Native American Reservations – 8%
    - Federal lands – 5%

      {Clarifying note: this means that of all lands occupied, this is the percent at which occupancy occurs. So this means as of the date of this article, out of all prairie dogs available, 87% of them were on private land, 8% of them were on Reservations, and 5% were on Federal Lands.}

- Of the 2% of their original range that prairie dogs still occupy, 1.5% occurs on tribal lands, 0.33% occurs on federal lands, and only .08% occurs on private lands (Miller et al., 2007).

  {Clarifying note: This means out of the 2% of remaining habitat, 1.5% is on tribal lands, .33% on federal, and .08% on private.}

- Over a 5 year period (1991-1996), APHIS alone has conducted prairie dog control on 14% of the estimated remaining black-tailed prairie dog habitat (Van Pelt, 1999).

- TBNG makes up 0.7% of the entire population of black-tailed prairie dogs (based on TBNG 2012 data, and National Data in the 2009 Federal Register).

- National Grasslands
  - Over 75% of habitat within National Grasslands is suitable for prairie dogs (Sidle et al., 2006).
  - Prairie dogs inhabit less than 2% of National Grasslands (Sidle, et al., 2006).
  - 1.1% of the Great Plains managed by the USFS is occupied by prairie dogs (Miller et al., 2007) .
    - 25 years ago, that number was 1.6% (Miller et al., 2007)
    - This is a 0.5% reduction
  - 2004 estimates of grassland occupied by prairie dogs were 71,136 acres (this may be less as plague was discovered in Coanta Basin since 2004)

- Wyoming estimates
  - From Proctor et al., 2006
    - Area of prairie dog habitat within former geographic range = 8,501,300 ha (20,998,211 acres)
    - Potential suitable prairie dog habitat available = 7,006,700 ha (17,306,549 acres)
  - Federal Register (USFWS, 2009)
    - Historic occupied habitat for black-tailed prairie dogs = 5,786,000 acres – 16,000,000 acres
    - 2006 occupied habitat for black tailed prairie dogs = 229,607 acres (2006)
    - Using the conservative historic estimate, and 2006 estimate, black-tailed prairie dogs occupy 4% of previously occupied habitat. Using the larger estimate, prairie dogs occupy 1.4% of previously occupied habitat which is a 98.6% reduction.

- Using the estimates from the Species Assessment for Black-tailed Prairie Dog in Wyoming, BTPDs occupy 1% of historic range in Wyoming (Buseck, 2005).

- In Wyoming, 54% of landowners with prairie dogs on their domains prefer to completely eliminate prairie dogs (Reeve et al., 2006).

- Occupied range in Wyoming has been reduced by over 80% from pre-settlement (Van Pelt, 1999)

- With the exception of approximately 20,000 acres on Thunder Basin National Grassland and small colonies occurring on BLM lands, most prairie dogs occur on private land (Van Pelt, 1999).

- Thunder Basin currently is at 24,824 acres of BTPDs (USFS, 2012 Management Report)
    - 4.4% of TBNG (553,000 acres)
    - 35% of MA 3.63 is occupied with BTPDs (15,508 acres in MA 3.63, MA 3.63 is 44,420 acres in size)
    - Based on 2006 estimates by Wyoming G&F, TBNG makes up 10.8% (Wyoming = 229,607 acres) of the prairie dog population in Wyoming.
    - Based on 2004 estimates (71,136), Thunder Basin makes up 35% of total prairie dog acres on NFS lands across the US.

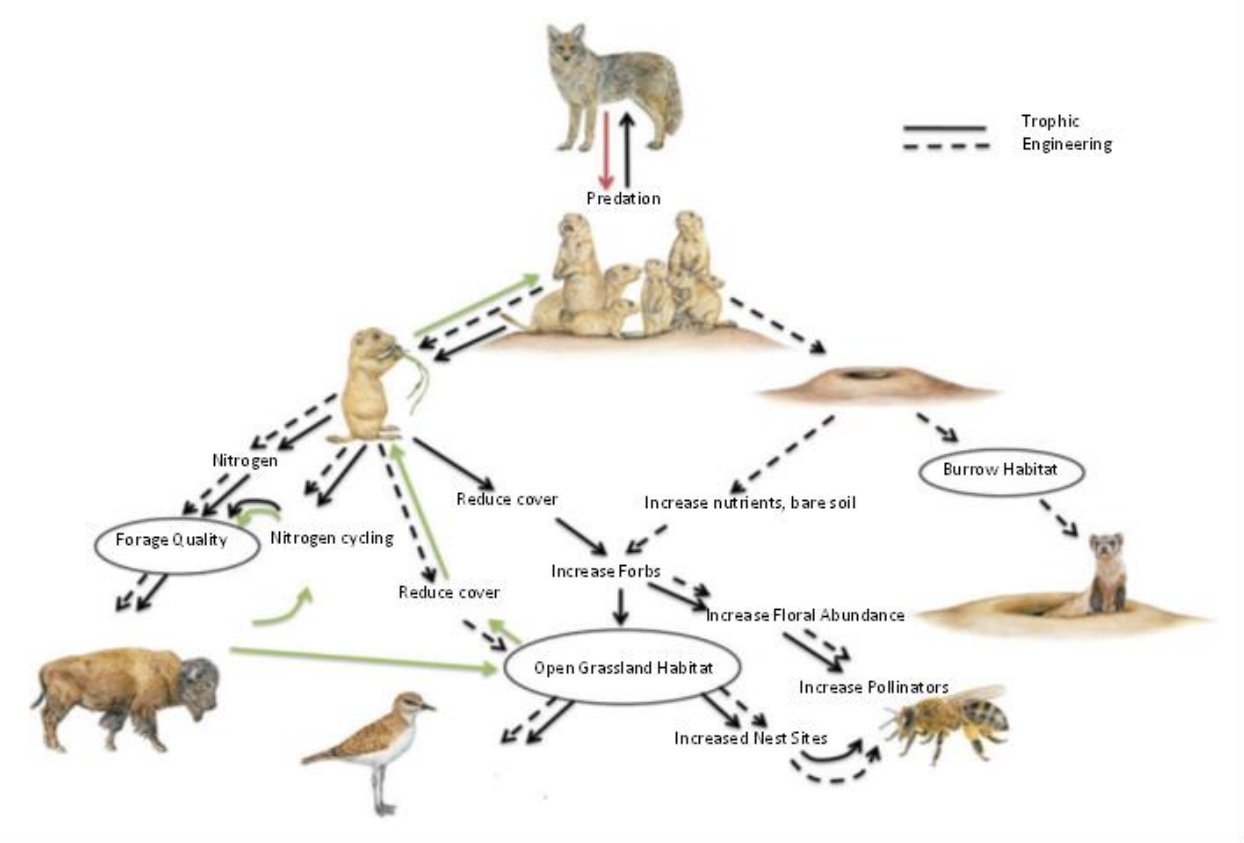
- In 2009 the MA 3.63 was reduced by 3,506 acres (ROD, 2009).

Heritage Ranks and WYNDD's Wyoming Significance Rank

(Buseck, et al., 2005, & WYNDD)

- The BTPD is ranked as imperiled (S2) in Wyoming. (species ranked S1 are critically imperiled and S5 are deemed demonstrably secure)
- The BTPD was ranked as imperiled in Wyoming due to the following factors:
    - BTPD range encompasses a moderate proportion of the state. The historic range likely covered 40% of Wyoming. Currently BTPDs occupy 1% of this historic range.
    - Exhibit low range occupation.
    - Abundance within Wyoming is uncertain and probably declining due to threats.
    - High intrinsic vulnerability due to habitat specificity and susceptibility to disease.
    - Face high extrinsic threats, including active eradication programs, land conversion, and habitat fragmentation. Poisoning, shooting, land conversion can each be a substantial threat to black-tailed prairie dogs, but when combined they can devastate entire populations beyond the point of recovery.

Prairie Dog As a Keystone Species



(Davidson et al., 2012)

- Prairie dogs are a keystone species by significantly affecting ecosystem structure, function, and composition. The impact of prairie dogs cannot be duplicated by another species (Miller et al., 2000).

- Prairie dogs exert an effect larger than predicted by their abundance, and the effects are unique (Miller et al., 2000).

- Breeding population declines of Ferruginous Hawks may be due to loss of primary species such as prairie dogs, rabbits, and ground squirrels, which can force hawks to look elsewhere for better nesting habitat (Banasch, et. Al, 2005).

- Large complexes of prairie dog colonies in the Northern Great Plains contribute to a substantially more diverse bird community than would occur in landscapes lacking prairie dogs (Augustine, D. and Baker, B., 2013).

- Prairie dogs are important to ferruginous hawks in grassland ecosystems (Cook et. Al, 2003).

- Prairie dogs are important to migrating and wintering ferruginous hawks in grassland ecosystems (Cartron, et. Al, 2004).

- Populations of nesting ferruginous hawks are likely to benefit from the enhancement of prairie dog populations (Cook, et. Al, 2003).

- Reducing prairie dogs as a food source for ferruginous hawks in locations where they nest could impact agricultural practices by reducing predation on other prey and rodent species (Cook et. Al, 2003).

- Prairie dogs helped drive the evolution of the grassland system over thousands of years (Miller et al., 2007).

- A minimum colony size of 9,884 acres is cited by Proctor, 2006, as the minimum area necessary for a fully functional grassland ecosystem that can provide suitable habitat for burrowing owls, mountain plover, and other species that depend on prairie dogs for survival (Proctor et al., 2006).

- Need 5,145 to 20,582 acres of prairie dog colonies to support 100 plover. (Augustine, D. and Baker, B., 2013)

- Prairie dogs are considered a keystone species. An entire community of organisms depends on prairie dogs directly and indirectly, including Mountain Plovers, Ferruginous Hawks, and Burrowing Owls. (Nicholoff S.H., 2003)

- 9 species are considered prairie dog obligates while at least 170 other species rely on prairie dogs at some level for survival (Miller et al., 2000)

- Removal of a keystone species can result in a cascade of changes and a rapid decline in species diversity (Nicholoff S.H., 2003).

- Prairie dogs graze, but represent much more than just grazers, they also do the following: move soil, influence nutrient cycling, increase nitrogen content of soil and plants, change vegetation structure and community dynamics, aerate the ground, alter soil chemistry, and deepen water penetration (Miller et al., 2007).

- Prairie dogs provide a ready source of prey to many predators and burrows for shelter to other animals and insects(Miller et al., 2007).

- Prairie dogs are a highly interactive keystone species within the prairie ecosystem, creating a matrix of different habitats increasing diversity across the grassland (Miller et al., 2007).

- There is higher species richness, density, and diversity of on prairie dog colonies than on grasslands unoccupied by prairie dogs (Miller et al., 2000).

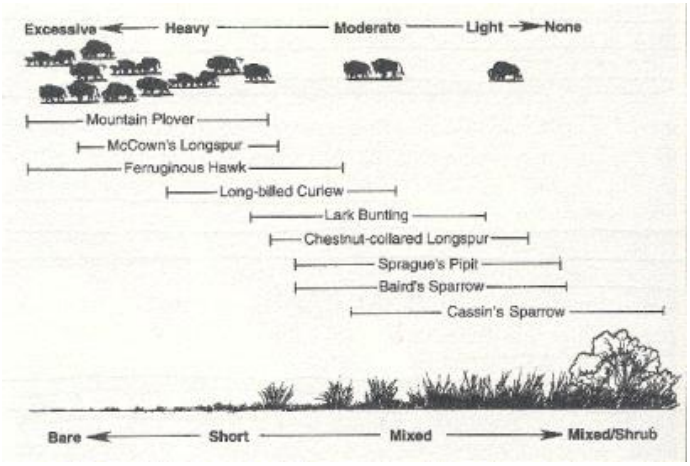
Avian species endemic to the grasslands of the Great Plains (Wyoming Game and Fish, 2005). R2

Sensitive species bolded

Species	Habitat Affinity
Ferruginous hawk	Widespread
Mountain plover	Shortgrass prairie
Long-billed curlew	Shortgrass prairie
Sprague's pipit	Mixed-tallgrass prairie
Cassin's sparrow	Shortgrass prairie
Baird's sparrow	Widespread
Lark bunting	Short-mixed-grass prairie
McCown's longspur	Shortgrass prairie
Chestnut-collared longspur	Short-mixed-grass prairie

- Larger prairie dog colonies show higher species richness of birds and small mammals than areas of grassland unoccupied by prairie dogs (Miller et al., 2000).

- The following figure shows distribution of different species of prairie birds across grasslands subject to different intensities of grazing (Nicholoff S.H., 2003).



- Prairie dog colonies on federal lands, especially National Grasslands, are fragmented and are therefore more prone to extinction (Sidle et al., 2006).

- Conversion of prairie to cropland, urban development, and control programs have dramatically reduced and fragmented prairie dog habitat (Luce, 2006)

- Prairie dogs currently exist in isolated, disjunct, and relatively small islands of colonies that are vulnerable to extirpation from genetic inbreeding, plague, human development, and stochastic events (Luce, 2006)

- The BTPD has declined greatly throughout its range to a level and distribution at which it can no longer serve its historical ecological function (Miller et al., 2007)

- 1,000 acres is the minimal size for a colony to meet multi-species needs (VanPelt, 1999; Luce et al., 2006)
    - Currently (as of 2012) TBNG contains 4 colonies that meet this criteria
    - All four colonies have burrowing owl/plover occurrences

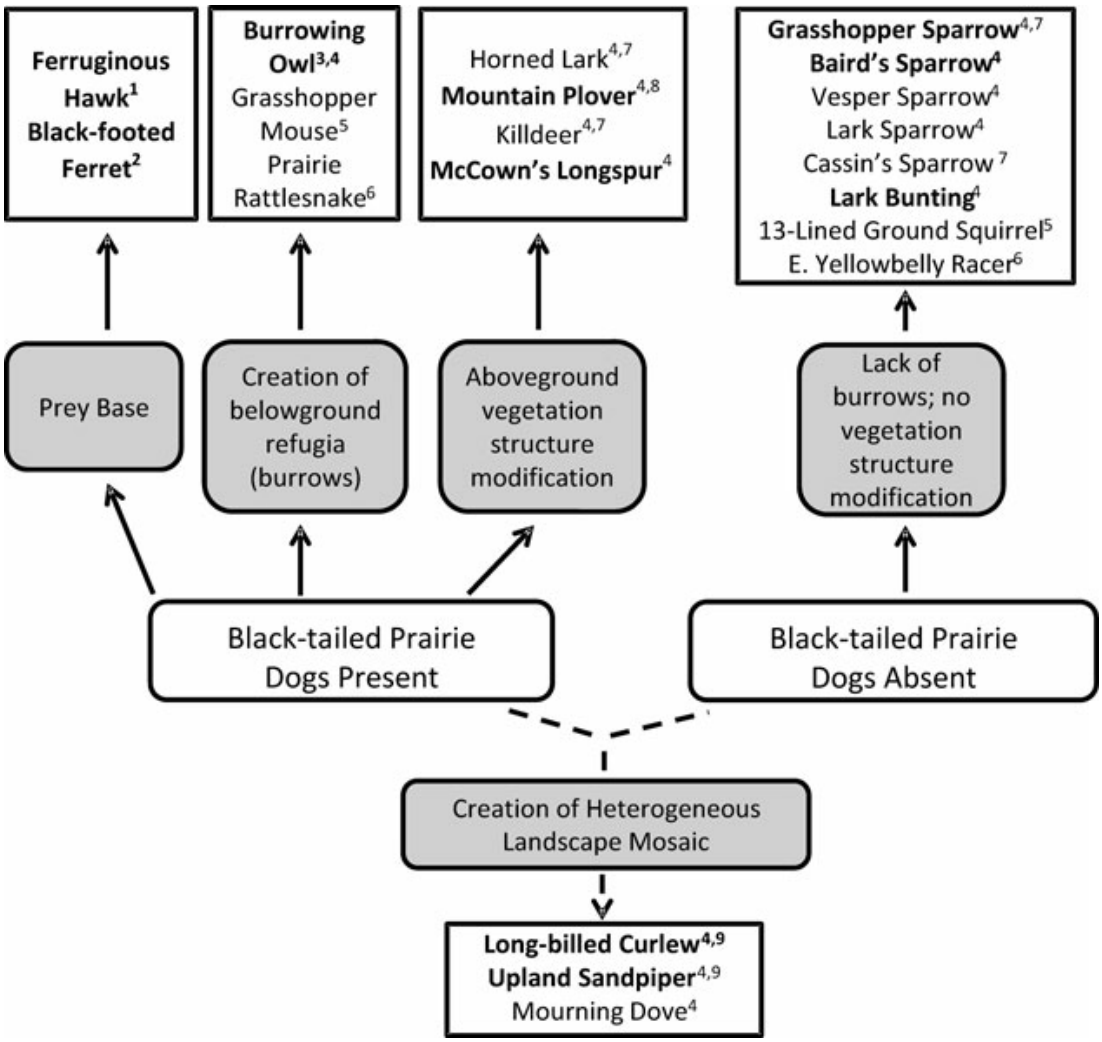
- It is possible to protect viable populations of prairie dogs without conserving sufficient numbers to maintain a viable population of black-footed ferrets (Miller et al., 2000)

- Constraining prairie dogs to low numbers in small widely distributed colonies may allow them to persist, but low densities and scattered distributions will preclude them from performing their ecosystem functions (Miller et al., 2007).

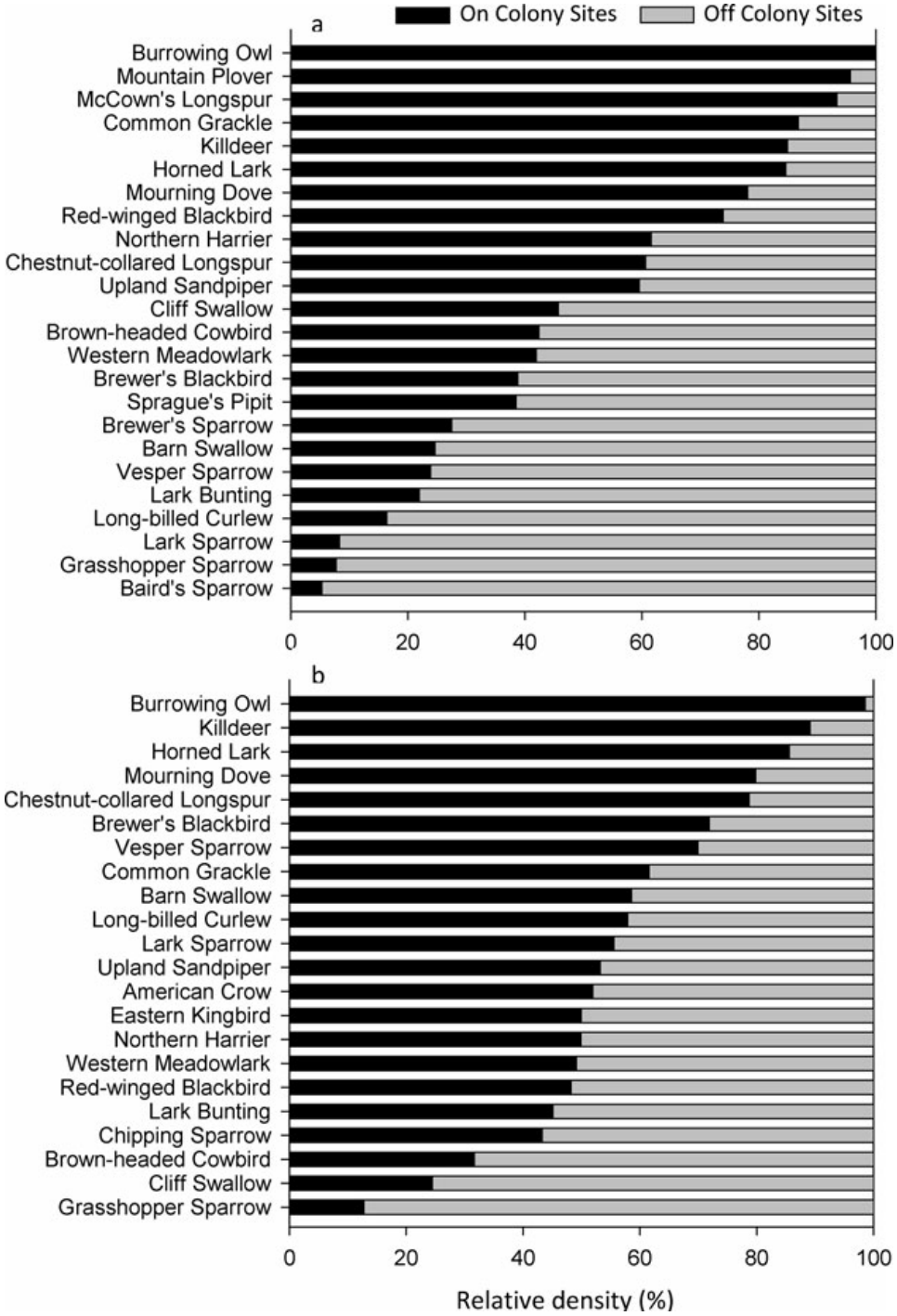
- Sasmal noted that habitat loss played a key role in the extirpation of swift fox populations and recommended maintenance of suitable habitat. She concluded that "*even a stable population can be threatened with extinction by an increase in mortality rate, which can be caused due to habitat loss, decrease in prey availability due to spread of disease like plague, or increased predation*". Finally, she recommended maintenance of connectivity with other neighboring populations to ensure genetic diversity maintenance (Sasmal, 2011)

- Swift fox population in shortgrass prairie of eastern Colorado was estimated at 7000 to 10000 with even more animals in mixed agricultural/prairie habitats (Pusateri 2002).

- Illustration of how black-tailed prairie dogs affect vertebrate species composition (Augustine and Baker, 2013)



- Comparison of relative bid density(%) on BTPD colonies versus off colony sites at (a) 3 western complexes in Wyoming and Montana and 4 (b) eastern complexes in South Dakota (Augustine and Baker, 2013).



Species of Greatest Conservation Need in Wyoming that are endemic to the grasslands of the Great Plains (Wyoming Game & Fish, 2005). *R2 Sensitive Species Bolded*.

Species	Native Species Status
Black-footed ferret	NSS1
Black-tailed prairie dog	NSS3
Hispid pocket mouse	NSS3
Olive-backed pocket mouse	NSS3
Plains harvest mouse	NSS3
Plains pocket mouse	NSS3
Prairie vole	NSS3
Ferruginous Hawk	NSS3
Long-billed Curlew	NSS3
White-tailed prairie dog	NSS4
Plains pocket gopher	NSS4
Swift fox	NSS4
Burrowing Owl	NSS4
Chestnut-collared Longspur	NSS4
Lark Bunting	NSS4
McCown's Longspur	NSS4
Mountain Plover	NSS4
Upland Sandpiper	NSS4
Bobolink	NSS4
Dickcissel	NSS4
Grasshopper Sparrow	NSS4
Short-eared Owl	NSS4

Risks to Prairie Dogs, Habitat, and Associated Species

- Habitat loss (USFWS, 2009)
    - Conversion of native prairie to cropland
    - Urbanization
    - Oil, gas, and mineral extraction
    - Habitat loss cause by loss of prairie dogs
    - Livestock grazing, fire suppression, and weeds
- Over-utilization for recreation purposes (shooting)

- Disease – sylvatic plague
    - Plague has crippled surviving prairie dog populations (Van Pelt, 1999)
    - Approximately 66% of the BTPD range has been affected by plague (Van Pelt, 1999)
    - Colony complexes with a history of recurring plague are typically composed of smaller colonies with greater intercolony distances (USFWS, 2009)
- Poisoning
    - Federal control programs may play a significant role in the continued decline of BTPD populations.
    - Risk of killing non-target species.
    - Poison has been the primary agent for controlling prairie dogs since the early 1900's (M. Delibes-Mateos et al., 2011)

Scientific Arguments for Prairie Dog Conservation

- 1.1% of the Great Plains managed by the US Forest Service is occupied by prairie dogs. Evidence suggests that there is little detriment to the livestock industry as a whole. It is scientifically and economically irresponsible to further reduce prairie dog populations on publicly owned lands because of competition with livestock (Miller et al., 2007).

- A 1.1% occupancy by prairie dogs on FS owned lands seems extremely modest (Miller et al., 2007).

- Conservation of keystone species, no matter how political the situation, would be far more cost-effective than trying to ensure the viability of each individual species that depends on them (M. Delibes-Mateos et al., 2011).

- Politics of the agricultural community only serve to minimize an important conservation issue. The prairie dog has declined greatly throughout its range to a level and distribution at which it can no longer serve its important historical ecological function (Miller et al., 2007).

- Setting goals for prairie dogs based on the real or perceived needs of domestic livestock means we favor an abundant exotic species at the expense of a declining native species (Miller et al., 2007).

- Prairie dogs helped drive the evolution of the grassland system over thousands of years. To label it as a pest is not ecologically sound (Miller et al., 2007).

Non-lethal Control of Prairie Dogs

- One week after pine tree visual barriers were put in place, there was no difference in use of experimental and distant control plosts. However by the third and fifth weeks of the experiment, there was a difference. Similarly us by prairie dogs was significantly less in adjacent exterior plots compared with distant exterior plots by the fifth week, suggesting that the presence of barriers had retarded colony expansion into adjacent native prairie (Franklin and Garrett 1989).

- Most physical barriers (82 percent) evaluated had damage, usually in numerous places and often covering a substantial area. Barriers were damaged in a variety of ways, but high winds were the most frequent cause (Witmer, Gionfriddo, Pipas 2008).

- Prairie dogs gained access to areas outside the physical barriers in several different ways, but animals digging under them was most prevalent (Witmer, Gionfriddo, Pipas 2008).

- Efforts to use vegetation as a visual barrier in addition to a nearby physical barrier did not prevent breaching by prairie dogs, but it may have reduced it (Witmer, Gionfriddo, Pipas 2008).

- Translocation shows considerable promise for restoring prairie dogs to areas decimated by plague or other factors, providing managers with a technique to re-establish inactive colonies or promote more rapid growth in remnant colonies. Growth of colony area and prairie dog populations was considerably greater on treatment colonies than on control colonies 1 year after translocation. Greater area growth on experimental control colonies versus nonexperimental colonies was possibly due to translocations near experimental colonies in 1997 and 1998 or possibly larger distances between nonexperimental colonies and source colonies (Bullum, Foresman, and Matchett 2005).

- Black-tailed prairie dogs responded to the combination of controlled burning and mechanical brush removal by disproportionately greater exploratory movements and burrowing in experimentally treated than in untreated control areas.

- There was ver little or no colony boundary expansion into control plots at any of the 3 study colonies in either year, even though there was a small increase in the number of burrows in control plot areas.

- Habitat manipulations can be used to encourage expansion of prairie dogs via broader scale application of controlled burning or mechanical brush removal around active colonies (Laux and Sweitzer 2006).

Plague

- Introduced diseases can indirectly affect community and ecosystem level processes through their modification of host species dynamics. Frequent epizootics that lessen the effects of prairie dogs on vegetation probably affect colony associated species and grassland food webs (Hartley, Detling, and Savage 2009).

- *Yersinia pestis* is a generalist found in >200 species of mammals (Biggins and Kosoy 2001).

- Plague may have originated on the Central Asiatic Plateau (Biggins and Kosoy 2001).

- More than 200 mammalian species in 73 genera are known to become infected with plague under natural circumstances (Biggins and Kosoy 2001).

- When populations are subjected to acute epizootics, potential consequences or evolutionary significance include selection by an epidemic for individuals that are genetically most resistant to the parasite; alteration by intense selective pressure of allelic frequencies of other loci that are linked genetically to loci affecting resistance; and possible reduction of a large population to a small number of survivors, causing a bottleneck effect with loss of genetic diversity. However to persist in an ecosystem, parasites should not eradicate populations of their hosts, and various evolutionary models predict coexistence (Biggins and Kosoy 2001).

- Plague is difficult to detect in rodents and fleas associated with prairie dog colonies unless samples are collected immediately after a prairie dog die-off (Thiagarajan, bai, Gage, and Cully 2008).

- 1) plague outbreaks exhibited high spatial and temporal variation, 2) the site of initiation of epizootic plague may have substantially influenced the subsequent inter-colony spread of plague, 3) the long-term effect of plague on individual colonies differed among sites because of how individuals and colonies were distributed, and 4) colony spatial characteristics were related to the probability of infection at all sites although the relative importance and direction of relationships varied among sites. Our findings suggest that conventional prairie dog conservation management strategies, including promoting large, highly connected colonies, may need to be altered in the presence of plague (Johnson, Cully, Collinge, Ray, Frey, and Sandercock 2010).

- The location of initial colony die-off may play an important role in epizootic spread. If initial die-off occurs in isolated colonies, infection may be slow to spread to neighboring colonies, whereas if die-off occurs near other colonies, the epizootic may spread rapidly (Johnson, Cully, Collinge, Ray, Frey, and Sandercock 2010).

- Colony area has been a consistent indicator of colony susceptibility to plague. Out results at Comanche and Kiowa-Rita Blanca are consistent with previous reports where larger colonies were more likely to be infected with plague (Johnson, Cully, Collinge, Ray, Frey, and Sandercock 2010).

- Nearest neighbor distance contributed to model fit at all study areas and that probability of infection increased as colonies were located closer together (Johnson, Cully, Collinge, Ray, Frey, and Sandercock 2010).

- The effects of colony proximity to low-lying dry creek drainages to contribute significantly to model fit of the probability of infection at any study area (Johnson, Cully, Collinge, Ray, Frey, and Sandercock 2010).

- Colony connectivity within a complex remains important to the meta-population structure and persistence of black-tailed prairie dogs, however, limiting the size and connectivity of colony complexes may allow managers to avoid widespread epizootics or to take action before an epizootic becomes widespread (Johnson, Cully, Collinge, Ray, Frey, and Sandercock 2010).

- Populations that endured plague were composed of fewer large colonies (>100 ha) than populations that were historically plague free. We suggest that these difference among sites in colony size and isolation may slow re-colonization after extirpation. At the same time, greater inter-colony distances may also reduce inter-colony transmission of pathogens. Reduced transmission among smaller and more distant colonies may ultimately enhance long-term prairie dog population persistence in areas where plague is present (Cully, Johnson, Collinge, and Ray 2010).

- At sites with a history of plague, maximum and mean colony sizes were smaller than at sites with no history of plague and at Thunder Basin 2001 (Cully, Johnson, Collinge, and Ray 2010).

- In general, colonies at plague sites were smaller and further apart than at plague-free sites, even after several years of post-plague colony growth (Cully, Johnson, Collinge, and Ray 2010).

- In the absence of visible plague, between 2001 and 2005, colonies grew at an average annual rage of 22 percent at Cimarron and 40 percent at Comanche. At Thunder Basin, from 2002 to 2004, colony area grew at 50 percent annually. If these rates could be sustained, following a plague epizootic that reduced colony area by 95 percent, it would require 15 years at Cimarron, 9 years at Comanche, and 7 years at Thunder Basin for

total colony area to be restored to the preepizootic area (Cully, Johnson, Collinge, and Ray 2010).

- At the scale of the National Grasslands, it is clear that plague limits black-tailed prairie dog population size (Cully, Johnson, Collinge, and Ray 2010).

- Plague is able to persist in prairie dog colonies for prolonged periods at low enzootic levels simply by moving sequentially between neighboring family groups and grasshopper mice, even at low frequencies, exacerbate plague spread throughout a prairie dog colony, causing large epizootics (Salkeld, Salathe, Stapp, and Jones 2010).

- Plague epizootics frequently kill >99 percent of prairie dogs in infected colonies (Cully, Williams 2001).

- Plague is not endemic to the new world, but entered the united states at several ports around 1900 and became established in commensal rodents in san Francisco in 1900 (Cully, Williams 2001).

- The first confirmed records of plague in black-tailed prairie dogs were from western Kansas in 1945 (Cully, Williams 2001).

- When individual black-tailed prairie dogs are infected with plague, the infection follows a pattern similar to that described for white-tailed and Gunnison's prairie dogs, with nearly 100% mortality (Cully, Williams 2001).

- Black-tailed and Gunnison's prairie dogs occur at densities up to 10 times as high as white-tailed prairie dogs and are more social. Thus they have many more opportunities to exchange fleas or directly transmit the infection (Cully, Williams 2001).

- Where plague is present, throughout most of the short-grass prairie, it is unlikely that prairie dogs will ever be able to attain their former abundance (Cully, Williams 2001).

Competition with Livestock

Prairie dogs are often viewed as pests by landowners, farmers, and managers due to the assumption that they can reach high densities locally. Thus, it is commonly believed that prairie dogs compete with livestock for forage and contribute to rangeland degradation (Delibes-Mateos et al., 2011; Vermeire et al., 2004; Hoogland, 2006; Slobodchikoff et al., 2009).

- First published mention of negative impacts to livestock from prairie dogs comes from a statement made by Merriam (1902) that prairie dogs ate 50% to 75% of forage that

could be utilized by livestock and concluded that 256 prairie dogs could eat as much forage as a single cow. However, no data was provided to support this statement (Delibes-Mateos et al., 2011).

- The dietary overlap between prairie dogs and cattle were studied by Hansen and Gold (1977) who concluded that overlap ranged from 42% in the winter to 69% in the summer. But, no indication was given on how this dietary overlap might affect weight gain in cattle (Delibes-Mateos et al., 2011).

- O'meilia et al. (1982) investigated the weight gain of cattle foraging in pastures both occupied by prairie dogs and pastures without prairie dogs and found no significant differences in weight gain or loss between the two pastures (Delibes-Mateos et al., 2011).

- Collins et al. (1984) looked at the net gain in forage for livestock achieved by poisoning prairie dogs with the cost of control in Conata Basin, South Dakota. The study concluded that control was economically unfeasible in that annual maintenance costs were greater than the annual value of the forage gained (Delibes-Mateos et al., 2011).

- Ureseck and Paulson (1988) suggested that if a 2,100 ha pasture was occupied by prairie dogs there could be a 3.2-10% reduction in the number of cattle that could be supported in that pasture (Delibes-Mateos et al., 2011).

- Derner et al. (2006) found that financial losses from decreased cattle weights might range from 5% in grazing areas where prairie dogs occupied 20% of the habitat, to 14% in grazing areas where prairie dogs occupied 60% of the habitat (Delibes-Mateos et al., 2011). Thus, this shows a decline in cattle weight with increased area occupied by prairie dogs, but only at a rate proportionately lower than the increasing percentage of pasture occupied by prairie dogs (Derner et al., 2006; Miller et al., 2007).

- Overlap in diets of cattle and prairie dogs of only 4-7% (Luce, 2006; Miller et al., 2007).

- Plant species diversity and livestock use of plant species was greater on than off prairie dog colonies (Uresk and Bjugstad, 1983).

- Competition between cattle and prairie dogs in a study in Oklahoma, had not statistical difference in weight gain between steers raised on and off prairie dog colonies (Miller et al., 2007).

- Uresk showed that grasses made up 87% of the diet of both BTPDs and cattle. The species of grasses consumed were also similar, however prairie dog preference of grasses was the opposite of cattle (Uresk, 1984,1986).

- Plant production where prairie dogs graze is 24% higher than cattle grazing only. Plant production on sites grazed by cattle and prairie dogs was 13% higher than cattle grazing alone (Uresk and Bjugstad, 1983).

- Prairie dogs can increase forage quality in and around their colonies, thus mitigating potential forage competition with livestock (Coppock et al. 1983).

- Existing data also suggests that BTPDs are more abundant in areas heavily grazed by cattle than in areas where cattle are excluded. Uresk found that burrow densities increased on cattle grazed sites at a rate 2 times higher than on prairie dog only sites (Uresk et al, 1981).

- Prairie dogs tend to colonize already degraded overgrazed habitat, rather than being the cause of degraded conditions (Knowles 1986a,b). Prairie dog densities appear to be affected by food resource distribution within their habitat. In relatively undisturbed grasslands, where food resources are more evenly distributed, prairie dog densities tend to be lower, whereas in overgrazed grasslands, prairie dog densities are higher (Travis et al. 1995). Prairie dog burrow densities more than double in areas where there are cattle grazing and prairie dog colonies (Uresk and Bjugstad, 1983).

- Higher prairie dog densities are more closely related to livestock grazing, especially when rangelands are heavily grazed (Uresk and Bjugstad, 1983).

- In mixed grass prairie, managing for long term climax stage vegetation by reducing livestock grazing, increases vegetation height and thus reduces the number of prairie dogs (Miller et al., 2007)

- Poisoning prairie dogs costs the taxpayers $19.40/AUM (Miller et al., 2007).

- Miller et al. (2007) described a study in which the removal of prairie dogs only increased forage by 51 kg/ha, rendering it uneconomical to poison prairie dogs for additional livestock forage, unless subsidized by the public sector.

- Coexistence of prairie dogs and large ungulates is possible, as millions of bison and elk lived for millennia with prairie dogs before domestic livestock was introduced to the Great Plains (Miller et al., 2007).

- Extensive poisoning or recreational shooting of prairie dogs reduces the local food supply for large predators like coyotes, which can in turn make predators more likely to attack domestic livestock. Does what a landowner's gain from shooting or poisoning prairie dogs outweigh losses from increased predation on livestock? (Reeve et al., 2006).

- While acknowledging that conditions vary across the range of prairie dogs in North America, several meta-analyses of these studies have concluded that, while poisoning prairie dogs may lead to additional forage for cattle, the resulting increase in body mass of cattle is rarely sufficient to offset the cost of poisoning (Detling 2006; Miller et al. 2007; Slobochikoff et al. 2009). Additional keystone species and ecosystem services benefits further skews the benefit/cost analysis against poisoning (Delibes-Mateos et al., 2011; Miller et al. 2007; Slobodchikoff et al. 2009).

Impacts/Results of methods used to control prairie-dogs

- Use of the prairie dog vacuum can result in losses of about 5% through direct mortality or injuries serious enough to require euthanasia, whereas live-trapping usually results in the loss of less that 1% of captured animals (David Seery, personal communication). However, live-trapping is time-consuming and labor-intensive. Although 80-85% of the animals can be captured with adequate effort, the remaining few animals can be very difficult to catch. Additionally, considerable effort must be expended to assure high survival rates of relocated animals (Truett et al. 2001) *in* Witmer and Fagerstone 2003.

- As with relocation approaches, the various lethal removal methods have advantages and disadvantages. For example, the efficacy and safety of the burrow torch has been questioned (Sullins and Sullivan 1992) and burning, like drowning, are not considered acceptable forms of euthanasia (American Veterinary Medical Association 2001) *in* Witmer and Fagerstone 2003.

- Zinc phosphide is highly toxic to both mammals and some birds. At least 61 acute oral toxicity studies, representing 28 species of mammals and 16 species of birds, have been conducted on zinc phosphide. It is 2-15 times more toxic to rodents that to carnivores (Witmer and Fagerstone, 2003).

- Field studies examining the effects of zinc phosphide on nontarget wildlife have generally found no significant effects, but zinc phosphide applications have occasionally killed non-target wildlife such as rabbits, seed-eating birds, gallinaceous birds, and waterfowl (Johnson and Fagerstone 1994).

- Most of these incidents have involved misuse of zinc phosphide (e.g., application at rates and concentrations that were much higher than label recommendation). To reduce primary hazards to non-targets, it is especially important to quickly clean up any spilled treated grain. (Witmer and Fagerstone 2003).

- There was no difference in the number of horned larks between treatment and control sites four days after application (September 1983) of zinc phosphide. No differences were found in relative densities between treated and control sites in June and July of 1984, The relative densities of horned larks in August 1984 were 93% higher (44/10ha) on control sites than on treated sites… Indirect impacts on horned larks resulted from habitat changes….After the 1983 treatment of prairie dog colonies in the fall, horned larks nested on what appeared to be potential optimum habitat in spring 1984….As summer progressed, prairie dogs were not available on treated sites to graze the spring growth….Plant biomass increased and provided suitable habitat for Western meadowlark, lark bunting, and chestnut-collared longspur…(Apa et al. 1991).

- Active prairie dog burrows were reduced 95% with zinc phosphide, 83% with strychnine (pre-baited), and 45% with strychnine without pre-bait (Uresk et al. 1986).

- Mortality of nontarget small mammals was determined after application of three black-tailed prairie dog *(Cynomys Zudovicianus)* rodenticide treatments (prebaited zinc phosphide, prebaited strychnine, and strychnine alone) in western South Dakota. Immediate (September 1983) and long-term (September 1983 through August 1984) impacts on deer mouse *(Peromyscus maniculatus)* relative densities were evaluated, and the three rodenticide treatments were compared for efficacy. The three treatments had no significant ($a < 0.1$*)* immediate impacts on deer mouse relative densities, although zinc phosphide did lower them; that impact was not, however, long term (Deisch et al. 1990).

- Acute oral LD50s to the kit fox *(Vulpes macrotis)* were determined to be 0.22 mg kg (for compound 1080 (sodium monofluoroacetate), 0.75 mg/kg for strychnine alkaloid, and 93 mg/kg for zinc phosphide. One fox each died within hours when fed a kangaroo rat *(Dipodomys* sp.) killed by 0.74 mg of 1080 or 12.8 mg of strychnine, amounts one rat might consume in field baiting programs. However, foxes survived repeated feedings of kangaroo rats each killed by 480 mg of zinc phosphide, equivalent to 3 times the LD50 for a fox and some 29 times the amount one rat might consume in bait (Schitoskey 1975).

- Two of three great-horned owls and the single saw-whet owl fed diphacinone (Kaput-D) killed mice died within 14 days of the feeding trial. Owls were fed 2 diphacinone laced mice/day for 5 days (Mendenhall and Pank 1980).

- Zinc phosphide use to reduce black-tailed prairie dogs immediately reduced ant densities, reduced non-significantly cricket densities but did not reduce spider mite, wolf spider, ground beetle, darkling beetle, or dung beetle densities (Deisch et al. 1989).

- Rozol does not lose its effectiveness when wet – it outlasts zinc phosphide and can be used under diverse weather conditions (Liphatech 2006). Highly palatable food grade winter wheat is a preferred food source for field rodents and provides excellent acceptance. No bait shyness or sub-lethal dose problems such as occurs with zinc phosphide. Rozol LD50 to birds is 20 to 2000x less than for zinc phosphide.

- Zinc phosphide in agricultural fields will likely kill nontarget birds and mammals. Zinc phosphide is a very toxic substance and will kill most animals to which it is administered. Rodents are more sensitive than carnivores. Gallinaceous birds (pheasants, turkeys, other large terrestrial birds) are more sensitive than other avian species, however, some passerines (songbirds) are also sensitive. The Agency also concludes that predators or scavengers who eat a target animal that has been killed by zinc phosphide will not die, however, they may become ill, listless, and regurgitate (EPA 1998).

- Two black-tailed prairie dog colonies treated completely with zinc phosphide resulted in 95% control (Knowles 1986). Perimeter control colonies had 65% and 83% reduction. Three to 5 years post treatment were needed to obtain pretreatment numbers in the colonies completely treated. Two years were needed to approach pretreatment numbers in the perimeter treatment colonies. An average of 12% of prairie dogs died above ground and 7 of 67 were scavenged within 48 hours after poison application (Knowles 1986).

- A bald eagle was poisoned in 2006 in Nebraska after eating prairie dogs that had eaten Rozol (USFWS 2011).

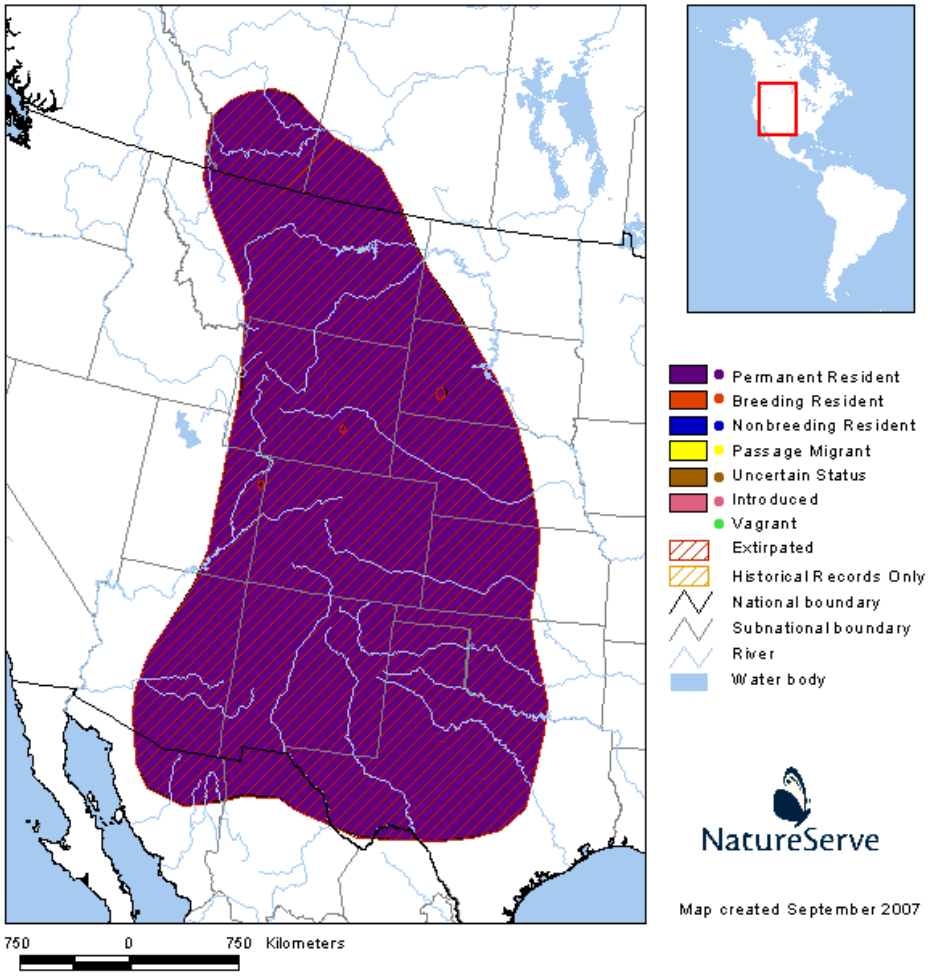
- *In Golden and Gober 2010*: Unlike many other burrowing mammals, the prairie dog relies on an open burrow system that results that results in a significant amount of time spent above ground, rendering them more easily accessible to predatory species. The risk to secondary consumers from anticoagulants (chlorophacinone and diphacinone) is higher than from historical choices for prairie dog control such as zinc phosphide due to their ability to persist in tissue of target organisms. Both Rozol and Kaput-D are classified as first-0generation anticoagulants, which are less acutely toxic than second-generation…and generally require multiple feedings to kill target organisms. Because there is a delay between exposure and death that generally lasts 5-10 days, primary consumers may continue to feed on available bait and accumulate large loads of anticoagulants that exceed the lethal threshold by the time of death. In one case, over 50 dead, dying, and scavenged prairie dogs were found on 1 160-acre treated site two weeks after treatment. An additional 400-500 prairie dogs were retrieved above ground 4 weeks after application. Significant mortality occurred in domestic ferrets (as a

surrogate for black-footed ferrets) consuming prairie dogs fed bait containing 0.0025% Rozol, half the concentration of the currently registered product. Mortalities have been reported in badgers and a bald eagle.

- The average effective bait life (zinc phosphide) of material exposed to dry soil is in excess of 100 days, whereas when bait is exposed to wet soil the value is around 20 days (Queensland 2013).

INFORMATION AND DATA FOR BLACK-FOOTED FERRET

Historical Range of the Black-footed Ferret from NatureServe website



- As a part of the Northern Great Plains Land Management Plan revision process, the FS designated ferret reintroduction sites (in addition to Conata Basin) on the Buffalo Gap, Little Missouri, and Thunder Basin National Grassland.

- In a letter signed May 8, 2007, the Regional Forester for Region 2 committed the FS to providing habitat for future ferret reintroductions, and also said "…Forest Service to continue to be a leader in the national recover effort."

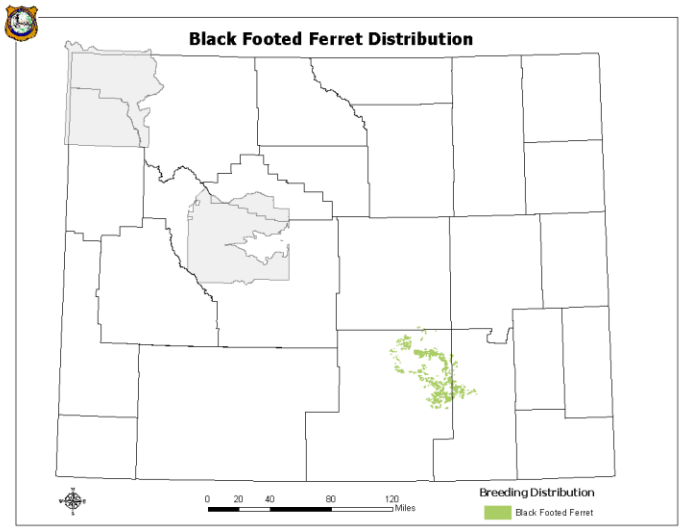
- Need approximately 10,621 acres of prairie dogs at moderate density to support ferrets (Jachowski et al., 2011) .
    - Moderate = 12.14 burrows/acres -32.38 burrows/acre
    - Thunder Basin currently has:
        - 15,508 acres in Category 1/MA 3.63
        - 33 burrows per acres *****
          ******This estimate is based on post emergence of young and thus likely overestimates burrow density.*

- In a letter dated March 16, 2007, the USFWS says the following: "Perhaps no other agency or identity can contribute to more assured and rapid recovery of the ferret than the Forest Service. Ferret recovery cannot be achieved on National Grasslands alone, but likewise, the establishment of adequate numbers of ferret populations across the historical range of the species may not be possible without concerted support by the forest Service and expansion of field recovery efforts across more of the Forest Service's vast western holdings. Even with more focused Forest Service management and development of additional sites for prairie wildlife, the amount of managed land actually required to meet these needs would represent a small percentage of the almost 4 million acres of National Grasslands."

- The ability of a site to maintain a self-sustaining ferret population is partly influenced by the size, availability, and density of high-density patches of prairie dogs. This supposition is supported by the greater connectivity of high-density parches and percent of area in mid to high-density patches at Conata Basin where ferret reintroduction has resulted in a self-sustaining population (Jachowski, Biggins, Livieri, Matchett 2008).

- In Wyoming
    - The WGFD classifies the black-footed ferret as a Native Species of Special Concern – NSS1 because populations are greatly restricted in numbers and distribution, extirpation appears possible and there is on-going significant loss of habitat. The U.S. Fish and Wildlife Service (FWS) designated this species as Endangered under the ESA (Wyoming Game and Fish, 2005).

- The black-footed ferret once occurred throughout the grasslands and basins of interior North America, from southern Canada to Texas. Only two reintroduced populations have been established and no longer require releases of captive-raised ferrets—one in western South Dakota and one in southeastern Wyoming (According to USFWS, 2006 this number has increased to three sites. Refer below.) Although there are historical records of black-footed ferrets from nearly all sagebrush and grassland habitats in Wyoming, the only population currently known in the state occurs in the Shirley Basin area near Medicine Bow (Wyoming Game & Fish, 2005).



- The black-footed ferret is found almost exclusively in prairie dog colonies in basin-prairie shrub lands, sagebrush-grasslands, and grasslands. It is dependent on prairie dogs for food and all essential aspects of its habitat. It spends a large portion of its time in prairie dog burrows (Wyoming Game & Fish, 2005).

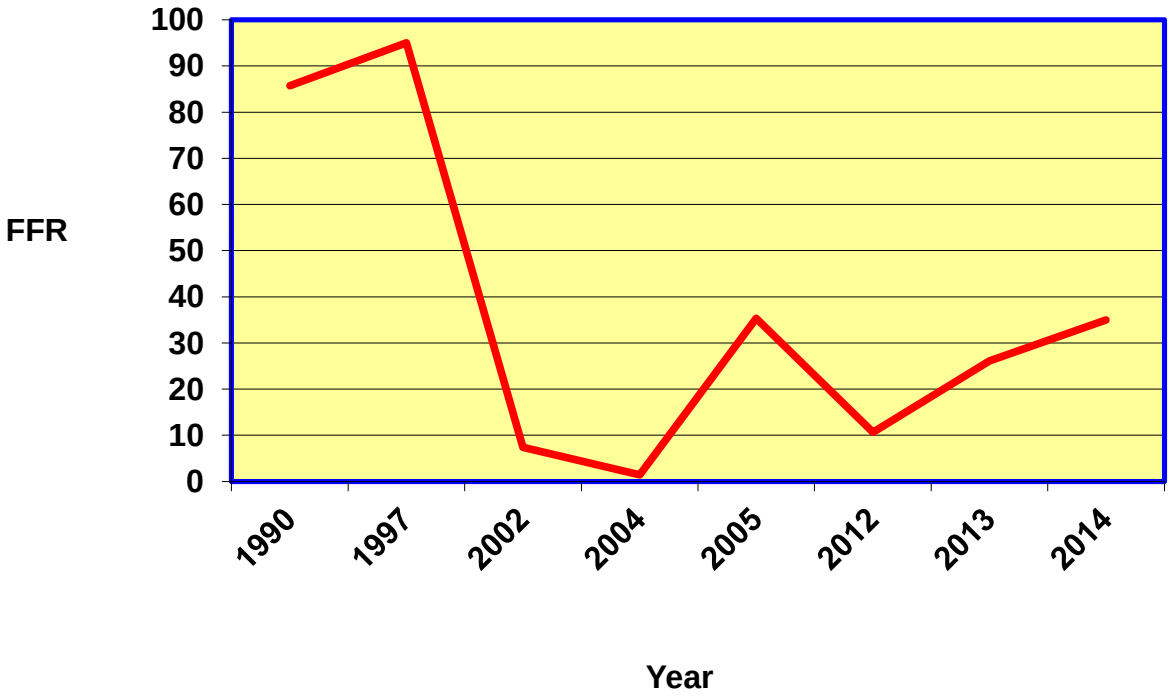
Problems:

- Control efforts of prairie dogs by humans directly coincided with the demise of the black-footed ferret.
- Epizootics of sylvatic plague and canine distemper hamper and minimize the potential for successful reintroduction under current management paradigms.
- Successful reintroduction efforts are limited by the availability of captive-raised ferrets; inadequate funding; and protocol that is cumbersome, cost-ineffective, and out-of-date.
- Funding has been inadequate to annually monitor the ferret population and habitat in the Shirley Basin/Medicine Bow Black-footed Ferret Management Area.

- Prairie dog control efforts and the needs of many livestock producers limit the number of potential reintroduction sites for black-footed ferrets. Recent petitions to list prairie dogs under the Endangered Species Act caused localized increases in control efforts and disabled cooperative programs with some private landowners (Wyoming Game & Fish, 2005).

TBNG

Ferret family ratings are used to determine approximately how many ferrets a prairie dog complex can support over times. Occupied acres and burrow density data are used in the formula to determine a FFR. A ferret family is defined by Biggins (1993) as the number of ferret families a prairie dog complex can support for one year (1 female, 3.3 young and 0.5 male).



Black-footed Ferret Recovery Plan (USFWS, 2006)

Current Species Status: The black-footed ferret was listed as endangered in 1967 under early endangered species legislation and "grandfathered" into the Endangered Species Act of 1973 (ESA). Critical habitat was not designated for the species; in fact, critical habitat designation for the species was precluded per ESA. Historically, the species occupied an estimated 100 million acres of intermountain and prairie grasslands in Arizona, Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah, Wyoming, and small portions of southern Canada and northern Mexico. However, by 1987, no wild ferrets remained. Seven of the ferrets trapped from the last wild population in Meeteetse, Wyoming

were successfully bred in captivity. The extant population today descends from these seven "founder" animals. In 2006, at least 647 ferrets existed in the wild at 11 reintroduction sites in Arizona, Colorado, Montana, South Dakota, Utah, Wyoming, and Mexico. An additional 290 animals are housed in captive breeding facilities. Three of the reintroduction sites (Shirley Basin, Wyoming, Conata Basin, South Dakota and Cheyenne River Reservation, South Dakota) are considered self-sustaining at present (2006).

Habitat Requirements and Limiting Factors: The black-footed ferret depends on prairie dogs (*Cynomys spp.*) for food and on prairie dog burrows for shelter. The historical range of the ferret coincided with ranges of the black-tailed prairie dog (*C. ludovicianus*), Gunnison's prairie dog (*C. gunnisoni*) and white-tailed prairie dog (*C. leucurus*). The ferret's close association with prairie dogs was an important factor in the ferret's decline. From the late 1800s to approximately 1960, both prairie dog occupied habitat and prairie dog numbers were dramatically reduced by the effects of habitat loss caused by conversion of prairie to cropland, habitat curtailment from poisoning, and habitat modification due to plague. The ferret population declined precipitously as a result.

Recovery Objective: The objective of the actions proposed by this recovery plan is to recover the black-footed ferret to the point where downlisting, and eventually delisting, are possible.

Recovery Priority Number: The recovery priority number for the black-footed ferret is 2 on a scale of 1-18, with 1 equaling the highest priority. This indicates that the ferret faces a high degree of threat and a high potential for recovery. The ranking also indicates the ferret's taxonomic status as a full species.

Recovery Criteria: To reclassify the black-footed ferret from endangered to threatened status, recovery criteria were established in the 1988 Black-footed Ferret Recovery Plan. These downlisting criteria have been retained in this recovery plan revision as follows:

- maintain a core breeding population of a minimum of 240 adults (90 males, 150 females);
- establish a prebreeding census population of 1,500 free-ranging black-footed ferret breeding adults in 10 or more populations with no fewer than 30 breeding adults in any population; and
- encourage the widest possible distribution of reintroduced black-footed ferret populations.

Delisting may occur when the following additional recovery criteria are met:

- establish a prebreeding census population of 3,000 free-ranging black-footed ferret breeding adults in 30 or more populations with no fewer than 30 breeding adults in any population and at least 10 populations with 100 or more breeding adults; and
- allocate black-footed ferrets in a manner proportional to their original distribution across the ranges of the relevant prairie dog species (approximately 60 percent within

the range of the black-tailed prairie dog, and 20 percent each across the ranges of the Gunnison's and white-tailed prairie dog), and with corresponding equity among the 12 states where the ferret once occurred.

Actions Needed: We believe that the single, most feasible action that would be most beneficial for recovery of the black-footed ferret would be to improve proactive management actions regarding prairie dog conservation. If an effort were undertaken to proactively manage certain areas of prairie dog habitat for ferret recovery, all other threats to the species could be addressed. Factors such as habitat loss, disease and poisoning could be addressed through active management. Several states within the historical range of the species do not manage prairie dogs so as to allow for ferret recovery. Many of these same states have significant disease-free areas and would consequently be particularly valuable to ferret recovery. We recommend that the following actions be taken.

1. Maintain a captive ferret population of optimal size and structure to support genetic management and reintroduction efforts.
2. Complete the search for remnant wild ferret populations to support genetic management and reintroduction efforts. [This task is no longer a high priority.]
3. Reduce disease-related threats in wild populations of ferrets and associated species.
4. Ensure sufficient habitat to support a wide distribution of self-sustaining ferret populations.
5. Establish free-ranging populations of ferrets to meet downlisting and delisting goals.
6. Promote partner involvement and adaptive management through regular programmatic review and outreach.

INFORMATION AND DATA FOR MOUNTAIN PLOVER

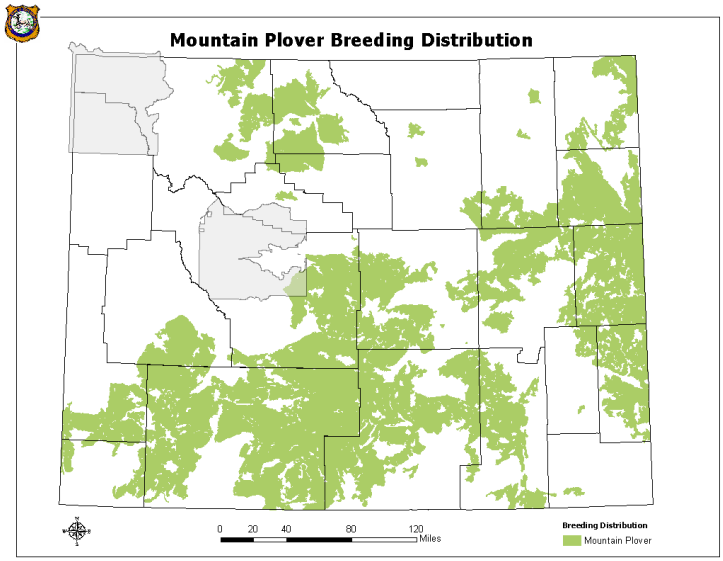
Listing History

- 1999 – Proposal to list mountain plover
- 2003 - Withdrew listing proposal
- 2010 – Reinstated 2002 proposed rule
- 2011 – Withdrew mountain plover as threatened or endangered

In Wyoming

The WGFD classifies the Mountain Plover as a Native Species of Special Concern – NSS4 because population status and trends are unknown but are suspected to be stable, and habitat is vulnerable but there is no on-going significant loss. This species is also sensitive to human disturbance. The North American Breeding Bird Survey (BBS) did not detect a trend for mountain plovers in Wyoming from 1966 – 2002. However, these data are considered uncertain because the BBS does not effectively monitor species, such as the Mountain Plover that occur at low densities and because BBS estimates are much less accurate at fine geographic scales (Wyoming Game & Fish, 2005).

The Mountain Plover nests locally in the western Great Plains from Montana south to New Mexico, in Utah, and in Mexico. It winters in a broad band from Texas west and north to the Central Valley of California. It occurs throughout most of Wyoming and has been documented in all of Wyoming's 28 latilongs, with confirmed or probable breeding in 20 latilongs (Wyoming Game & Fish, 2005).



Plumb (2004) estimated the statewide population to be approximately 3400 adults (range 2270 to 4430). Within the occupied range in Wyoming, Plumb (2004) estimated Mountain Plover density at 4.47 ± 0.55 birds km^2 (Wyoming Game & Fish, 2005).

The Mountain Plover inhabits low, open habitats, such as arid shortgrass and mixed-grass prairies dominated by blue grama and buffalograss, with scattered clumps of cacti and forbs and saltbush habitats of the shrub-steppe of central and western Wyoming. It prefers to nest in large, flat grassland expanses with sparse, short vegetation (10 cm [4 in] or less) and bare ground . It is adapted to areas that have been disturbed by prairie dogs, heavy grazing or fire (Wyoming Game & Fish, 2005).

Problems:

- Population trends are not well documented, but the species winters in areas (such as southern California) that have experienced intensive conversion of native grasslands to cropland and urbanization.
- A narrow range of habitat requirements combined with a high degree of site fidelity increases its vulnerability to impacts at traditional breeding sites.
- Important breeding areas for the Mountain Plover in Wyoming are only partially identified, so management efforts and habitat maintenance may not be adequate (Wyoming Game & Fish, 2005).

In Region 2

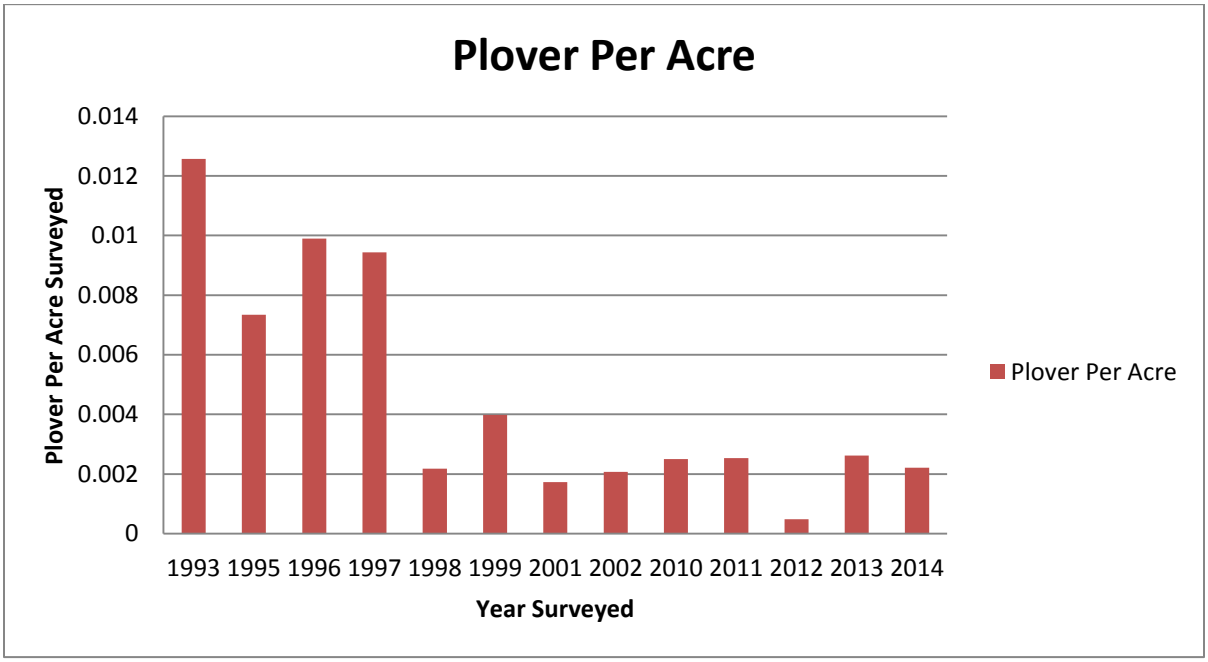
The mountain plover has suffered from a long term reduction in both numbers and distribution within Region 2. Their present distribution appears to be stable in Region 2, although recent and sharp declines are suspected in key nesting areas and may indicate their distribution is declining. Mountain plovers in Region 2 suffer from multiple threats that jeopardize their long-term persistence (Dinsmore, 2003).

Mountain plovers selectively nest on active prairie dog colonies, particularly those of BTPDs. Mountain plovers have declined during the last century, mainly as a result of threats to their breeding grounds. Continued losses of prairie dogs resulting from disease, poisoning, or recreational shooting should be viewed as direct threats. Activities that increase the distribution of prairie dogs will also increase the abundance and distribution of mountain plover (Dinsmore, 2003).

Plover Viability

According to Augustine and Baker (2013): "Density estimates of rare bird species, particularly those of conservation concern, may provide guidance on the area of prairie dog colonies needed to support desired minimum population level." Their estimates were 2.4 birds/km^2 on colony sites in Wyoming and Montana. They estimate that a BTPD complex may need 5,145-20,582 acres to support 100 Mountain Plovers (Augustine and Baker, 2013).

On TBNG



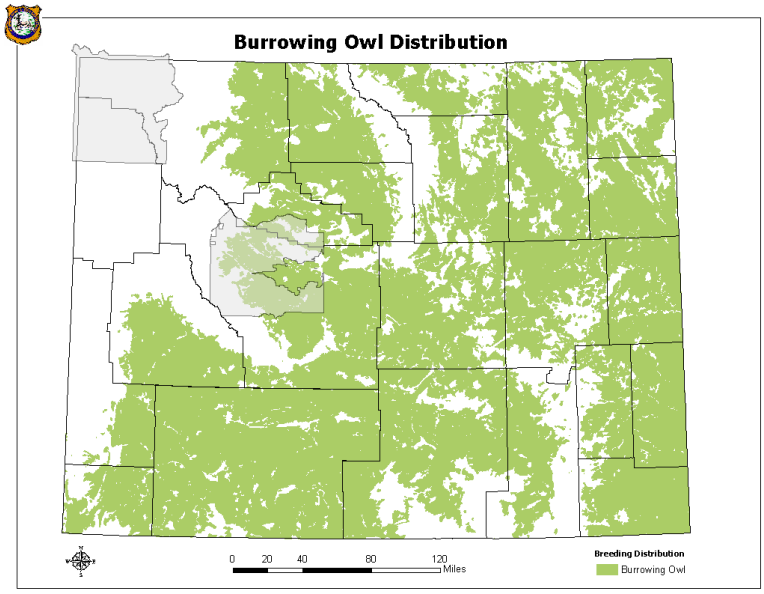
*Note: More information pertaining to the current graph can be obtained in the annual Thunder Basin Prairie Dog Management Report.

INFORMATION AND DATA FOR BURROWING OWL

In Wyoming

The WGFD classifies the Burrowing Owl as a Native Species of Special Concern – NSS4 because the species is widely distributed, population status and trends are unknown but are suspected to be stable and habitat is vulnerable but there is no on-going significant loss. The species is also sensitive to human disturbance. The BBS detected significant negative declines in Wyoming during 1966 – 2002 (Trend –19.66, P = 0.065, n = 11; Sauer et al. 2003). However, these data are considered uncertain because the BBS does not effectively monitor species, such as the Burrowing Owl, that occur at low densities, and because BBS estimates are much less accurate at fine geographic scales (Wyoming Game & Fish, 2005).

During summer, the western subspecies of the Burrowing Owl inhabits southern British Columbia to southern Manitoba and south through most of the western US to central Mexico (Haug et al. 1993). It winters from California to Texas south through most of Central America. In Wyoming, the highest concentrations of Burrowing Owls are in the south and east, although it occurs throughout most of the state. It has been documented in all of the state's 28 latilongs, with confirmed or probable breeding in 24 latilongs (Wyoming Game & Fish, 2005).



The Burrowing Owl is considered an uncommon summer resident in Wyoming. The Burrowing Owl uses a wide variety of arid and semiarid environments with well-drained, level to gently sloping areas characterized by sparse vegetation and bare ground. It prefers open prairie, grassland, desert and shrub-steppe habitats, and it may also inhabit agricultural areas. It

depends on mammals, particularly prairie dogs and ground squirrels that dig burrows, which it uses for nesting, roosting, and escape (Wyoming Game & Fish, 2005).

Problems:

- The Burrowing Owl is impacted by the elimination of burrowing mammals through pest control programs and habitat loss.
- Sylvatic plague outbreaks in prairie dog populations have reduced available burrowing owl habitat in Wyoming.
- The Burrowing Owl is impacted by the loss of habitat to urbanization and conversion of native grasslands to croplands or to taller, nonnative grasslands (Wyoming Game & Fish, 2005).

In Region 2

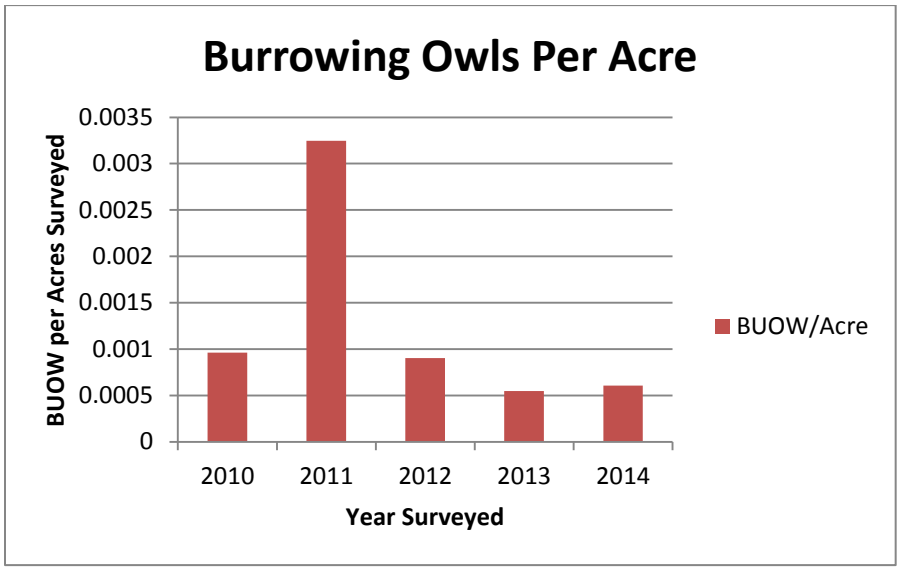
Western burrowing owl is declining over much of its range. The fate of burrowing owls at the regional scale is largely tied to that of prairie dogs. Region 2 lies roughly at the center of the burrowing owl's range, and conservation of the species in Region 2 appears integral to overall species conservation. Burrowing owl populations have declined in Region 2, and these declines are closely linked to declines in prairie dogs (McDonald, et al., 2004).

Habitat loss and degradation is identified as the single most important threat to persistence. Much of the decline in the range and abundance of burrowing owls is linked to the decline of prairie dogs in Region 2. Any discussion of threats to burrowing owls must be linked to threats and persistence of prairie dogs (McDonald et al., 2004).

Extensive burrow availability is critical to the persistence of burrowing owls. Livestock grazing and large-scale control and eradication efforts for prairie dogs have historically reduced the availability of habitats with suitable vegetation height and burrow density. Poisoning and shooting of prairie dogs has been encouraged on private lands, in some cases mandated, and encouraged and supported on public lands. Well-connected and large prairie dog colonies should be maintained in historical prairie dog and burrowing owl habitats (McDonald et al., 2004).

Burrowing Owl Viability on TBNG:

In the case of TBNG where only 16%-78% of prairie dog colonies are occupied by burrowing owls and assuming each burrowing owl pair requires a prairie dog colony of 83 acres, at least 2,075 acres of occupied BTPD habitat would be required to support short-term viability and 20,075 acres would be for long-term viability (Lantz, 2005).



*Note: More information pertaining to the current graph can be obtained in the annual Thunder Basin Prairie Dog Management Report.

INFORMATION AND DATA FOR SWIFT FOX

Listing History

- 1995 – Listed as Candidate
- 2001 – Removed from Candidate listing

Nationally

- "*In general, swift foxes are short-lived carnivores with relatively high reproductive potential….At any given point in time, the majority of swift foxes present in a population are likely to be under three years old…The relatively high reproductive rates of swift foxes are necessary to balance out low survival rates, especially of juveniles*." In a review of several studies, adult survivorship ranged from 0.40 to 0.75 and juvenile survivorship ranged from 0.05 to 0.33….The authors used a median of the mean survival rate of 57.5% for adults acquired from several studies (Fitzgerald 1997, Kitchen et al. 1999, Olson and Lindzey 2002). The authors developed a lifecycle population graph in which they concluded that survival rates, especially juvenile survival rates, were most important to population viability…They concluded that swift fox populations were vulnerable to random events that affected adult survival (Stephens and Anderson, 2005).

- Swift fox density has been reported to be 0.07 to 0.11, 0.19 and 0.18 to 0.30 foxes/km^2 (Harrison et al. 2002, Fitzgerald 1997, Schauster et al. 2002).

- Coyotes are generally regarded as the primary cause of swift fox mortality... Historically, human activities presented the greatest threat to swift fox since they are easily trapped, shot, or poisoned in control efforts directed toward rodents or other carnivores…."*Poisoning has probably been the most deleterious influence upon swift fox populations in the Great Plains (Scott-Brown et al. 1987).* In other areas, conversion of habitat to agricultural production has been a significant contributor to decreasing swift fox distribution.

- Using data collected between 2001 and 2006, the species' current distribution is estimated to be about 44% of its historical range in the United States and 3% in Canada (Sovada et al, 2009).

- Population viability analysis for swift foxes has not been completed, and therefore the current

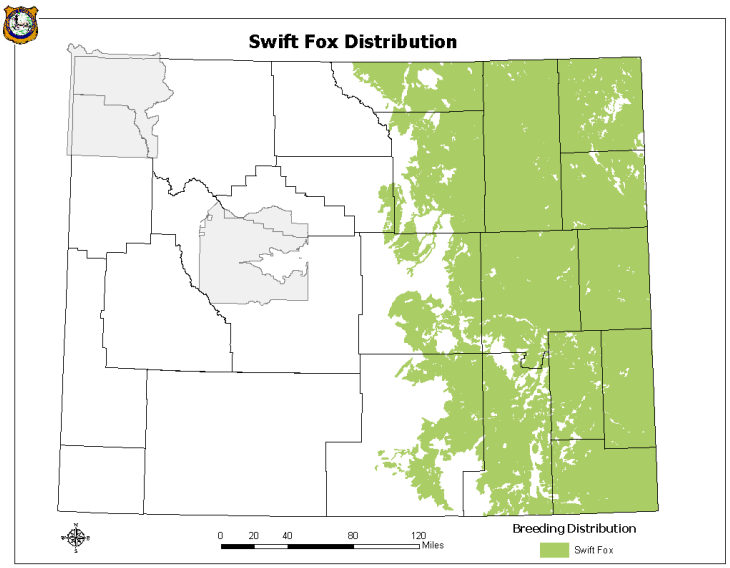
- long-term recovery goal (Section 2.2) is based on the COSEWIC (Committee on the status of endangered wildlife in Canada) (2004) quantitative status assessment criteria for a designation of Threatened status….By 2027, restore a self-sustaining swift fox population of 1,000 or more mature, reproducing foxes that does not experience greater than a 30% population reduction in any 10-year period (Pruss et al., 2008).

- Following several discussions at SFCT (swift fox conservation team) meetings, the team has concluded that it is not appropriate to use population viability analyses (PVA), because the large amount of data necessary for precise estimates is not available (Dowd Stukel, 2011).

In Wyoming

The WGFD classifies the swift fox as a Native Species of Special Concern – NSS3 because population trends are not known and the habitat is vulnerable. The species was petitioned for listing under the ESA in 1993. As a result of additional information and conservation measures implemented by the Department and the Swift Fox Conservation Team (SFCT), the USFWS determined that the species was not-warranted for listing and removed the species from the Candidate List in 2002. When the swift fox was petitioned for listing under the ESA , the ten state wildlife management agencies within the range of the swift fox formed the SFCT in 1994 (Wyoming Game & Fish, 2005).

Historically the swift fox inhabited southern Saskatchewan and Alberta south across Montana and the Dakotas through the Great Plains states to northwestern Texas and eastern New Mexico. It is now extirpated or uncommon in some parts of that range. In Wyoming, swift fox are native to the grassland prairies and they primarily occur east of the continental divide. Swift fox have been documented in 16 of the state's 28 latilongs, with confirmed or probable breeding in 13 latilongs (Wyoming Game & Fish, 2005).



The swift fox is considered common in Wyoming. While conducting spotlighting surveys in Shirley Basin in 1997, 2000, 2001, 2003, and 2004, swift fox detectability on survey routes varied between 64.3 - 84%. The data were collected while conducting spotlight surveys for black-footed ferrets and swift fox. The analysis was performed by only evaluating transects where swift fox were detected at least once between 1997 and 2004 (Wyoming Game & Fish, 2005).

The swift fox primarily inhabits shortgrass and mixed-grass prairies, although it often uses highway and railroad right-of-ways, agricultural areas, and sagebrush-grasslands. It is closely associated with prairie dog colonies and uses underground dens year-round. It selects habitat with low-growing vegetation, relatively flat terrain, friable soils, and high availability of den sites (Wyoming Game & Fish, 2005).

Problems:

- Human related activities in the early 1800s through the mid 1900s contributed to recent restricted distribution and abundance throughout the range of the swift fox. Some of these activities include the loss of native prairie habitat, predator control campaigns, unregulated trapping and hunting, and rodent control programs.
- Swift fox are highly vulnerable to trapping, poisoning, and highway mortalities.
- Population trends and distribution are poorly known in Wyoming.
- Numerous studies have documented coyote predation as the main source of swift fox mortality. More information is needed on the impacts of interspecific competition between swift fox and larger canids (coyotes and red fox) (Wyoming Game & Fish, 2005).

Reported estimates of swift fox home range size vary from 3.7 to 16.6 km^2 in Wyoming based on different home range estimation methods (in Olson 2000 and Pechacek et al. 2000).

In Wyoming their distribution has changed little (Lindberg 1986). Woolley *et al.* (1995) found swift foxes in eight Wyoming counties, as far north as the Powder River Basin and as far west as the Red Desert in Sweetwater County (Madson 2001). Survey efforts in Wyoming were increased in 1995 after the swift fox was proposed for the endangered species list, and the Wyoming Game and Fish Department found that swift foxes were much more widely distributed than had been previously thought (Madsdon 2001). While it appears that the swift fox is expanding its range in Wyoming and increasing in number, Game and Fish officials still believe the population is relatively small (Dark-Smiley and Keinath,2003)

In Wyoming, home-ranges (x $\pm$ SE, n=10) averaged 11.7$\pm$1.3 and 7.7$\pm$1.1 km2 using the 95% adaptive kernel method and the 100% minimum convex polygon, respectively (Pechacek *et al*. 2000). Home-range overlap of paired foxes was significantly greater than range overlap of unpaired animals, and paired foxes shared more than 70% of their dens (Pechacek *et al*. 2000). 75% of one foxes total number of dens, were located within that individual's core area (Pechacek *et al*. 2000).

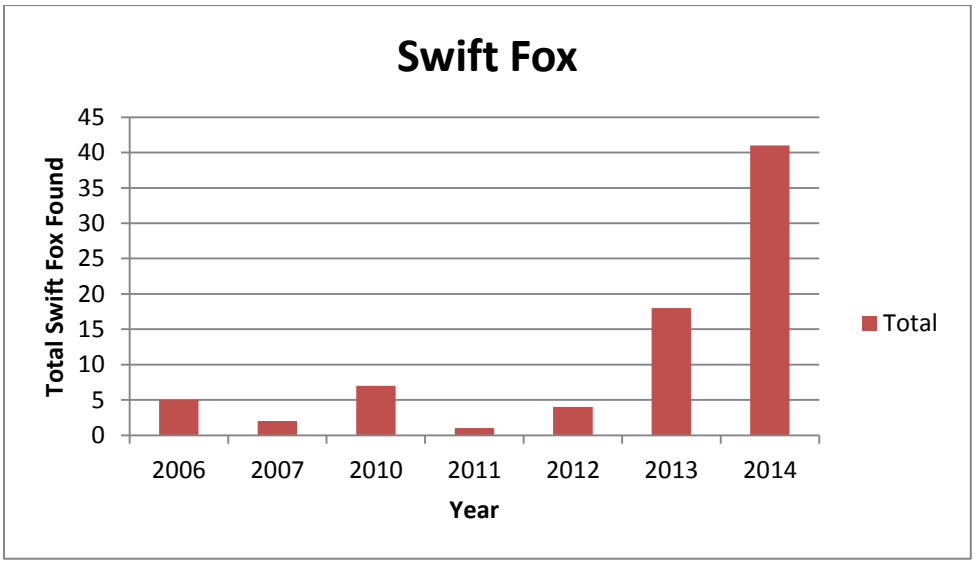
In Region 2

The most limiting factor for swift foxes are probably competition with coyotes and red foxes, and the conversion of shortgrass prairie. The key component in the restoration of swift fox is the provision of suitable habitat where they can obtain prey while avoiding predators (Stephens et al., 2005).

Current swift fox distribution is about 25% of the reported historic range from the literature or approximately 40% of the suggested historic range based on vegetation classification mapping of the shortgrass and mid-grass prairie grassland types… Based on existing distribution and demographic data, population viability in Wyoming is not threatened at this time…"Much of the information gathered from recent studies of swift fox ecology indicates that swift fox viability in Region 2 is sustainable within its remaining core distribution (p. 30)"

On TBNG

Spotlight surveys are conducted almost every year, along with searches in prairie dog colonies where the vegetation is more desirable to swift fox.



*Note: More information pertaining to the current graph can be obtained in the annual Thunder Basin Prairie Dog Management Report.

INFORMATION AND DATA FOR LONGSPUR SPP AND OTHER BIRDS

In Wyoming

Grassland birds are considered to be the fastest declining group of birds in North America. In addition to the bird species already discussed, Upland Sandpipers (*Bartramia longicauda*) – NSS4; Short-eared Owls (*Asio flammeus*) – NSS4; Baird's Sparrows (*Ammodramus bairdii*); McCown's Longspurs (*Calcarius mccownii*) – NSS4; Lark Buntings (*Calamospiza melanocorys*) – NSS4; Grasshopper Sparrows (*Ammodramus savannarum*) – NSS4; Chestnut-collared Longspurs (*Calcarius ornatus*) – NSS4; Dickcissels (*Spiza americana*) – NSS4; and Bobolinks (*Dolichonyx oryzivorus*) – NSS4 are considered priorities for monitoring by Wyoming Partners In Flight (Nicholoff 2003). The range-wide BBS trend estimate for each species is presented in Table 1(Wyoming Game & Fish, 2005).

The Breeding Bird Survey (BBS) was initiated in 1966 to obtain information on the trends of breeding birds throughout North America. At a broad geographic scale, BBS data provides the information necessary to detect continental trends in distribution and long-term changes in abundance. BBS results may be used as a guide to local or regional management decisions, with several caveats. BBS results are often inconclusive due to difficulties associated with the interpretation of index counts. Many species (especially less common species) and habitats are inadequately sampled, and BBS data do not reliably predict population trends at fine geographic scales (Wyoming Game & Fish, 2005).

Table 1. Rangewide BBS trend estimates[a] for grassland bird species of special concern.

Species	Trend	P-value	n	Data quality[b]
Mountain Plover	-1.9	0.27	43	B
Burrowing Owl	-1.2	0.62	310	B
Ferruginous Hawk	2.9	0.01	240	B
Long-billed curlew	-1.8	0.06	250	A
Upland Sandpiper	0.8	0.01	633	A
Short-eared Owl	-4.3	0.01	154	A
Baird's Sparrow	-3.5	0.00	135	C
McCown's Longspur	-2.6	0.23	69	C
Lark Bunting	-1.3	0.01	367	C
Grasshopper Sparrow	-3.9	0.00	1574	C
Chestnut-collared Sparrow	-2.6	0.00	154	A
Dickcissel	-1.2	0.00	922	A
Bobolink	-1.7	0.00	1232	A
Sharp-tailed Grouse	-1.6	0.17	159	B

In 2002, Rocky Mountain Bird Observatory (RMBO) initiated a monitoring program called Monitoring Wyoming's Birds to address the needs of determining population trends at the scale of the state. Transect locations were finalized in 2004 (Wyoming Game & Fish, 2005).

Table 2. Select RMBO grassland transect data from the 2004 field season

Species	Observations	Species	Observations
Brewer's Sparrow	262	Brewer's Blackbird	47
Burrowing Owl	3	Brown-headed Cowbird	41
Chestnut-collared Longspur	48	Bullock's Oriole	8
European Starling	59	Cassin's Kingbird	5
Field Sparrow	2	Common Grackle	6
Grasshopper Sparrow	34	Common Raven	22
Horned Lark	1112	Eastern Kingbird	19
Lark Bunting	1264	House Finch	1
Lark Sparrow	13	Orchard Oriole	1
Lincoln's Sparrow	4	Red-winged Blackbird	36
Loggerhead Shrike	13	Say's Phoebe	6
Long-billed Curlew	1	Western Kingbird	17
McCown's Longspur	138	Yellow-headed Blackbird	8
Mountain Plover	1	Common Nighthawk	2
Sage Sparrow	1	Greater Sage-Grouse	1
Sage Thrasher	11	Mourning Dove	97
Savannah Sparrow	3	Ring-necked Pheasant	1
Short-eared Owl	9	Ferruginous Hawk	6
Upland Sandpiper	9	Golden Eagle	3
Vesper Sparrow	253	Great Horned Owl	1
Western Meadowlark	1136	Northern Harrier	9
American Crow	7	Prairie Falcon	1
American Goldfinch	8	Red-tailed Hawk	2
American Kestrel	10	Swainson's Hawk	2
Black-billed Magpie	4		

Habitat loss is a primary threat to endemic birds of the grasslands. Causes of habitat loss include conversion for agriculture, urbanization, oil and gas development, fragmentation, reductions of native mammal populations, and suppression of natural disturbances. While we are currently unable to estimate the amount of grasslands that have been converted for cropland, it is apparent that there has been a substantial loss. Approximately 7% (4.3 million acres) of Wyoming's landmass (62.1 million acres) has been converted to croplands. While most of the losses due to agricultural conversion were historical, more recent losses are primarily occurring from other factors (Wyoming Game & Fish, 2005).

Habitat loss from increasing oil and gas development in Wyoming and the associated negative impacts of disturbance and fragmentation negatively affects birds (Wyoming Game & Fish, 2005).

It is likely that the loss of natural disturbance has negatively affected grassland birds also. Humans have largely removed prairie dogs and bison from the grasslands. Prairie dogs have been eradicated from nearly 98 percent of the western Great Plains, and the estimated 30 – 60

million bison that used to roam the Great Plains are practically gone. Now, bison have been replaced by fenced cattle, which graze the landscape much more uniformly. Suppression of another natural disturbance, fire, has also decreased habitat quality. Fires that historically burned at 2 – 25 year intervals are now suppressed. Decreased habitat heterogeneity is the result of the removal of natural disturbances that previously occurred across the landscape, which many of these birds rely on (Wyoming Game & Fish, 2005).

In Region 2

McCowns: Compared to its historical distribution, the breeding range of McCown's longspur has been drastically reduced. This is due to reduction is shortgrass prairie. Viability of McCown's could be impaired throughout Region 2 by continued fragmentation of habitats, which have altered natural expanses of shortgrass prairie (Sedgwick, 2004).

Much of the McCown's longspur range is in Region 2, and because McCown's is restricted to shortgrass prairie, risks in Region 2 are similar to risks across their range. Longspurs are at risk from continued loss of shortgrass prairie to agriculture, urban expansion, fragmentation, indiscriminant use of pesticides, fire suppression, and oil and gas development (Sedgwick, 2004).

To conserve McCown's longspurs, land managers need to replicated native historic shortgrass prairie condtions (Sedgwick, 2004).

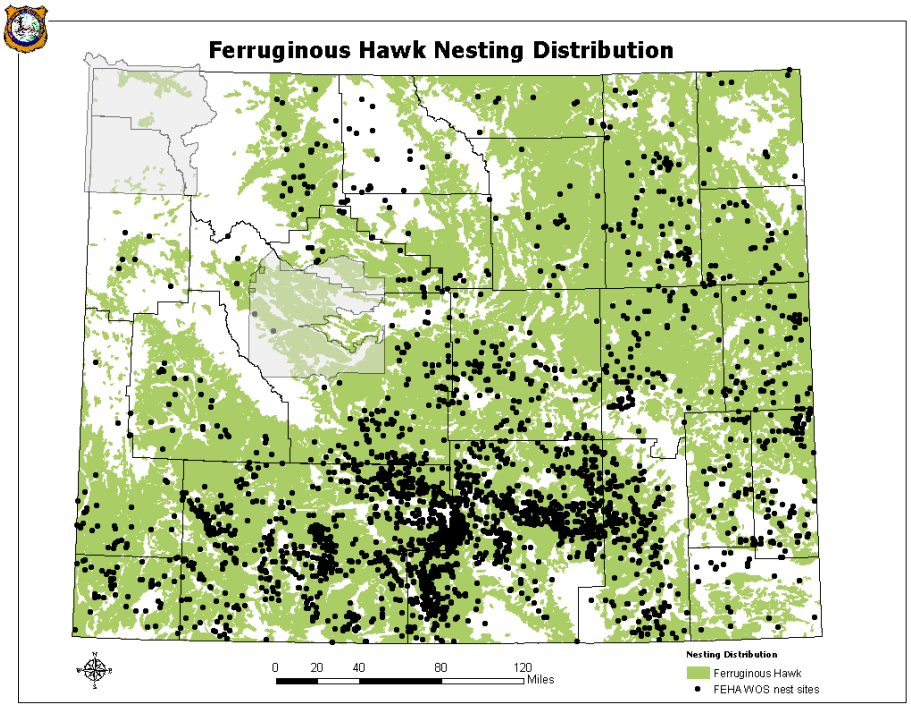
Chestnut-collared: The breeding range has contracted and long term population decline is evident. Declines are occurring in USFS Region 2 states. Viability of this species could be impaired throughout Region 2 by continued fragmentation of habitats. Region 2 parallels continent-wide risks, because much of the habitat of the chestnut-collared longspur falls within Region 2. This species is restricted to shortgrass and mixed grass prairies (Sedgwick, 2004).

INFORMATION AND DATA FOR FERRUGINOUS HAWK

In Wyoming

The WGFD classifies the Ferruginous Hawk as a Native Species of Special Concern – NSS3 because the species is widely distributed, population status and trends are unknown but are suspected to be stable, and there is on-going significant loss of habitat. The species is also sensitive to human disturbance. The BBS did not detect a trend for Ferruginous Hawks in Wyoming from 1966 – 2002. However, these data are considered uncertain because the BBS does not effectively monitor species, such as the Ferruginous Hawk, that occur at low densities, and because BBS estimates are much less accurate at fine geographic scales (Wyoming Game and Fish, 2005).

The Ferruginous Hawk breeds from the Canadian Prairie Provinces south to Oregon, Nevada, Arizona, and Oklahoma. It winters from the central and southern portions of its breeding range south into Baja California and central Mexico. It occurs throughout most of Wyoming, and has been documented in all of the state's 28 latilongs, with confirmed or probable breeding in 25 latilongs (Wyoming Game and Fish, 2005).



The Ferruginous Hawk inhabits semiarid open country, primarily grasslands, basin-prairie shrublands and badlands. It requires large tracts of relatively undisturbed rangeland and nests on rock outcrops, the ground, cutbanks, cliff ledges, or trees (Wyoming Game and Fish).

Problems:

- The Ferruginous Hawk is impacted by conversion of native prairie to cropland or other uses, urbanization, human disturbance near the nest site, and reduced prey availability, including the elimination of prairie dog towns and ground squirrel colonies.
- Resource development is occurring or proposed for a significant portion of Ferruginous Hawk nesting habitat in Wyoming. Disturbance at the nest site can increase nest desertion and lower the productivity of nesting pairs.
- Current monitoring efforts such as the BBS are not adequate to document population trends or identify needed management over large areas of the state.

In Region 2

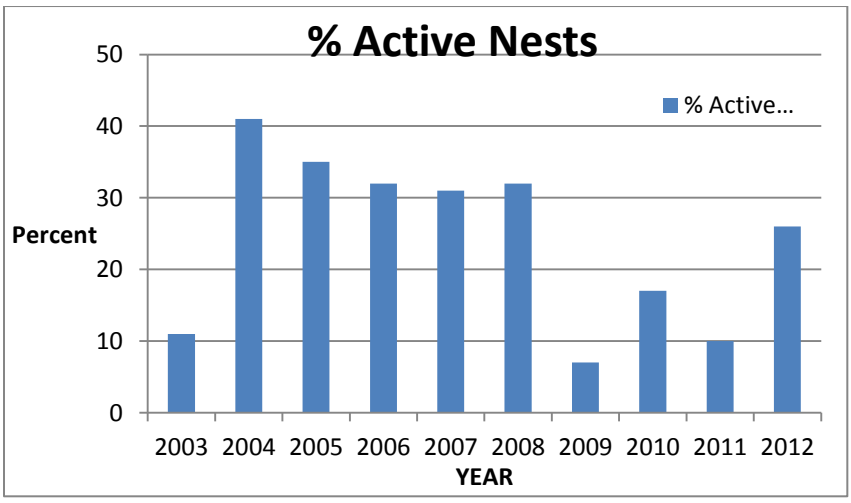
Small mammals, especially black-tailed prairie dogs were historically more abundant and widely distributed throughout Region 2. It is likely that the ferruginous hawk was also historically more abundant and widely distributed (Collins et. Al, 2005). The introduction of large scale agriculture, widespread domestic livestock grazing, deliberate control of rodent populations, and shooting have all led to declines in ferruginous hawk populations (Collins et. Al, 2005).

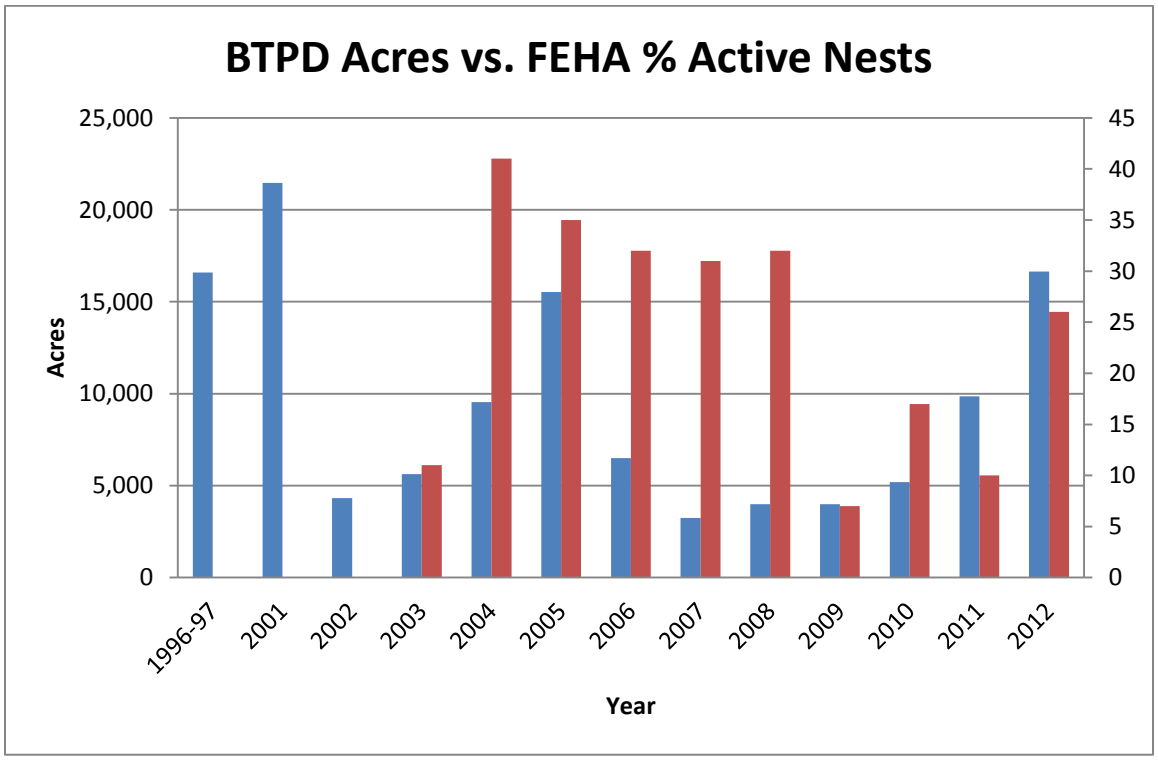
Grasslands in Region 2 contain between 3 to 6 percent of total breeding populations of ferruginous haws within the region (Collins, et. Al, 2005).

The decline of black-tailed prairie dogs due in part to chemical control, and its importance as prey to ferruginous hawks, pose a significant and persistent threat to ferruginous hawks in Region 2 (Collins, et. Al, 2005).

On TBNG

The population on TBNG is monitored through annual nest surveys. The population appears to be tracking along with the prairie dog population, with a 1-2 year lag time from declines and increases in the prairie dog population, which is normal for predator/prey population trends.





Red bars represent percent active ferruginous hawk nest surveyed on TBNG, and is associated with the secondary Y axis. The blue bars represent active acres of prairie dogs on TBNG, and are associated with the primary Y axis.

This is a comparison of acres of black-tailed prairie dogs and percent of active ferruginous hawk nests surveyed on the TBNG. This graph is meant to illustrate how ferruginous hawk population trends appear to track with prairie dog populations trends on TBNG.

GENERAL DISCUSSION OF VIABILITY

On the basis of empirical evidence, a population size of 10 is far too small, 100 is usually inadequate, 1,000 is adequate for species of normal variability, and 10,000 should permit medium- to long-term persistence of most of the most variable birds and mammals (Thomas 1990). A population size of 10,000 should normally be sufficient to permit long-term demographic persistence and to satisfy genetic considerations (Thomas 1990).

Populations that occupy habitat fragments that are far too small to hold thousands of individuals may still possess great conservation potential, particularly when populations are not completely isolated. When populations show average or low population variability and inhabit stable environments, geometric mean values of 500 may be adequate for long-term persistence. For birds, populations above 200 individuals often give high probabilities of survival for periods of at least three quarters of a century….(Thomas 1990).

FS Regulations for Threatened and Endangered Species

- **Forest Service Manual (FSM) 2670** - establishes that the Forest Service will manage for Threatened, Endangered, and Sensitive plants and animals.

- **FSM 2670.31** – Place top priority on conservation and recovery of endangered, threatened and proposed species and their habitats.

- **FSM 2670.31** – Avoid all adverse impacts on threatened and endangered species and their habitats.

- **FSM 2670.44** – Develop recovery strategies to implement approved Recovery Plans.

- **FSM 2670.46** – Identify, manage, and protect habitat to meet recovery objectives for federally listed species.

FS Regulations for Sensitive Species

- **FSM 2670.5** – Sensitive Species. Plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by:
    - Significant current or predicted downward trends in population numbers or density.
    - Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

- **FSM 2672.1** – Sensitive native plant and animal species must receive special management emphasis to ensure viability and to preclude population trends that would result in the need for Federal listing.

- **FSM 2670.32** – Avoid or minimize impacts to species whose viability has been identified as a concern.

The 1982 regulations for the National Forest Management Act (NFMA) require National Forests to provide habitat in order "to maintain viable populations of existing native and desired non-native vertebrate species in the planning area."

NFMA regulations (36 CFR219.19) define a viable population as "one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area." "Habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area."

We often will not have data to determine whether population trends are in "significant decline", or "within the range of historic variation" for individual species.

Conclusions regarding the viability of all other species may be based on the analysis of broad ecological trends, more qualitative discussions of habitat conditions, or other information.

Where information is weak, likelihood should not be considered as a statistical measure, but rather as an expression of the level of belief that viability will be maintained. These evaluations must be as credible and informative as possible, given the reality of scarce information, and may depend on techniques such as expert opinion panels and the application of general conservation principles.

In cases where population and habitat trends are believed to be in significant decline throughout the planning area, and substantial habitat disruption is allowed by the forest plan, a more rigorous approach to maintaining viability is indicated.

Black-tailed Prairie Dog

A reserve should meet some minimum criterion regarding the viability of the target species, e.g., 90% probability of 100 year survival. Plague, the potential inclusion of the black-footed ferret in the reserves, continued recreational shooting and possible perimeter poisoning make analysis supporting viability computations quite challenging (Gilpin 2001).

Mountain Plover

According to Augustine and Baker (2013): "Density estimates of rare bird species, particularly those of conservation concern, may provide guidance on the area of prairie dog colonies needed to support desired minimum population level." These estimates were 2.4 birds/km^2 n

colony sites in Wyoming and Montana. It is estimated that a BTPD complex may need 5,145-20,582 acres to support 100 Mountain Plovers (Augustine and Baker, 2013).

Burrowing Owl

Burrowing owl populations have declined in Region 2, and these declines are closely linked to declines in prairie dogs (McDonald, et al., 2004). In the case of TBNG where only 16%-78% of prairie dog colonies are occupied by burrowing owls and assuming each burrowing owl pair requires a prairie dog colony of 83 acres, at least 2,075 acres of occupied BTPD habitat would be required to support short-term viability and 20,075 acres would be for long-term viability (Lantz 2005).

Swift Fox

The most limiting factor for swift foxes are probably competition with coyotes and red foxes, and the conversion of shortgrass prairie. The key component in the restoration of swift fox is the provision of suitable habitat where they can obtain prey while avoiding predators (Stephens et al., 2005). Habitat loss plays a key role in the extirpation of swift fox populations and maintenance of connectivity with other neighboring populations will ensure genetic diversity maintenance (Sasmal, 2011).

Ferruginous Hawk

It is likely that the ferruginous hawk was historically more abundant and widely distributed (Collins et. Al, 2005). Grasslands in Region 2 contain between 3 to 6 percent of total breeding populations of ferruginous hawks within the region (Collins, et. Al, 2005). The population on TBNG appears to be tracking along with the prairie dog population, with a 1-2 year lag time from declines and increases in the prairie dog population, which is normal for predator/prey population trends.

McCown's Longspur

Compared to its historical distribution, the breeding range of McCown's longspur has been drastically reduced. This is due to reduction is shortgrass prairie. Viability of McCown's could be impaired throughout Region 2 by continued fragmentation of habitats, which have altered natural expanses of shortgrass prairie (Sedgwick, 2004).

Chestnut Collared Longspur

The breeding range has contracted and long term population decline is evident. Declines are occurring in USFS Region 2 states. Viability of this species could be impaired throughout Region 2 by continued fragmentation of habitats. Region 2 parallels continent-wide risks, because much of the habitat of the chestnut-collared longspur falls within Region 2. This species is restricted to shortgrass and mixed grass prairies (Sedgwick, 2004).

Black-footed Ferret

Although there are historical records of black-footed ferrets from nearly all sagebrush and grassland habitats in Wyoming, the only population currently known in the state occurs in the Shirley Basin area near Medicine Bow (Wyoming Game & Fish, 2005).

According to Jachowski et. al, 2011, approximately 10,621 acres of prairie dogs at moderate density are required to support ferrets.

- Moderate = 12.14 burrows/acres -32.38 burrows/acre
- Thunder Basin currently has:
  - 10,974 acres in MA 3.63 (10,502 in Category 1)
  - 35 burrows per acres

Forest Plan Direction Concerning Prairie Dogs and Associated Species

Biological Resources:

- Any net loss of suitable black-footed ferret habitat as a result of prairie dog poisoning or development of new facilities within colonies must be replaced with suitable ferret habitat. This is based on the amount of suitable habitat available when poisoning or development is proposed to occur. (20)

- Prescribe burn selected large flats (a section or more in size). Prescribed burns should be timed to provide large blackened areas in the spring. (23)

- Evaluate the desirability and feasibility of trying to establish a nesting population (mountain plover) with reintroduced birds. (24)

- Prohibit development of new facilities within 0.25 miles of know mountain plover nests or nesting areas. (24)

- Any net loss of suitable and occupied mountain plover habitat as a result of prairie dog poisoning will be replaced within the year by concurrent expansion of suitable plover habitat or in some cases, enhanced management and protection of occupied plover habitat elsewhere on the National Grassland. (27)

- To reduce risks to mountain plover from traffic, limit vehicle speeds in occupied mountain plover habitat to 25 mph on resource roads and 35 mph on local roads. (31)

- Vegetation management projects in suitable mountain plover habitat will be designed to maintain or improve mountain plover habitat. (32)

- Use the following criteria at the project planning level to help determine where to use prescribed burning and high level livestock grazing intensities to provide low grassland structure and enhanced mountain plover nesting and brooding habitat. (34)

    - Proximity to existing mountain plover nesting areas
    - Proximity to prairie dog colonies
    - Presence of expansive flat grassland areas.

- Do not spray grasshoppers within 0.25 miles of known burrowing owl nests. (64)

- To optimize habitat for burrowing owls, manage for active prairie dog colonies that are larger than 80 acres. (65)

- Prohibit prairie dog shooting in areas where risks have been identified or other wildlife species or where shooting is preventing or slowing desired prairie dog expansion. (66)

- Prohibit use of M-44's for predator control in occupied swift fox habitat on National Grasslands. (72)

- Design and implement livestock grazing strategies that provide a mosaic of low, moderate, and high grassland structure in occupied swift fox habitat, consistent with vegetation objectives for the GA. (73)

- Identify key habitats (for swift fox) on National Grasslands; and develop appropriate population and habitat management strategies. (74)

- Implement management activities for expanding the distribution of swift fox. (75)

- From January 1 through September 30, don't use rodenticides (above ground baits) to reduce prairie dog populations. This is necessary to reduce risk to migratory birds.

Broken Hills GA

- Maintain an increasing trend of black-tailed prairie dog populations across the GA over the next 10-15 years.
- Maintain and expand the current distribution of black-tailed prairie dogs across the GA over the next 10-15 years.
- Improve the complex of prairie dog colonies.
- A range of 23,616 to 31,488 acres of low structure grasslands is prescribed for this GA.

Cellars Rosecrans GA

- Plant and animal species communities associated with black-footed ferrets and black-tailed prairie dogs will be actively restored.
- Maintain an increasing trend of black-tailed prairie dog populations across the GA over the next 10-15 years.
- Maintain and expand the current distribution of black-tailed prairie dogs across the GA over the next 10-15 years.
- Improve the complex of prairie dog colonies.
- A range of 36,324 – 42,378 acres of low structure grasslands is prescribed for this GA.

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