Devils Tower National Monument

PRAIRIE DOG MANAGEMENT PLAN

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INTRODUCTION

Devils Tower National Monument is located at the northwestern edge of the Black Hills in northeastern Wyoming. Devils Tower, a monolith of igneous rock, rises 867 feet above the surrounding grassland and ponderosa pine forest and is a dominant landmark in the northern Great Plains. Within the landscape of the monument is a small portion of short grass prairie that includes a black-tailed prairie dog (BTPD: *Cynomys ludovicianus*) population. Black-tailed prairie dogs are considered a keystone species of the mixed grass prairie because they significantly affect ecosystem structure, function, and composition, and their impact on the prairie is not duplicated by any other species (Kotliar et al. 1999; Miller et al. 2000). A range of native wildlife species depend on prairie dogs and their burrow systems for survival. Historically, prairie dogs have been considered a pest species and subjected to widespread eradication programs because of their effects on livestock grazing and croplands (Forrest and Luchsinger 2006). At Devils Tower National Monument, black-tailed prairie dogs are the second most popular visitor attraction after the tower itself.

Devils Tower National Monument does not currently have a Prairie Dog Management Plan. The current prairie dog colony comprises around 40 acres in the southeast corner of the monument. The colony has required population control measures to prevent encroachment into high visitor use areas. An EA (NPS 2000) was completed in 2000 to address the issue of prairie dogs encroaching on high visitor use areas at Devils Tower National Monument. In subsequent years, these control measures require categorical exclusions due to a lack of a prairie dog management plan.

Devils Tower National Monument is putting forward this Prairie Dog Management Plan with management strategies that are consistent with the latest resource objectives and policies of the National Park Service.

The primary purposes of developing this management plan for the black-tailed prairie dog (*Cynomys ludovicianus*) at Devils Tower National Monument are to: propose and evaluate an approach for sustaining a long-term population of prairie dogs that meets other park objectives; conserve natural processes and conditions; identify tools to manage the prairie dog population in the park; manage park resources in accordance with the park's general management plan (NPS 2001) and NPS *Management Policies 2006* (NPS 2006); and to protect public health, safety, and welfare. The resulting plan would be used to manage prairie dogs in the monument until the plan is obsolete or no longer feasible.

The management strategies and options identified in this plan are based on an ***adaptive management approach.*** This management approach recognizes that knowledge of natural resources and associated processes are often limited, unknown, or difficult to predict. As such, adaptive management requires (1) management actions to be based on clearly identified goals and outcomes, (2) the use of monitoring to ensure management actions are meeting the identified goals/outcomes, and (3) the use of new information to re-evaluate management activities and goals and/or to facilitate management changes, if needed.

Although this document is intended to guide the long-term management of prairie dogs at Devils Tower National Monument it is essential that identified management goals and outcomes be evaluated on a regular basis using information gained through the adaptive management process. This will ensure that management goals and approaches are credible and reflect an increasing scientific knowledge base.

PURPOSE AND NEED

Purpose of the Management Plan

The following objectives are more specific statements of purpose that were identified by NPS staff in initial project planning phases. Successful management of the prairie dog resources will depend on the degree that these objectives are realized.

- Maintain a prairie dog population within the park that achieves a sustained minimum population size and distribution that is sufficient to fulfill the ecological role of the species.
- Establish the appropriate target prairie dog population levels that are ecologically sound and allow other park objectives to be achieved.
- Conserve regional biological diversity, especially rare and imperiled species.
- Protect ethnographic and other cultural resources associated with prairie dog colonies.
- Continue monitoring prairie dog populations to ensure that prairie dog management actions are maintaining long-term viable populations and that the management objectives are being met.
- Identify potential methods that can be used to control prairie dog populations if control is needed.
- Present a contingency plan/Standard Operating Procedures for management of disease outbreaks in prairie dog populations.

This prairie dog management plan represents a continued commitment to preserve valuable park resources. These resources include the prairie dog itself and the numerous interdependent species that rely on the prairie dog and the habitat alterations that prairie dogs make. These species include plants, snakes, rodents, and predators such as coyotes, raptors, and badgers.

Need for the Management Plan

Devils Tower National Monument does not currently have a prairie dog management plan. With the new management plan, NPS seeks to adopt an approach to managing prairie dogs that addresses three major needs. The first need is to ensure that the local prairie dog population remains viable and maintains its key role in the ecology of the park. The second need is to

control prairie dog populations in the park where control is required to protect park infrastructure, limit human-prairie dog interaction, and meet other park management goals and objectives. The third need is to develop Standard Operating Procedures for plague monitoring and outbreak at the park.

The black-tailed prairie dog has become a conservation concern over the last 20 years because of dwindling populations and large complexes, lack of regulatory protection, plague, and habitat loss. The black-tailed prairie dog was petitioned for listing as threatened throughout its range under the Endangered Species Act in July 1998. After several investigations and petitions, the U.S. Fish and Wildlife Service found that listing was not warranted on December 9, 2009 (USFWS 2009). However, the Wyoming National Diversity Database lists the black-tailed prairie dog as a G4/S2 species (WYNDD 2010). The global rank of G4 indicates that black-tailed prairie dogs are considered "apparently secure, although may be quite rare in parts of its range, especially at the periphery." The state rank of S2 indicates that the black-tailed prairie dog is "imperiled because of rarity or because of factors making it vulnerable to extinction" within the state of Wyoming. Within the state of Wyoming, the Department of Game and Fish (WGFD) classifies black-tailed prairie dogs as a sensitive species (NSS3-2B) due to populations that have declined and vulnerable habitat, but lack of ongoing significant habitat loss. In contrast, the Wyoming Department of Agriculture (WDA) classifies the black-tailed prairie dog as a pest (Emmerich 2009). There is a Memorandum of Understanding between the WGFD and the WDA to restrict the use of toxicants and the WGF Commission has the authority to implement a shooting closure, if deemed necessary to protect black-tailed prairie dog populations in Wyoming (Emmerich 2009).

Prairie dog habitat at Devils Tower National Monument is restricted to the current colony and the surrounding area. The prairie dog colony occupies approximately 40 acres in the southeast corner of the park. There is limited potential for colony expansion due to lack of suitable habitat and location of park resources (sculpture, campground, amphitheater, and picnic area). Expansion of prairie dogs outside the current colony boundaries results in direct prairie dog/human contact and potential damage to park resources. Burrowing activities of the prairie dogs can compromise infrastructure or facility integrity, which could pose hazards to public health, safety and welfare. As a result, management is needed to ensure that prairie dog expansion does not create potentially unsafe or hazardous conditions that could affect the public. Control of prairie dogs at Devils Tower National Monument has been ongoing for over eighty years. Control measures have included relocation, shooting, poisoning, and gassing. The prairie dog population seems to be unaffected by control measures and maintains a fairly stable population size. The only fluctuation in black-tailed prairie dog populations at Devils Tower National Monument have been attributed to natural causes and followed by rapid recovery within one to two years.

Prairie dogs have long been known to be potential carriers for sylvatic plague. Fleas that use prairie dogs as hosts are known to carry the plague bacteria, *Yersinia pestis* (CDC 2010). Plague has never been reported in prairie dogs in Devils Tower National Monument and is unlikely to occur there due to the isolation of the colony (Britten, personal communication). Most public health officials believe that the chance of humans contracting plague from prairie dogs or fleas is extremely low because fleas are host specific and therefore avoid humans (Cully et al. 2006).

However, public awareness of the potential for prairie dogs to act as a vector for the disease is needed and, despite the low risk to human safety, a management plan is needed to provide strategies for dealing with the potential for plague outbreak.

In the event that the presence of prairie dogs persistently conflicts with other park resource objectives, human uses or activities in the park, or prairie dogs disperse from the park to adjacent private lands where they are unwanted, and there is no way to accommodate the presence of prairie dogs, there may be a need to use lethal controls. This prairie dog management plan evaluates the conditions where and when lethal controls may be used as well as outlining nonlethal control methods to be used in conjunction with lethal control. Areas where prairie dog colony expansion will and will not be accepted, will be delineated.

Purpose and Significance of Park

Devils Tower National Monument was established in 1906 by President Theodore Roosevelt as 1,153 acres under the Antiquities Act as the nation's first national monument for "the lofty and isolated rock ... an extraordinary example of the effects of erosion in the higher mountains as to be a natural wonder and an object of historic and great scientific interest…"(Proc. No. 658). The management of Devils Tower National Monument is guided by the 1916 Organic Act, the General Authorities Act of 1970, the act of March 27, 1978 relating to the management of the national park system, and other applicable federal laws and regulations, such as the Endangered Species Act and the National Environmental Protection Act. In 1955, in recognition of 50 years as a monument, 155 acres were added to Devils Tower National Monument for the establishment of a public campground. According to the First Annual Centennial Strategy for Devils Tower National Monument (NPS 2007), "[t]he guiding principles of the Monument, are to balance the education, cultural, and recreation values of Devils Tower, while protecting and preserving the Park's natural and cultural resources."

While the black-tailed prairie dog is not specifically identified by name as a resource to be protected in the establishing legislation or its expansion, the prairie dog is an integral element of the mixed-grass prairie habitat and the second most popular visitor attraction in the park after the Tower formation itself.

PRAIRIE DOG OVERVIEW

Black-tailed prairie dogs (*Cynomys ludovicianus*) are a stout, burrowing rodent in the squirrel family. They are approximately 14-17 inches long and weigh between 1-3 pounds. They are generally yellowish-tan in color with a short black-tipped tail. Black-tailed prairie dogs are active by day and live in colonies. Undisturbed colonies may occupy thousands of acres and contain thousands of residents. Within colonies, prairie dogs live in contiguous, territorial family units called coteries. See Appendix A for full life history and range information.

Black-tailed prairie dogs, one of five species of prairie dogs found in North America, are native to the Great Plains and historically ranged from Mexico to Canada across 11 states. The black-tailed prairie dog is found generally east of the continental divide from North Dakota to Texas. The black-tailed prairie dog is found in the eastern third of Wyoming. The only other prairie dog

species known in the state, the white-tailed prairie dog, occupies the western two-thirds of the state.

Range wide, habitat conversion and fragmentation, sylvatic plague outbreaks, and human hunting and control measures have been identified as factors contributing to black-tailed prairie dog declines (USFWS 2009). Sylvatic plague (also known as bubonic plague in cases of human infection) is a disease caused by the bacterium *Yersinia pestis* found in fleas (Barnes 1993) that is often responsible for 100 percent mortality in affected black-tailed prairie dog colonies. Plague, an introduced disease, has decimated prairie dog populations since it was first found in black-tailed prairie dogs in the mid-1940s (Cully et al. 2006). Black-tailed prairie dogs show neither effective antibodies nor immunity. If there are any survivors, they do not exhibit resistance to plague; surviving animals appear to have avoided death only by the remote chance of avoiding exposure. Currently, plague is known from all parts of the historic range of black-tailed prairie dog. Sylvatic plague has been documented in Wyoming since the 1930s (Emmerich 2009). Plague has not been documented within the Devils Tower National Monument prairie dog colony. The closest known occurrence of plague to Devils Tower is 60 miles south (NPS 2000). The isolation of this prairie dog colony makes it unlikely for plague to be currently present or potentially introduced to the Devils Tower National Monument in the future (Britten, personal communication).

While there has been a drastic decrease in the habitat occupied by the black-tailed prairie dog across its range, the colony within Devils Tower National Monument has remained fairly stable and viable for over 100 years (Fig. 1). The prairie dog colony within Devils Tower National Monument occupies around 40 acres of the southeast corner of the park (Fig. 2). The population of black-tailed prairie dog is constrained to this area due to lack of other suitable habitat within the monument. Expansion is restricted to the north due to increased slope and to the south and east by the Belle Fourche River. There is a small area that could be potential habitat to the west (between the current colony and the park administration buildings) but this area has never been historically occupied by black-tailed prairie dog.

The nearest known black-tailed prairie dog colony is on private land about 7 miles south of Devils Tower National Monument. Private property abuts the monument to the east with some suitable black-tailed prairie dog habitat but expansion of prairie dogs into this area is unlikely due to the Belle Fourche River.

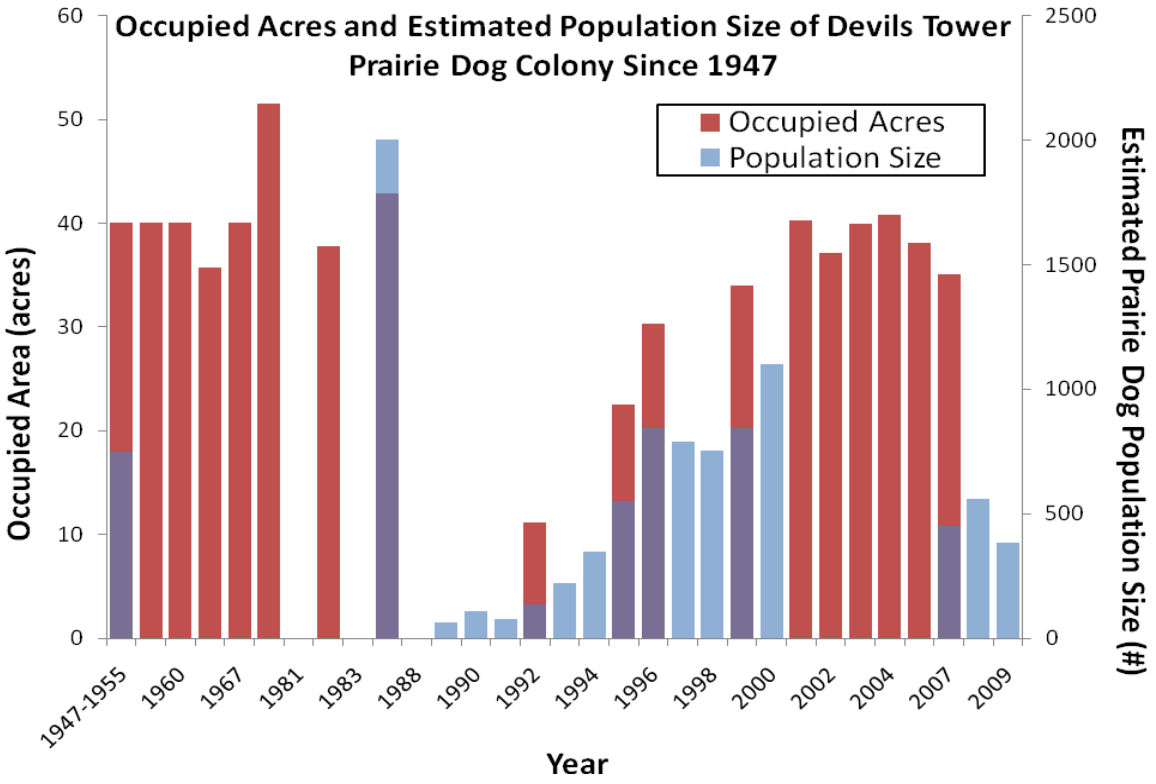

Figure 1. Black-tailed Prairie Dog Occupied Acres and Estimated Population Size at Devils Tower National Monument since 1947.

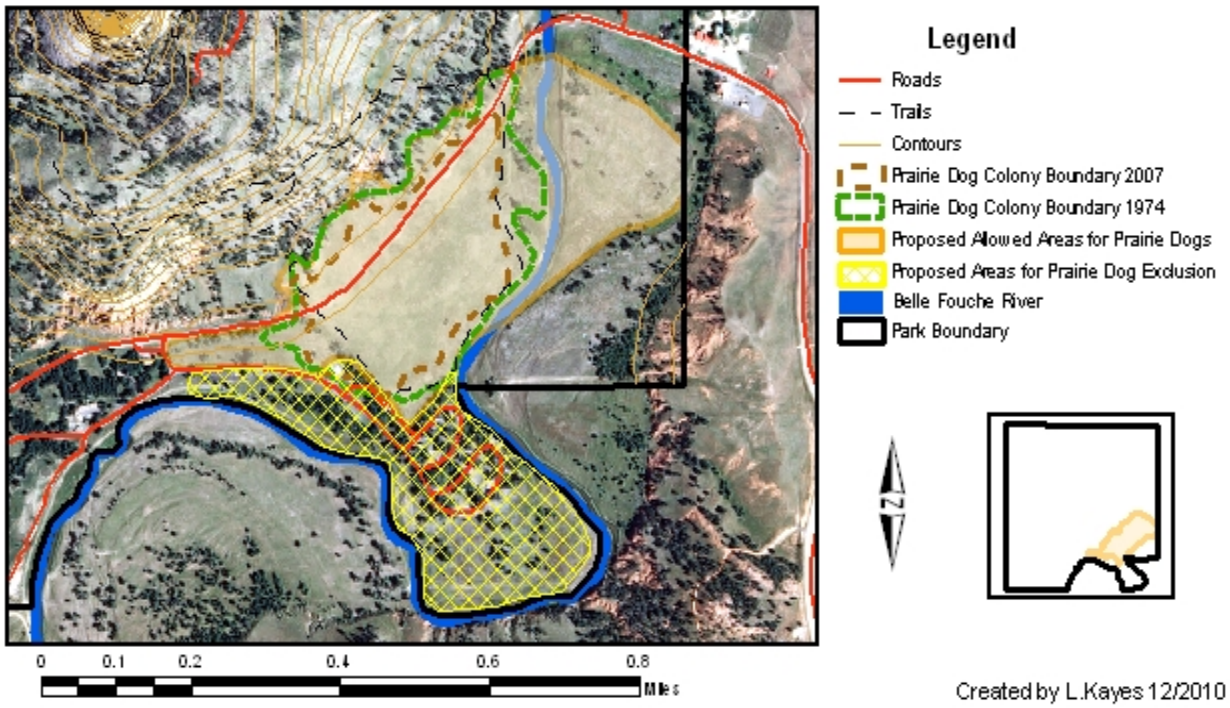

Figure 2. Historic (1974) and modern (2007) prairie dog colony boundaries and allowed areas for prairie dog and areas for exclusion.

PRAIRIE DOGS AS KEYSTONE SPECIES

The prairie dog functions as a keystone species because the populations and distribution of many wildlife species depend on prairie dogs and/or the unique habitat they create (Kotliar et al. 1999). Keystone species have an ecological effect disproportionate to their abundance; a decline in a keystone species' population initiates changes in ecosystem structure and a decline in overall species diversity (USFWS 2000). In their role as a keystone species, black-tailed prairie dog have been identified as a pivotal ecosystem component strongly influencing species composition and ecosystem function due to their function as a disturbance agent (Kotliar et al 1999). The temporal and spatial scales of prairie dog colony disturbance are unique (Kotliar et al. 1999). Black-tailed prairie dogs aggregate into large and dense colonies that persist for decades thus concentrating disturbance in a specific area and over a longer time frame. Disturbances caused by other fossorial mammals or nomadic ungulates tend to be short-term and more dispersed. Additionally, many prairie ecosystems have lost other natural disturbance regimes (such as fire or ungulate browsing) increasing the value of prairie dog colonies and their role as disturbance agents.

Prairie dogs are considered to be ecosystem regulators by maintaining, creating and regulating habitat biodiversity through soil and vegetation manipulation (Agnew et al. 1986). Prairie dog tunneling loosens and aerates the soil. Prairie dogs alter vegetation species richness, structure, phenology, and biomass compared to uncolonized mixed-grass prairie (Detling and Whicker 1988; Archer et al. 1987). Grazing also causes vegetation to grow more vigorously and creates a diverse plant community as other plants take hold among the grasses. This, in turn, creates habitat where other animals and plants can flourish. Studies have shown that "managed" grasses and forbs atop a prairie dog colony are higher in protein and nitrogen and are favored for grazing by bison, elk, and pronghorn.

Finally, a number of species (including rare and endangered species) are wholly or partially dependent on prairie dog colonies as prey and/or for habitat. Prairie dogs provide a direct food source for predators, and their activities nurture an entire web of life. Up to eighty-nine species of wildlife have been identified as being in some way associated with prairie dog colonies. Seeds and insects exposed by prairie dog grazing attract meadowlarks, lark buntings and other birds. Declines of prairie dogs have, in turn, impacted animals that depend on the prairie dog for food and shelter. For example, with their nesting-sites disappearing, burrowing owls are declining. Black-footed ferrets, and raptors like ferruginous hawks and golden eagles, which depend heavily on prairie dogs, are also affected. Animals dependent on black-tailed prairie dog, such as black-footed ferrets and burrowing owls are endangered or declining in numbers due to decreased numbers of prairie dogs and their associated habitat.

HISTORY OF BLACK-TAILED PRAIRIE DOGS MANAGEMENT AT DEVILS TOWER NATIONAL MONUMENT

Prairie dogs were first reported at Devils Tower National Monument in 1894 by Vernon Bailey or the U.S. Biological Survey. Although the prairie dog colony was part of the original monument designation it was used as a hay pasture for cattle until the 1930s. In the 1930s, the hay pasture was abandoned due to the persistence of the prairie dogs. Based on aerial

photographs, the boundary of the prairie dog colony did not change between 1940 and 1974 and remained about 40 acres (Fig 2).

Local ranchers poisoned prairie dogs at Devils Tower in the 1930s and up until the 1950s (NPS 2000). In the late 1950s, the park superintendent judged the prairie dog population was too large. Live trapping and gassing took place from 1959 to 1961 to reduce prairie dog numbers.

In 1962, prairie dog numbers declined due to a cold winter after three years of drought (NPS 2000). In 1965, prairie dog numbers declined by 60% due to natural causes. Prairie dog populations had rebounded by 1967 and 50 animals were gassed north of the picnic area.

In the 1980s, prairie dog control efforts were concentrated in areas where the expanding colony encroached into developed areas including the road, amphitheater, campground, and picnic area (NPS 2000). Lethal control (gassing and shooting) was used on prairie dogs throughout the 1980s (NPS 2000). Poisoning and planting natural barriers were used to control prairie dogs in the mid 1990s. In 2000, an Environmental Assessment (NPS 2000) was written to trap and relocate prairie dogs encroaching into visitor use areas.

The black-tailed prairie dog colony has maintained a fairly constant area and population size despite nearly 80 years of population control at Devils Tower National Monument.

LAW AND POLICY OVERVIEW

NPS Management Policies

The USDI National Park Service (NPS) has authority for conservation of prairie dogs through the 1916 NPS Organic Act (16 USC 1) which charges the NPS with management of parks to "... conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." Additional authorities, which guide the NPS, are found in the General Authorities Act of 1970 (16 USC 1c (a)), and the Redwood Act of 1978 (16 USC 1a-1).

NPS Management Policies Section 4.4 and the NPS-77 Natural Resources Management Guideline state that the NPS will seek to perpetuate the native animal life as part of the natural ecosystem of parks. They further define Species of Concern as all native animal species within a park that face an immediate danger of losing their natural role in an ecosystem because of human-induced change. Black-tailed prairie dogs are ranked a G4/S2 by the Wyoming National Diversity Database (2003) and are a Native Species of Special Concern 3 by the Wyoming Game and Fish Department indicating that within the state populations have declined and habitat is vulnerable but there appears to be no ongoing significant habitat loss. Regarding Species of Concern, NPS-77 states that the NPS should also look for opportunities to enter into cooperative and interagency agreements and memoranda of understanding with other federal and state agencies on research, monitoring, and management of the Species of Concern, and, where appropriate, promulgate regulations. A Multi-State Conservation Plan for the Black-Tailed Prairie Dog (Luce 2003a) was developed to provide guidelines under which individual states and

their respective working groups developed management plans. The NPS strives to protect the natural conditions and processes and the ecosystem integrity to the greatest extent possible for a Species of Concern.

Endangered Species Act

Section 7 of the Endangered Species Act of 1973, as amended (16 USC 1531 et seq.) requires all federal agencies to consult with the U.S. Fish and Wildlife Service to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of listed species or critical habitats. The black-tailed prairie dog was petitioned for listing but found to not be warranted for listing (USFWS 2009). If black-tailed prairie dog were to be listed at some point in the future, the habitat management plan would be reviewed and amended as necessary to comply with the ESA with regard to the management of prairie dogs. Section 7 of the Endangered Species Act of 1973, as amended (16 USC 1531 et seq.) requires all federal agencies to consult with the U.S. Fish and Wildlife Service to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of listed species or critical habitats. Section 7a1 of the ESA directs all federal agencies to use their authorities to improve conditions for listed species.

National Environmental Protection Act

The National Environmental Policy Act (NEPA) of 1969, as amended, is environmental protection legislation establishing as a goal for federal decision-making a balance between use and preservation of natural and cultural resources. NEPA requires all federal agencies to: 1) prepare in-depth studies of the impacts of and alternatives to proposed "major federal actions"; 2) use the information contained in such studies in deciding whether to proceed with the actions; and 3) diligently attempt to involve the interested and affected public before any decision affecting the environment is made. See Director's Order #12: Conservation Planning, Environmental Impact Analysis, and Decision-making, for additional information.

An environmental assessment (EA) will be completed in accordance with NEPA to address the proposed prairie dog management plan and subsequent management actions. A scoping brochure will be developed and released for public review and comment and then substantive comments will be incorporated into a draft EA that will be released for a 30-day public review and comment period. Once this process is completed, a Finding of No Significant Impact (FONSI) will be signed and the plan will go into effect. Additional compliance needs will be determined with the consultation of the Regional Environmental Quality Coordinator.

State or other Species-of-Concern

State wildlife management regulations may apply to certain prairie dog management activities, depending on the jurisdiction within the park and whether or not the management activities involve movement of prairie dogs in or out of the park. Typically a state permit is required for

the purpose of capturing, handling, or transporting wildlife on lands under the states' jurisdiction, such as relocation of prairie dogs into or out of the park.

NPS policies regarding management of state listed threatened or endangered species, or species of concern are covered in the "Law and Policy Overview, NPS Management Policies" section above.

Public Health

It is the policy of the NPS to protect the health and well-being of NPS employees and park visitors through the management of disease agents and the various modes of their transmission to ensure compliance with applicable Federal, State and local public health laws, regulations and ordinances (Director's Order 83: Public Health, and Reference Manual 83G Vector-Borne and Zoonotic Diseases). NPS unit managers will reduce the risk of transmission of vector-borne and zoonotic diseases to park visitors and employees through education, surveillance, and control efforts when necessary. Control procedures will reduce risk while minimizing adverse impact on natural and cultural resources. The NPS will follow an integrated pest management approach in addressing vector-borne disease issues as outlined in Director's Order 77-7 (currently in draft) (see Integrated Pest Management below).

The primary public health concern associated with prairie dogs is sylvatic plague, which can be contracted by humans, typically through flea bites. To reduce the risk of humans contracting plague, prairie dog colonies should be kept away from high visitor use areas (e.g. campgrounds, picnic areas, employee housing and work areas) to the extent possible and a plague standard operating procedure (SOP) developed to respond to an outbreak. Monitoring for plague occurrence can be conducted in areas of concern (see Appendix B and C for methods).

Integrated Pest Management

The National Park Service implements an Integrated Pest Management (IPM) program to reduce risks to the public, park resources, and the environment from pests and pest-related management strategies (Directors Order 77-7 Integrated Pest Management, currently in draft). IPM is a science-based, decision making process that coordinates knowledge of pest biology, the environment and available technology to prevent unacceptable levels of pest damage, by cost-effective means, while posing the least possible risk to people, resources and the environment.

Pests are investigated and managed on a case by case basis with management strategies tailored to the specific characteristics of the individual site and pest biology with pest management plans to address both short and long-term pest management solutions. Pest management issues relative to prairie dogs include direct control of prairie dogs and control of fleas associated with prairie dogs as well as public education and area closures as necessary.

Pesticide Use

It is the policy of the Department of the Interior (517 DM 1 Pesticide Use Policy) to comply with the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), as amended, for the use of pesticides on the lands and waters under its jurisdiction. It is the policy to use pesticides only after full consideration of alternatives - based on competent analyses of environmental effects, safety, specificity, effectiveness, and costs. The full range of alternatives including chemical, biological, and physical methods, and no action will be considered. When it is determined that a pesticide must be used in order to meet important management goals, the least hazardous material that will meet such goals will be chosen.

A Pesticide Use Proposal will be completed, and the Regional IPM Coordinator will review and, if applicable, approve all pesticide including those for prairie dog related issues. Pesticide use in prairie dog management may include rodenticides (commonly zinc phosphide) for direct control of prairie dogs, and insecticides (commonly deltamethrin) for control of fleas in prairie dog burrows (usually to deter or avoid the spread of plague).

Animal Welfare Act, and Animal Care and Use Committee

The Animal Welfare Act (AWA) as amended (7 USC, 2131 et. seq.) requires that minimum standards of care and treatment be provided for certain animals bred for commercial sale, used in research, transported commercially, or exhibited to the public. Individuals who operate facilities in these categories must provide their animals with adequate care and treatment in the areas of housing, handling, sanitation, nutrition, water, veterinary care, and protection from extreme weather and temperatures. The USDA's Animal and Plant Health Inspection Service (APHIS) administers the AWA, its standards, and its regulations.

The AWA does not apply to common NPS prairie dog management activities, such as burrow dusting and monitoring. The current management plan was reviewed by the National Park Service Interim Institutional ACUC. The ACUC found that all actions contained in the plan were AWA Category B and thus do not require formal review.

The AWA requires an Animal Care and Use Committee (ACUC) to oversee the handling and treatment of animals used in research. If a university or other agency researchers are to conduct research in the park, they will need to apply for an NPS research permit and address ACUC approval, if deemed necessary, in that process.

RELATED PLANS AND PROJECTS

This Prairie Dog Management Plan will be consistent with ongoing or planned management activities within the park. Specific plans and policies that relate to the actions proposed in this prairie dog management plan are summarized below.

The 2001 Devils Tower Final General Management Plan/Environmental Impact Statement. The General Management Plan (GMP) outlines proposed actions to be taken to protect park resources and enhance visitor experiences at the park. The park's GMP states that the park will "[c]complete an inventory of plants and animals in the monument and regularly monitor the

distribution and condition (e.g. health, disease) of selected species that are (a) indicators of ecosystem condition and diversity, (b) rare or protected species, (c) invasive exotics, (d) native species capable of creating resource problems (e.g. habitat decline due to overpopulation)" and "take mitigating actions to restore native species and their habitats where warranted" (NPS 2001). In addition the GMP states that "[v]isitor and employee safety and health will be protected", visitors will have the "opportunity to understand, appreciate, and enjoy the monument", and the park will "[e]nsure that all programs and facilities in the monument are accessible to the extent feasible" (NPS 2001). A new Environmental Assessment is underway making amendments to the preferred alternative of the General Management Plan that includes the retention of the campground, amphitheater, and picnic area. This black-tailed prairie dog management plan is consistent with the current GMP and supports the monitoring of prairie dog populations and the protection of visitor safety and health and ability to enjoy and access all facilities in the monument.

Devils Tower National Monument Fire Management Plan 2004. The Fire Management Plan (FMP) is a detailed program of action that provides specific guidance and procedures for using fire to restore and perpetuate natural processes in the park. This is done by accomplishing the park's fire management objectives, such as: "manage wildland fires so that monument resources are protected from damage," "use wildland and prescribed fire as appropriate as a tool to meet resource management objectives," and "maintain and restore where possible the monument's natural resources and natural ecological conditions that would prevail without modern civilization." Manual fuel reduction would be used in areas with heavy fuels accumulation and cultural resources that might be damaged by prescribed or Wildland fire and prescribed burning will be used in areas with fewer values at risk and lower fuel loading. With respect to the black-tailed prairie dog, it was determined that the preferred alternative would have minimal negative impacts on small mammals. Because prairie dogs prefer disturbed areas with low vegetation, prescribed fire can influence the size, location, and grazing pressure of prairie dog colonies (Augustine et al. 2007; Klukas 1998). However, the current prairie dog colony expansion is restricted due to steep slopes and the Belle Fourche River rather than vegetation. Therefore, it is unlikely that prescribed fire even in the vicinity of the prairie dog colony would impact prairie dogs. There is a proposed prescribed burn in the prairie dog unit in spring 2014 and this action will be conducted so as to remain in compliance with the 2004 FMP.

Northern Great Plains Exotic Plant Management Plan and Environmental Assessment 2005. The Exotic Plant Management Plan uses an integrated pest management approach to exotic plant management. The management plan would have beneficial effects on wildlife by eliminating exotic plants and increasing native vegetation. The Exotic Plant Management Plan has the following practices regarding plan implementation in prairie dog colonies: 1) physical disturbance will be avoided; 2) mechanical treatments will not be used; 3) pesticides will be used only if there is no other alternative; 4) only low potential toxicity pesticides will be used; 5) herbicides that do not readily break down in the soil will not be used; and 6) ATVs will avoid physically disturbing colonies. This black-tailed prairie dog management plan is not inconsistent with the Exotic Plant Management Plan.

Wyoming Black-Tailed Prairie Dog Draft Management Plan. Wyoming Black-Tailed Prairie Dog Working Group released a draft of their prairie dog management plan in June 2001. This

document identifies and coordinates actions to facilitate the conservation of the black-tailed prairie dog in Wyoming. The goal of this plan is to "maintain the current abundance and distribution of black-tailed prairie dogs in Wyoming." The current management plan is consistent with this goal and helps meet the first two objectives of the plan to: "[m]anage for a statewide total of no less than 200,000 acres of occupied black-tailed prairie dog acreage" and "[m]aintain presence of the black-tailed prairie dogs in all of the 11 counties in the primary range of the species in Wyoming." This habitat management plan is consistent with the Wyoming Black-Tailed Prairie Dog Draft Management Plan.

Multi-State Conservation Plan for the Black-Tailed Prairie Dog in the United States. The eleven states within the range of the black-tailed prairie dog began a multi-state conservation effort in 1998 by forming the Interstate Black-tailed Prairie Dog Conservation Team. The Conservation Team developed the Black-Tailed Prairie Dog Conservation Assessment and Strategy (CA&S) in 1999 (Van Pelt, 1999). The Multi-State Conservation Plan (MSCP: Luce 2003) is an addendum to the CA&S, and was prepared to provide guidelines under which management plans would be developed by individual states and their respective working groups. The state management plans would contain the specific and measurable actions, deadlines, and objectives for that state. The MSCP target objectives include at a minimum maintaining the currently occupied acreage of black-tailed prairie dogs in the U.S., increasing prairie dog acreage to 1,693,695 acres by 2011, and maintaining prairie dog distribution over at least 75% of the counties in the historic range or at least 75% of the histories geographic distribution (Luce, 2003). The target objectives in the MSCP are minimum values based on a range-wide analysis, and the states would build upon those minimum recommendations (Luce, 2003). This habitat management plan is consistent with the MSCP.

A Plan for Bird and Mammal Species of Greatest Conservation Need in Eastern Wyoming Grasslands 2006. Wyoming Department of Game and Fish released this plan that encompasses black-tailed prairie dog management concerns, goals and objectives in eastern Wyoming. This document provides guidance for the management of prairie dogs on federal, state, and private lands in the state. The objectives of this plan are to " enhance and conserve grassland habitat quality, and where opportunities exist, increase grassland habitat quantity, thereby improving the long-term viability of terrestrial wildlife species endemic to grasslands, maintain effective inventory and monitoring programs for both habitat and wildlife; implement this plan's proposed conservation actions, recommended support actions, and species-specific actions and monitoring strategies; develop an understanding of the needs and values of private landowners and resource managers to identify areas where WGFD conservation interests complement or enhance landowner needs; develop an information source for landowners that want to improve or restore grassland habitat." Specific to black-tailed prairie dogs and relevant to Devils Tower National Monument prairie dog populations, the plan proposes to maintain similar acreage to black-tailed prairie dog habitat currently occupied, evaluate monitoring results to make assure objectives from Luce (2003) are met, continue inventory and monitoring efforts, and develop information about the role of prairie dogs in ecosystems. This habitat management plan is consistent with the Plan for Birds and Mammal Species of Greatest Concern.

DESIRED FUTURE CONDITION OF THE BLACK-TAILED PRAIRIE DOG POPULATION AND HABITAT AT DEVILS TOWER NATIONAL MONUMENT

This prairie dog management plan intends to maintain a black-tailed prairie dog population that can persist through environmental perturbations and coexist with other resources and visitors, particularly species that depend on prairie dogs and their habitat and vegetation. The desired condition would include a prairie dog population, in terms of areal extent and distribution that can withstand or at least recover from stochastic events such as prolonged drought or possibly a plague epizootic. At the same time, the population would be able to coexist with other park resources and not compromise other park goals and objectives. Habitat conditions in the prairie dog colony would include a vegetation community comprised of native species with a complement of plant species that reflects the typical species composition associated with healthy prairie dog complexes (Agnew *et al.* 1986; Detling and Whicker 1988). The fauna typically associated with the prairie dog would be present and the interdependence between species that is specific to the altered prairie dog colony habitat (i.e. system of burrows, soil mixing, increased water infiltration) would be exhibited.

To achieve the goals of this plan, natural processes would be allowed to continue wherever possible. It is understood that prairie dog colonies are not static and they would be allowed to expand and contract largely unimpeded, within areas designated as potential colony (See Fig.2). However, there are areas of suitable prairie dog habitat where prairie dog colony expansion would not be allowed (Fig. 2), such as developed zones within the park (i.e. campground, amphitheater, sculpture and picnic area). Measures would be taken to control prairie dogs in the areas where they conflict with other park management goals. Non-lethal and lethal population controls (identified below) would be used to manage prairie dogs to meet needs in these particular locations.

Visitors would continue to be able to view prairie dogs in their colonies, observing their foraging and social habits in conjunction with NPS interpretive messages, which would help park visitors understand the role that prairie dogs play in the prairie ecosystem.

PRAIRIE DOG MANAGEMENT

Impact Topics and Management Issues

Impact topics were used to focus the evaluation of the potential environmental consequences of the alternatives. Impact topics, issues, and concerns regarding prairie dog management will be derived from public and internal scoping sessions; federal laws, regulations, and orders pertaining to the environment; on NPS Management Policies 2006; guidance from the National Park Service, and resource information specific to Devils Tower National Monument. The main issues associated with the management of black-tailed prairie dogs at Devils Tower National Monument include the following:

A brief rationale for the selection of each impact topic is given below, as well as the specific concerns regarding the topic in relation to this management plan or rationale for dismissing specific topics from further consideration. The impact topics carried forward for the

management of black-tailed prairie dogs at Devils Tower National Monument include the following:

Preventive Management Actions

Preventive management actions under this prairie dog management plan would be designed to avoid later circumstances (such as prairie dog colony expansion into undesired areas) which could require substantially more effort and/or expenditures. Possible preventive actions proposed include the establishment of a temporary physical barrier and/or a permanent natural vegetative barrier between the prairie dog colony and the campground, amphitheater, and sculpture.

Physical barrier: A physical barrier, either permanent or temporary, would be established between the prairie dog colony and campground, amphitheater, and sculpture. Physical barriers are somewhat successful at maintaining or limiting prairie dog populations within certain areas (Witmer et al. 2008; Witmer and Hoffmann 2002). Other studies have found some types of physical barriers to be ineffective at reducing recolonization rates of prairie dogs (Hygnstrom 1995). The physical barriers should be set up before emergence of juvenile prairie dogs in early- to mid-May. The most commonly used physical barriers are vinyl fencing or privacy fencing but any and all viable alternatives would be considered including rock walls, erosion control fabric, etc. This barrier will serve as a control while a natural barrier of shrubs and tall grasses is established. Interpretive signs would be installed along the physical barrier to inform the public of the purpose of the barrier and the human health concerns associated with prairie dogs. Once vegetation is established the physical barrier may be removed.

For guidelines for establishing a physical barrier see guidelines developed by the Cities of Fort Collins and Boulder in Colorado (Appendix D). The type of barrier installed would be determined by the site location, success of previous exclusion attempts, and would not be limited to fabric, rock, fence, or other materials. The disturbed soil will be reseeded with native plants following installation of the barrier and any exotic species encountered will be removed during barrier installation according to NPS IPM guidelines.

Natural barrier: A vegetative buffer would be established between the prairie dog colony and the campground, amphitheater, and sculpture, as appropriate. Because prairie dogs are limited in their dispersal by habitat preferences, the presence of suitable soils, slope, and vegetation could control where prairie dog colonies are located on the landscape (NRCS 2001). Natural vegetation barriers can be used to maintain prairie dog populations within a certain area (Witmer and Hoffmann 2002). Since a vegetative barrier requires time for vegetation to establish, this will be done in conjunction with a permanent and/or temporary physical barrier. The physical barrier (see above) will be established to prevent prairie dog expansion into undesirable areas and to protect the vegetative buffer until vegetation reaches a size and density great enough to deter prairie dog use (potentially several years).

Transplants of native shrubs such as *Rosa arkansana* (prairie rose), *Rosa woodsii* (Wood's rose), or *Artemesia* sp. (sagebrush) and tall grasses such as *Achnatherum hymenoides* (Indian ricegrass), *Pascopyrum smithii* (western wheatgrass), *Pseudoroegneria spicata* (bluebunch wheatgrass), or *Andropogon gerardii* (big bluestem) would be planted in areas where future colony expansion is anticipated and would be undesirable (i.e. between prairie dog colony and the campground, amphitheater, and sculpture). Any exotic species encountered during planting of natural barrier will be removed according to NPS IPM guidelines. The vegetative buffer should be established at the maximum width possible given the constraints of the campground and trail location. Breakthrough is minimized at vegetation heights of 15.5 inches and visual obstruction measuring 3.9 inches cm (Terrall 2006). Visual obstruction can be measured following Robel et al. (1970). If necessary for establishment, shrubs will be watered throughout the summer.

Following the establishment of the natural and physical barriers, prairie dogs on the campground side of the barriers would be live-trapped and relocated or otherwise removed.

Effective Communications

Interpretive signage along the entrance road will remain in place. Interpretive information on prairie dogs' function in the ecosystem, the management policies and plans regarding prairie dog management actions, and prairie dog management issues (e.g. human health concerns and population dynamics) will continue to be provided to the public through The Tower Columns (park newspaper), the pamphlet/map given to all visitors at arrival, and ranger interpretive programs.

Individuals who may be potentially affected by prairie dog management actions (adjacent land owners, Tribal members, other state and federal agencies) would be notified of such activities.

The Standard Operating Procedure for Plague Outbreak (Appendix C) provides guidelines on providing accurate and timely information dispersal through public notices or to news media, particularly during plague occurrences.

Triggers for Management Actions

Issues and concerns which may trigger management actions were identified during internal and public scoping. The main issues associated with the management of black-tailed prairie dogs at Devils Tower National Monument include the following:

Natural Resources

<u>To assist in the conservation of federal, state or locally endangered, threatened, imperiled or rare species and to preserve and ensure sustainability of the ecological integrity and biological diversity of natural ecosystems:</u>

- The management plan will maintain prairie dogs as a keystone species in a mixed-grass prairie and as a rare species through continued monitoring of density, occupied habitat, and prairie dog population status and condition. (Management Actions: Live Trapping and Relocation, Monitoring and Research, Reestablishment if necessary).

Public Relations and Perceptions

To ensure effective communication and collaboration with park visitors, neighbors, and partners:

- The management plan will assist the public, neighbors, and/or partners in understanding the ecological importance of prairie dogs in natural ecosystems (Management Actions: Interpretation, Public Education).

- The management plan will assist the public, neighbors, and/or partners in understanding human health concerns and management actions (Management Actions: Interpretation, Public Education, possible Reestablishment, Relocation, and Lethal Control).

Public Health and Safety

To protect the integrity of developed facilities, or park infrastructure**:**

- The management plan will prevent damage to developed facilities in close proximity to prairie dog colonies (Management Actions: Preventive Measures, Live Trapping and Relocation, Lethal Control, and Monitoring).

To manage human health concerns and/or to protect human safety:

- The management plan will strive to prevent the spread of disease within and external to the park (Management Actions: Population Monitoring, Interpretation, Public Education, Flea Monitoring, Relocation, Lethal Control, and Standard Operating Procedure for Plague Outbreak)

Management Action Options

The strategies proposed in this management plan are designed to meet NPS and park objectives for black-tailed prairie dog populations while addressing the issues related to prairie dog management described previously in the "Purpose and Need" section. A range of management alternatives for the black-tailed prairie dog plan were developed by National Park Service and university biologists and resource managers utilizing agency comments. Devils Tower National Monument will have a variety of tools, both non-lethal and lethal, with which to manage prairie dogs under this plan. The tools used in a specific situation depend on the success of other tools, the time of year, available staff, and conflicts with other management issues. Prairie dog control measures will be evaluated to select the method or methods that will be effective for the specific situation that has the least impact to the park's resources and prairie dog population as a whole.

The park would use appropriate Integrated Pest Management procedures to evaluate appropriate courses of action in the event that control measures are employed.

The following management strategies may be employed:

Monitoring and Research

Monitoring is the systematic collection and analysis of resource data at regular intervals to predict or detect natural and/or human-induced changes, and to provide the basis for appropriate management responses.

Prairie Dog Population Monitoring: Annual monitoring of the Devils Tower prairie dog colony will continue to determine the occupied acreage and estimate general density of the monument's prairie dog population. This will ensure that acreage level and population size are consistent with the objectives of the plan (described in the "Purpose and Need" section of this document). Devils Tower National Monument currently monitors black tailed prairie dogs by measuring annual prairie dog colony acreage and using weekly visual counts of prairie dog density throughout the summer. Visual counts of prairie dog density are done during periods of high prairie dog activity by walking through the colony and counting visible prairie dogs. The occupied acreage of the colony is monitored annually by mapping the boundary of the colony based on clipped vegetation lines several times throughout the summer.

Flea Monitoring: In addition to the above monitoring of prairie dog populations, flea monitoring and collection will occur following the protocols established in Appendix B if at any point during the year a significant reduction in prairie dog density is noted or dead prairie dogs are found. If at any point an outbreak of sylvatic plague is suspected, the appropriate authorities will be notified and the appropriate actions taken (Appendix B and C).

Management Effects Monitoring: Monitoring prior to and following a management action will be completed to determine the effectiveness of the action. This monitoring needs to be appropriate for the management action taken. For example, vegetation transects to determine plant density or other parameters may be done if a vegetative barrier is developed to control prairie dog movements, as well as monitoring prairie dog presence and or densities on either side of the barrier.

Research: Research opportunities for studying prairie dogs in the park will continue to be encouraged and will occur on a funding available basis. Issuance of permits and ensuring permit compliance will continue to occur.

Live-Trapping and Relocation

This control method could be used for animals encroaching on park facilities, assuming a suitable relocation area has been identified and adequate staff is on hand to set and monitor traps throughout the day. Live trapping prairie dogs and relocating to a willing taker outside the park or donating them to the Black-Footed Ferret Recovery Program (Contact: Black-footed Ferret Recovery Implementation Team, P.O. Box 190, Wellington, CO 80549) could reduce prairie dog

populations in the park where they are not desired. If suitable habitat for prairie dog introduction were located in Devils Tower National Monument, new prairie dog colonies could be established by relocating the animals to prepared sites at the discretion of the park superintendent once appropriate NEPA compliance has been completed. See guidelines under reintroduction for live trapping methods.

The Wyoming Game and Fish Department will be consulted prior to any relocation efforts so that necessary permits (Chapter 10 and 33) may be obtained. The Wyoming Game and Fish Commission must approve any relocation of black-tailed prairie dogs within and from outside the state of Wyoming. Approval is given on a case-by-case basis and under consultation with Wyoming Game and Fish permitting office and the regional biologist. If this management option is pursued, the Wyoming Game and Fish Directors Office will be contacted early in the process to get the relocation proposal on the WGF Commission agenda in a timely manner. See Appendix E for live trapping protocol from NPS.

Reestablishment

If the black-tailed prairie dog colony at Devils Tower National Monument were eradicated, reintroduction could be used to re-establish prairie dogs within the existing prairie dog colony boundaries.

The Wyoming Game and Fish Department will be consulted prior to any reestablishment efforts so that permits (Chapter 10 and 33) may be obtained. The Wyoming Game and Fish Commission must approve any reintroduction of black-tailed prairie dogs within the state of Wyoming. Approval is given on a case-by-case basis and under consultation with Wyoming Game and Fish permitting office and the regional biologist. If this management option is pursued, the Wyoming Game and Fish Directors Office will be contacted early in the process to get the reestablishment proposal on the WGF Commission agenda in a timely manner.

The art and science of such reintroduction continues to evolve (Bly-Honness et al. 2004, Long et al. 2006). Some studies have shown that the more individuals relocated, the higher the probability of success (Robinette 1995). The best techniques to date based on Long et al. (2006) are:

1. Capture prairie dogs between late June and mid-September using wire mesh livetraps (such as the "Tomahawk" brand trap used in small mammal studies). Place the traps on level ground within 1-2 yards of the burrow entrance and bait them with horse sweet feed, mixed grain, or whole oats. Check traps several times per day (more frequently in hot, sunny weather or during snow or cold rain; overheating in hot weather is the most common cause of prairie dog mortality during live trapping). The source population should have as high a prairie dog density as possible. Colonies that have been little disturbed by poisoning or trapping should be favored. Note that live trapping is easiest on those colonies (portions of colonies) that have little or low-quality forage. (Long et al. 2006). Transplant success may be enhanced by relocating as many family members as possible (Shier 2004, but see Long et al. 2006).

2. Reintroduction should involve 60-100 prairie dogs, for which ages and sexes approximate natural conditions (i.e. more adults than juveniles and more females than males).
3. Consider dusting the prairie dogs while they are in the live traps with insecticide dust such as carbaryl or permethrin to kill fleas.
4. Transport prairie dogs in holding cages, such as "Havahart" rabbit hutches. Be sure to protect the prairie dogs from prolonged direct sunlight, precipitation, or high (>70F) or low (<40F) temperatures.
5. The new site should have had all tall vegetation removed from at least an area of 4-5 acres by mowing, grazing, or burning.
6. Post-release monitoring of prairie dogs should be implemented.

Lethal Control for Reduction or Eradication

Nuisance and pest animals may be controlled in limited or localized situations where a problem exists because of conflicts with human safety, property, natural features, cultural resources, or park facilities or operations. Along with control methods discussed above, lethal control may be used to remove prairie dogs from areas where they are not desired, once these areas have been identified and boundaries delineated. Lethal control can be used where immediate removal is needed, and as a short-term resolution while longer-term solutions (e.g. natural or physical visual barriers) are being put in place. Due to the limited number of animals needing control and the proximity to high visitor use areas, the only method of lethal control currently available for use at Devils Tower is fumigation with gas cartridges (Myron Chase, personal communication). Lethal control may be used at Devils Tower to prevent the encroachment of prairie dog colonies into areas utilized to meet other park goals, such as the campground, amphitheater, and sculpture and prevent excessive contact between visitors and prairie dogs. When encroachment into these areas occurs, fumigants may be used in burrows following the protocols outlined below and in Appendix C. All label directions with respect to the application of fumigants would be followed by all NPS staff involved in their application and the appropriate Job Hazard Analysis and other safety considerations will be reviewed and adhered to.

Gas cartridges are incendiary devices designed to give off carbon monoxide when ignited. They are specifically made for use in rodent burrows (Gas Cartridge – EPA Reg. No. 56228-2). These are most effective when the ground moisture is high, such as in the spring or after soaking precipitation. Care should be used during dry weather and vegetation as the gas cartridges can present a fire hazard. The use of gas cartridges must be approved through the Integrated Pest Management process and requires an annual Pesticide Use Proposal. Cartridges can be obtained through APHIS wildlife control offices. Hygnstrom et.al. 2002 and Virchow et.al 2002 provide additional information on the use of gas cartridges for prairie dog control.

Interpretation and Public Education

Interpretive signs and pamphlets will be evaluated on a regular basis to determine the need for updating information. Prairie dog crossing signs may be implemented along the entrance road to alert vehicles to slow down near the prairie dog colony to reduce prairie dog mortality. Additionally, new signs indicating human health and safety hazards associated with prairie dogs may be implemented both at the pullouts on the entrance road and where the trails around prairie

dog colony come into the visitor use areas indicating potential hazards associated with prairie dog (i.e. biting, plague and stepping in burrows, and feeding anthropogenic foods).

Standard Operating Procedure for Plague Outbreak

A Standard Operating Procedure for Plague Outbreak at Devils Tower National Monument is in Appendix C.

PLAN FOLLOW-UP AND EVALUATION

Management Action Reporting

Management actions conducted under this plan will be fully documented as to methods used and effects on prairie dogs and/or their habitat. Completed reports will be kept on file in the Resource Management files. Examples: annual reports to provide monitoring data on prairie dog occupation, population level, flea sampling, etc.; a report documenting live-trapping and relocation efforts; reports documenting plague detection and associated management actions taken.

Evaluation of Management Actions Taken

Management actions will be evaluated and critiqued by participants, Devils Tower National Monument Natural Resource personnel and others (researchers, biologists, etc) as needed, for improving management strategies and procedures. Examples: synthesis of monitoring data to evaluate relocation and reintroduction efforts; assembling data and information on actions taken during a plague outbreak to review and determine if more effective or efficient actions could be recommended the future.

Evaluation and Revision of Plan

The Resource Management Division will be responsible for preparing and submitting annual summary reports for prairie dog management activities for the year, and for updating the Prairie Dog Management Plan. Review of the Management Plan may be conducted on an annual basis and will be conducted by the park Management Team with employee input encouraged. Major review and changes will be carried out every 5-10 years or when environmental conditions change significantly from when the plan was first approved. Other agencies will be sent copies of the Management Plan for review, when the major review process is undertaken, for their evaluation and comments. Comments and suggestions received will be considered and substantive comments will be incorporated into the Management Plan as appropriate.

The management strategies and options identified in this plan are based on an adaptive management process. This management approach recognizes that knowledge of natural resources and associated processes are often limited, unknown, or difficult to predict. As such,

adaptive management requires: (1) management actions to be based on clearly identified goals and outcomes; (2) the use of monitoring to ensure management actions are meeting the identified goals/outcomes; and (3) the use of new information to re-evaluate management activities and goals and/or to facilitate management changes, if needed.

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APPENDICES.

APPENDIX A: BLACK-TAILED PRAIRIE DOG TAXONOMY, DESCRIPTION, DISTRIBUTION, AND LIFE HISTORY

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BLACK-TAILED PRAIRIE DOG TAXONOMY, DESCRIPTION, DISTRIBUTION, AND LIFE HISTORY

Source: Van Pelt, W.E. 1999. The black-tailed prairie dog conservation assessment and strategy. Nongame and Endangered Wildlife Program Technical Report 159. Arizona Game and Fish Department, Phoenix, Arizona.

LIFE HISTORY

Black-tailed prairie dogs are highly social animals. They live in colonies or towns, which cover from one acre to thousands of acres of grassland habitat. A family group, or coterie, is made up of an adult male, one to four breeding females and their offspring younger than two years of age. With the emergence of young, coteries can number as many as 40 individuals (Hoogland 1996). Black-tailed prairie dogs are active all year long, but during extremely cold weather will remain underground for several consecutive days.

Black-tailed prairie dogs become sexually mature in the second February or March following birth (Hoogland 1996). Breeding season varies with latitude, starting in January in the southern parts of its range and continuing into April in the northern part (Hoogland 1996). They normally have one litter per year and sizes range from one to eight young. However, due to mortalities, on the average, only three individuals survive and come above ground. Pups emerge at about 41 days and will stay with their natal coteries for a minimum of two years (Hoogland 1996). Prairie dogs have been documented to live up to eight years in the wild (Foster and Hygnstrom 1990).

Black-tailed prairie dogs are herbivores and feed on a variety of vegetation including grasses and forbs (Koford 1958), and to a lesser extent seeds and insects (Foster and Hygnstrom 1990). Shortgrass species commonly eaten by prairie dogs include buffalograss (*Buchloe dactyloides*) and blue grama (*Bouteloua gracilis*). It has been estimated that it takes 256 prairie dogs to eat as much as one cow eats in one month (Koford 1958). Grasses and other vegetation are clipped close to the ground to allow for a greater range of sight. The digging actions of prairie dogs contribute to enhancing soil structure, water filtration, and forb growth.

Ungulate species seek out and take advantage of the highly nutritional vegetation created by prairie dogs continuously clipping it (Foster and Hygnstrom 1990). Besides attracting ungulates, prairie dogs and their colonies also are used by a wide variety of wildlife species. A number of species prey on prairie dogs, and in the case of the black-footed ferret, have become very specialized in killing this communal rodent (Koford 1958). Because the black-tailed prairie dog influences ecosystem functions through its activities in unique and significant ways, it is considered by some as a keystone species of the prairie grasslands (USFWS 1999).

However, the same activities some consider as a necessity to the grassland ecosystem, others consider them as a nuisance. In a study by Conover and Decker (1991), prairie dogs, and their activities were identified by some as causing the worst damage by any wildlife species in their state and contribute hundreds of thousands of dollars worth of damage to agriculture crops, earthen dams, airports, and golf courses annually. In addition to damages, prairie dog species can

be a health hazard. Cases of human death due to plague contracted from handling Gunnison's prairie dog have been documented in Arizona (ADHS 1993).

TAXONOMY

Taxonomists recognize two subspecies of black-tailed prairie dogs*: Cynomys ludovicianus ludovicianus* and *C. l. arizonensis* (Hall 1981). Black-tailed prairie dogs that occurred in Arizona, southern New Mexico, western Texas and northern Mexico are typically considered Arizona blacktailed prairie dogs, while others elsewhere are considered plains black-tailed prairie dogs. These two subspecies have been the subject of several investigations including those of Hollister (1916), Pizzimenti (1975), Hansen (1977), and Chesser (1981). Regardless of conclusions made during these and other investigations, it is generally recognized that *arizonensis* is only slightly differentiated from the nominant form *ludovicianus*. For purposes of nomenclatural convenience, regarding this species as monotypic may be adequate. However, from the standpoint of evolution, the uniqueness of populations throughout their range must be given serious consideration.

DISTRIBUTION

Early accounts about prairie dogs, although anecdotal at times, indicate they occurred in large numbers. Naturalist Ernest Thompson Seton estimated that five billion black-tailed prairie dogs inhabited the North America prairies in the early 1900s (Seton 1953). However, since that time prairie dog numbers and distribution have been greatly reduced across their range. This reduction resulted from a number of factors including intensive control programs, conversion of habitat to croplands, disease epizootic, and urbanization. Historic and current distributions of black-tailed prairie dogs in Wyoming and the surrounding states are detailed below by state. For distributions of black-tailed prairie dogs throughout their range see the source article.

Colorado

In the 1800s, black-tailed prairie dog towns covered large portions of the eastern 1/3 of Colorado. Cary (1911) stated "[t]here is probably not a county east of the foothills in which it is not present in considerable numbers, and colonies are found in some of the broader foothill valleys to an elevation of 6,000 feet." Lechleitner (1969) cites Hollister (1916) as a source that indicated "...this species was very abundant on the plains of Colorado and often occurred in towns covering several square miles." However, no early estimates on the acreage inhabited by prairie dogs are available for Colorado.

Historical estimates suggest that 20 percent of the short- and mid- grass prairies may once have been inhabited by prairie dogs (Laurenroth 1979). If it is assumed lands used for dry-land and irrigated crops within the black-tailed prairie dog range were once suitable habitat, and that a 20% occupation rate is reasonable, then historically, black-tailed prairie dogs occupied approximately 4.6 million acres in Colorado.

Colorado has no current statewide, scientifically based estimate of habitat occupied by black-tailed prairie dogs. Prior to 1979, most reports of prairie dogs in Colorado were anecdotal in nature. A 1978 and 1979 survey of 12 counties in eastern Colorado mapped 24,600 acres of

black-tailed prairie dog towns (Bissell et al. 1979). The counties surveyed represent approximately 48% of the land area of the counties in eastern Colorado within the species range. This survey did not include the rapidly developing counties along Colorado's Front Range, where as much as 39,000 acres were occupied by prairie dogs. Extrapolating the acreage yields an estimate of approximately 50,800 acres, and with the addition of 39,000 acres of prairie dog towns along the Front Range yields a total estimate of approximately 89,000 acres occupied by black-tailed prairie dogs in eastern Colorado at that time. In contrast, Colorado Agricultural Statistics Service estimated approximately 1,553,000 acres being occupied by prairie dogs in Colorado. However, this survey included all prairie dog species, and landowners were asked to estimate occupied acreage. However, due to prairie dog species distribution the Colorado Department of Agriculture interprets the results to over 930,000 of the acres identified in the survey were black-tailed prairie dogs. In 1998, Knowles (1998) estimated 44,000 acres were occupied in areas outside agricultural and private lands in eastern Colorado.

Regardless of the lack of complete information, it is clear the black-tailed prairie dog in Colorado has undergone a substantial reduction in population size (number and size of towns) since the early 1900s; however, they are still abundant in many localities (Fitzgerald et al. 1994). Limited acres of small scattered black-tailed prairie dogs colonies exist on parcels of public lands administered by the Bureau of Land Management (BLM) in eastern Colorado. Few colonies exceeded 49 acres (Lechleitner 1969), with a mean colony size of 43 acres (Bissell et al. 1979).

Montana

Although the original abundance of prairie dogs in Montana is unknown, early accounts indicate they were abundant and widely distributed east of the Continental Divide (FaunaWest 1999). Lewis and Clark reported prairie dog colonies along the Missouri River were common and some were three to seven miles long (FaunaWest 1999). There are anecdotal accounts of prairie dog towns stretching from the Little Rocky Mountains to the Larb Hills (FaunaWest 1999). Flath and Clark (1986) estimated prairie dog acreage in southeastern Montana at 117,492 acres based on railroad survey notes recorded from 1908-1914.

Prairie dogs were intensely controlled with toxicants in Montana starting at the time of settlement. Control efforts peaked during the 1920s and 30s resulting in a substantial decline in prairie dogs. For example, over 172,000 acres were poisoned in Phillips County during this period. Declines in prairie dog numbers continued until 1972 when the use of Compound 1080 was banned on Federal lands.

Plague and conversion of habitat to agricultural use continue to impact prairie dogs in Montana. The first attempt to estimate prairie dog acreage occurred in the late 1980s. Campbell (1989) estimated over 100,000 acres located in about 1,000 colonies east of the 110 meridian. However, much of the information was not based on actual field surveys and the degrees of certainty for this estimate is low (FaunaWest 1999). In 1995, Knowles and Knowles updated the Campbell information and estimated 80,000 acres. FaunaWest (1999) estimated 1,353 colonies covering 66,139 acres. Colony size average was 49 acres.

South Dakota

Presettlement estimates of South Dakota's prairie dog acreage are anecdotal, as are many such wildlife population estimates. In 1923, it was estimated approximately 1,756,720 acres of occupied black-tailed prairie dog habitat existed in South Dakota, following the initiation of control efforts in 1918. Estimates for prairie dogs in the 1960s ranged from 33,000 acres to 60,000 acres in 1968. Hansen (1988) reported statewide acreage for 1968 as 61,000 acres. Tschetter (1988) reported results of a prairie dog survey questionnaire, estimating 184,000 acres in 1987, with more than 75% of this acreage on tribal lands. In 1996, South Dakota Department of Game, Fish and Parks (SDGFP) completed a similar survey questionnaire, resulting in a statewide prairie dog acreage estimate of 264,000 acres (SDGFP 1996), with 58% reported on tribal lands, 43% on private lands, 9% on federal lands, and 4% on state lands. A recent report, based on a interview with a state agency representative, estimates 244,520 acres of occupied habitat in South Dakota, which is 36% of the habitat in the United States (Knowles 1998).

No comprehensive statewide prairie dog acreage survey has been conducted in South Dakota. Recent statewide estimates are based on questionnaires of land management agency representatives, with varying levels of ground-truthing associated with the estimates. However, the Cheyenne River Sioux Tribe and several federal land management agencies, such as Wind Cave and Badlands National Parks and Nebraska National Forest, have implemented prairie dog acreage monitoring programs (USDA-Forest Service 1988).

Wyoming

The historical range of the black-tailed prairie dog includes approximately the eastern third of the state and was contiguous with the range of the species on the Great Plains. Elevation (approximately 5,500 feet) and vegetation define the western edge of the range. The habitat changes from Great Plains to the Intermountain West. The western range boundary follows a line from the Wyoming-Montana state line along the east slope of the Bighorn Mountain Range, then southeast along the east slope of the Laramie Mountains to the Wyoming-Colorado state line.

The black-tailed prairie dog has undergone severe reduction in occupied range and population in Wyoming since settlement and the advent of farming and ranching. Occupied range has been reduced by over 80% from pre-settlement (Campbell and Clark 1981). Similar to other parts of the historical range, the major reduction in prairie dog populations probably occurred in the early 1900s when poisoning programs began in earnest.

The Wyoming Game and Fish Department (WGFD) conducted prairie dog colony mapping between 1982 and 1987 to identify potential black-footed ferret populations and/or reintroduction sites. Mapping was concentrated in the primary range of the species in Wyoming. Small, scattered colonies were thought to occur in the Bighorn Basin but were not mapped. In 1987, estimates indicated that within the primary range 73 townships supported between 1,000 and 2,000 acres of prairie dog colonies, and 29 townships supported over 2,000 acres of prairie dog colonies. The data indicated a minimum of 131,000 acres and a maximum of 204,000 acres. In 1998, the Wyoming Department of Agriculture (WDOA) estimated 362,284 acres of occupied black-tailed prairie dog habitat in their Weed and Pest Districts and Conservation Districts (pers. comm. Reichenbach 1999).

Conversion of native rangeland to cropland is occurring at a very negligible rate in eastern Wyoming. Poisoning of black-tailed prairie dogs continues, and estimates indicate that acreage remaining decreases a few percent annually in localized areas. Data have not been collected in such a way that annual or long-term increases or decreases by colony, complex or county could be monitored. The five-year Objective in the WGFD Nongame Bird and Mammal Plan is to maintain black-tailed prairie dog distribution in a minimum of 102 townships, and all counties, within the range and at a level of 167,500 acres.

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APPENDIX B: PLAGUE AND FLEA MONITORING

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(Information in this appendix is from: Western Association of Fish and Wildlife Agencies. 2006. Draft Gunnison's prairie dog conservation plan: addendum to the white-tailed and Gunnison's prairie dog conservation strategy. Western Association of Fish and Wildlife Agencies. Laramie, Wyoming. Unpublished Report. 41 pp.)

Prairie Dog Sylvatic Plague Monitoring Protocol

Since its documented appearance in wild rodents on the Pacific Coast of North America in the early 1900s, sylvatic plague has spread eastward to approximately the 103rd Meridian, affecting sciurid and cricetid rodents, insectivores, lagomorphs, carnivores, and humans (bubonic plague) (Barnes 1982; Cully 1993). Prairie dog species are extremely susceptible to this typically flea-borne disease and may serve as "amplifying hosts" (Barnes 1993).

Plague epizootics may originate from focal areas, with possible maintenance in non-focal areas between epizootics. During epizootics, plague can spread over great distances and in the process affect humans, most often during and shortly following epizootics (Cully 1993). Several wildlife species are considered enzootic or maintenance species for sylvatic plague, meaning individuals have some or considerable resistance to the disease. Examples include the California vole (*Microtus californicus*) in San Mateo County, California, kangaroo rats (*Dipodomys* spp.), deer mice (*Peromyscus maniculatus*), and northern grasshopper mice (*Onychomys leucogaster*) (Cully 1993).

In the past, plague has been monitored for the protection of human health and conservation of prairie dog populations for ecosystem values, particularly protection of reintroduced populations of black-footed ferrets

Application of deltamethrin insecticide (e.g., Deltadust), as a prophylactic treatment for flea control in burrows, is sometimes used prior to prairie dog relocation into plague-affected colonies. This technique may have limited applicability for flea control in other situations and is the only active treatment method currently available.

Sylvatic plague surveillance methods are summarized below.

Technique	Description
"Windshield surveys"	General observations of prairie dog towns to detect die-offs, with follow-up evaluations needed to confirm cause and status.
Collection and analysis of dead prairie dogs	Prairie dogs often die in burrows, but a small percentage of those exposed to plague die above-ground and can be picked up if colonies are regularly surveyed for dead and dying prairie dogs
Collection and analysis of fleas from prairie dog burrows	This technique has had widespread use as a surveillance technique for human health concerns.

Technique	Description
Collection of blood samples from members of Order Carnivora, especially coyotes and badgers	Although such species as badgers and coyotes can become infected with plague, their primary role in the disease cycle is the transport of plague-infected fleas (Poland and Barnes 1979 cited in Gage et al. 1994). Nobuto blood-sampling papers have been used extensively, since the technique does not require access to refrigerators and requires only 0.2 ml of blood (Wolff and Hudson 1974, Gage et al. 1994). This technique has recently been used in association with black-footed ferret reintroduction, either via collection of blood samples from live animals, dead animals collected for this purpose, or animals killed during animal damage control activities (Anderson et al. Undated, Williams et al. 1998, Matchett 2001). In addition, black-footed ferrets captured for removal of radio collars, for implantation of transponder chips, or for canine distemper vaccination can be bled for disease analysis samples.
Collection of blood samples from domestic dogs	Barnes (1982) reported using domestic dogs as sentinels for exhibiting antibodies to plague. This technique has been effective on Native American reservations in the Southwest to detect seroconversion before plague was observed in rodents or humans.
Collection of blood from potentially resistant small mammals	Certain rodent species appear to be resistant to plague and may serve as maintenance or enzootic hosts that maintain plague between epizootics (Cully 1993, Gage et al. 1994). The Wyoming Game and Fish Department has monitored small mammals for plague seroconversion in Shirley Basin, Wyoming (Luce et al. 1994, 1996, 1997). Trapping efforts focused on deer mice and grasshopper mice, with the assumption that active plague would be detectable by antibodies produced during the short life span of these rodents. These investigations detected a relationship between seroprevalence of plague in deer and grasshopper mice and status of white-tailed prairie dog populations in Shirley Basin.

ACTIONS:

1. Staff initiates a public information program to inform adjacent landowners, visitors, and other members of the public concerning the need to notify the agency of die-offs of prairie dogs or ground squirrels.

2. Staff informs state wildlife management agency personnel, adjacent land management agencies, local veterinarians, and other government personnel that deal with animal control, or have regular contact with landowners and the public, of the need for reporting die-offs.

3. Staff may provide, as needed, information for state wildlife management agency personnel, adjacent land management agencies, local veterinarians, and other government personnel that

deal with animal control, on protocols for collection of dead prairie dogs and ground squirrels, packaging and record keeping.

The Centers for Disease Control (CDC), Fort Collins, Colorado has extensive experience conducting disease surveillance in wild mammals. CDC does not charge for diagnostic services, but has limited laboratory capacity. In addition to testing for plague, specimens may also be tested for tularemia, pasteurellosis, undetected poisoning, drowning, and predator kill.

4. Staff will develop windshield survey routes throughout the prairie dog habitat to be conducted on a routine basis (e.g. biweekly, monthly, annually) by staff where prairie dogs occur, particularly during March and April. Windshield surveys will follow the CDC protocol (attached). Significant decline in any colony or complex should be immediately reported to the park resource manager.

   In the event of a suspected die-off (if a windshield survey route reports a significant loss of prairie dogs or ground squirrels), the staff will implement the plague contingency plan immediately (attached).

   A. Make inquiries to determine whether or not the colony was poisoned, or whether mortalities were due to shooting.

   B. If neither shooting nor poisoning occurred, the colony or complex should be searched for prairie dog and ground squirrel carcasses as soon as possible after discovery of the population decline. Carcasses should be handled in the field according to protocol (attached).

   C. In the event that carcasses cannot be found, and the disappearance of prairie dogs is verified as recent, burrow swabbing should be conducted to collect fleas according to CDC protocol (attached).

6. If plague is verified, the resource manager, in cooperation with NPS public health officials and CDC, should immediately notify, and make plague contingency recommendations to, the following: landowners and wildlife agency personnel in the affected area, state Department of Agriculture, USDA-Wildlife Services, NRCS, veterinarians, and local government personnel that deal with animal control, and the general public through local media sources. The NPS public health officials and CDC should be consulted on the need for insecticide treatment at this time to control fleas in burrows, and therein reduce the potential for further plague infections.

7. Post-plague monitoring of prairie dog colonies should be conducted annually in March or April (or more frequently, if possible) to document the rate of re-colonization and verify occupied acreage. Initial monitoring, which will take place from one to several years, should consist of windshield surveys. When visual surveys indicate prairie dog colonies are recovering, a quantitative survey method should be initiated. The recommended method, due to widespread use, particularly on black-footed ferret reintroduction sites, is transecting using

the Biggins method (Biggins et. al. 1993) that equates active and inactive burrow densities to population density.

8. The resource manager and staff should evaluate the extent of the impact of the epizootic as it affects the acreage and distribution objectives in the management plan. The group should determine whether or not there is a need to modify prairie dog management in the plague area, and potentially elsewhere in the park, if occupied acreage is below the objectives in the management plan.

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Procedure for Visual Evaluation of Prairie Dog Colonies for Plague in the Southwestern United States by the Centers for Disease Control

Source: Enscore, R. Centers for Disease Control and Prevention, NCID, Division of Vector Borne Infectious Diseases, Plague Section, Fort Collins, Colorado.

HEALTHY COLONY

OBSERVATION: The vast majority of burrows show signs of recent use, unless it has rained within the past 24 hours – in which case the colony should be reexamined following a period of at least 24 hours without precipitation. Active prairie dogs are observed during periods of acceptable weather conditions. Only a relatively few (<10%) burrow openings appear inactive (lack of disturbed soil, presence of cobwebs or wind-blown vegetation over the entrance). An occasional carcass or dried bones may be present as a result of non-plague death or predation.

EVALUATION: Unless recently (days) introduced, plague is not likely to be present. Fleas are not likely to test positive.

SAMPLE RECOMMENDATIONS: No samples recommended.

DEAD COLONY

OBSERVATION: The colony appears completely inactive. Burrows show no signs of recent use (re-examine if it has rained within 24 hours). An occasional desiccated carcass and bones may be present, and have likely been scavenged.

EVALUATION: 1) Make inquiries to determine if the colony was poisoned. This is especially likely if it appears that dirt was shoveled into the burrows. If there is no evidence of poisoning and the food supply appears ample: 2) it is likely that plague or some other zoonotic disease killed the colony. An experienced observer can usually make an estimate (recently, 1 season, or 2 seasons) on how long the colony has been inactive by considering the soil type and degree of burrow degeneration.

SAMPLE RECOMMENDATIONS: Sample only if there is no evidence of poisoning. A recent (same season) die-off might produce many fleas through burrow swabbing. Older die-offs will likely produce few or no fleas. Typically, many burrows (dozens or even hundreds) may be swabbed with only a few producing flees. If burrowing owls are using the inactive burrows, small black stick-tight fleas may be present in large numbers (in contrast to the larger, reddish-brown prairie dog fleas). Fresh or desiccated prairie dog carcasses may also be collected for analysis.

SCATTER PATTERN:

OBSERVATION: Inactive burrows constitute an unusually high (typically 20-90%) percentage of the total burrows. Active burrows however are clearly evident and active prairie dogs are observed during periods of acceptable weather. Active and inactive burrows are scattered amongst each other in no particular pattern (see below), keeping in mind that family units may have multiple burrow openings and hence an inactive unit may produce a small cluster of 2-5 inactive burrow openings. An occasional carcass (fresh or desiccated) and bones may be present.

EVALUATION: Several scenarios could account for these observations – and more than one scenario may be in play at the same place and time. Presented in order of likelihood: 1) make inquiries to determine if the colony was poisoned. This is especially likely if it appears that dirt was shoveled into the burrows. This scatter pattern could be produced if the application of poison was scattered and not comprehensive, 2) if there is no evidence of poisoning, assess the available food supply. Such a pattern of death could also be attributable to a population crash as a result of lost carrying capacity of the site or over-population, 3) if there is no evidence of poisoning or population crash, hunting by humans or excessive predation by carnivores or birds of prey are highly likely. Human hunting usually produces physical evidence such as footprints, tire tracks and spent ammunition shells. Depending upon the local culture, human hunters may collect their prey (many Native American groups regard prairie dogs as a delicacy) or leave it for scavengers. Experienced observers can often spot carnivore tracks and recognize hunting and attack patterns in these tracks near burrow entrances, 4) finally, a zoonotic disease could be responsible, but given this mortality pattern, a disease with a lower mortality rate than plague is more likely.

SAMPLE RECOMMENDATIONS: If there is no evidence of poisoning, population crash, or excessive human hunting: collect fleas by swabbing burrows – especially inactive burrows – and collect fresh or desiccated prairie dog carcasses if available.

DEAD ZONE

OBSERVATION: Within an otherwise healthy appearing colony, there is a zone of inactive burrows. This zone may encompass a relatively small or large proportion of the colony, and may be located anywhere in the colony. Eventually it spreads to encompass a section of the colony and appears to be spreading, along a discernable line of demarcation, over the remaining section of the colony. Experienced observers can often clearly distinguish and mark (flagging tape) this demarcation line between active and inactive regions. Marking allows for periodic re-examination to assess the rate of spread and facilitates sampling. Fresh or desiccated carcasses may be present. Near the demarcation line, recently inactive burrows may reveal the odor of decaying carcasses and flies may be common at burrow entrances.

EVALUATION: 1) There is a high probability that plague is active in such a colony. Although other zoonotic diseases are possible, plague is most likely. 2) Depending upon the location of the dead zone with respect to other human activity (homes, barns, etc.) poisoning is also a possibility and should be investigated.

SAMPLE RECOMMENDATIONS: Collect fleas by swabbing burrows immediately along both sides of the demarcation line, concentrating a majority of your efforts immediately along (within 10meters) the inactive (dead) side of the line. Fleas are likely to be numerous. You may wish to apply extra insect repellent but be extremely cautious not to directly or indirectly get repellent on your burrow swab! (If this happens: discard it, wash your hands, and start with a new one). If others in a group are getting fleas and you are not, and you are swabbing essentially the same area, you likely have repellent on your swab. Collect any available rodent carcasses (fresh or desiccated, prairie dog or other rodent) for testing.

Additional Notes: Please include GPS coordinates for all samples. One set of coordinates per colony is acceptable. Specify the type of inactivity pattern noted for each sampled colony: dead colony, scatter pattern, dead zone. Analysis of samples from "dead zone colonies" will receive laboratory priority.

The above activity patterns are typical for the warm months. Visual examination during winter months is more difficult due to decreased daily activity among even healthy animals.

Literature Cited:

Enscore, R. Undated. Visual examination of prairie dog colonies for plague in the southwestern U.S. Centers for Disease Control and Prevention, NCID, Division of Vector Borne Infectious Diseases, Plague Section, Ft. Collins, CO. Personnel Communication. 3pp.

Field Procedures for Collecting and Handling Carcasses as Diagnostic Specimens by the Centers for Disease Control

1. Search prairie dog colonies systematically by walking transects spaced at about 50 meters.

2. When a carcass is discovered, ascertain, if possible, whether or not the animal was shot. If mortality by shooting is confirmed, there is no need to collect the specimen.

3. Before you collect a carcass, prepare a tag with the following information: species, date, location (both legal description and UTM is recommended), name of collector, agency or affiliation of collector, telephone number and address of collector, and a brief description of circumstances for collection.

4. When collecting a carcass, the collector should wear leather or latex gloves, and a long sleeved shirt or jacket that is tight at the wrist, to ward off fleas.

5. Invert a one-gallon plastic ziplock freezer bag over your hand, grasp the carcass in your hand, quickly fold the bag over the carcass, roll the bag on the ground, away from your body, to expel the air, and seal the ziplock.

6. Immediately place in a second ziplock bag, put in the tag, roll and seal the second bag.

7. As soon as possible after collection, freeze the specimen.

8. Sample Size:

   A) If specimens are from a single sample area (one prairie dog colony or area), collect as many specimens as is practical up to 15, but initially ship only the freshest five specimens to the diagnostic lab.

   B) Freeze the additional specimens that were collected, up to ten, and save for further testing needs, depending upon the results from the testing of the first five specimens. Keep the samples until notified by the lab that results were obtained from the first five samples and that the additional specimens will not be needed.

9. Ship the frozen specimen to CDC, or designated lab.

   (DO NOT USE UPS). U.S. Postal System or FedEx can ship carcasses that are sealed in plastic bags and a cardboard box. Their regulations require:

   A) Carcasses must be individually labeled and bagged in watertight bags (minimum triple bag in ziplock bags).

   B) Placement of absorbent packing material around the carcass (crumpled newspaper, etc.).

   C) Use of approved laboratory shippers or hard-sided containers, adequately taped closed.

D) Marking of the container with "Biomedical Material" label (for U.S. Postal Service) or shipped as hazardous material by Federal Express (requires a special form and should be labeled as Diagnostic Biomedical Material on the form. Labels and forms may be obtained from the U.S. Postal Service or FedEx.

E) Carcasses should be frozen or packed with frozen ice packs (no wet ice).

10. Cost: CDC testing is free but the Ft Collins laboratory has limited capacity and can handle no more than 50 specimens per year.

11. Contact before shipping:

(Shipment by U.S. Postal System)
CDC/Bacterial Zoonoses Branch
c/o Mr. John Young
P.O. Box 2087
Ft. Collins, CO 80522

(Shipment by FedEx)
CDC/Bacterial Zoonoses Branch
c/o Mr. John Young
Rampart Road (CSU Foothills Campus)
Fort Collins, CO 80521

Procedure for Flagging (Swabbing) Rodent Burrows by the Centers for Disease Control

Source: Gage, K. Centers for Disease Control, Ft. Collins, CO.

John Young:	970-221-6444 (jyoung2@cdc.gov)
Marty Schriefer:	970-221-6479 (mschriefer@cdc.gov)
Ken Gage:	970-221-6450 (Plague Section Chief - Responsible for CDC's plague surveillance and control program. Trained as a medical entomologist/zoologist)
Rusty Enscore:	970-221-6452 (Environmental Health Specialist IV, Plague Section – Registered Sanitarian)
John Montenieri:	970-221-6457 (Biological Technician, Plague Section - GIS specialist)

Some important flea vectors of plague infest rodent species that live in burrows. Although these fleas usually can be found in abundance on live hosts, they also can be collected by a procedure known as burrow flagging or burrow swabbing.

This procedure requires:

1) Burrow swabbing device consisting of a flexible cable, wire, or strong rubber hose with spring-loaded clip attached to the end. We prefer a steel plumber's "snake" that has an alligator clip attached to (screwed onto) the end as a means of attaching the flag. A simple burrow swab can be made by attaching a flag to the end of a piece of wire (about the thickness of a coat hanger), but this primitive swab allows only the top 2 or 3 feet of a burrow to be swabbed and will miss some fleas. Despite the shortcomings of the latter technique, it can be useful when die-offs are encountered unexpectedly and more sophisticated means of swabbing fleas are not available.

2) Flags consisting of white flannel cloth squares (approx. 25 cm^2 or 10 in^2). We prefer white flannel because it is easier to see the fleas on white cloth than on cloth of other colors. Flannel is better than most other cloth because of its deep nap, which increases the likelihood that fleas will continue to cling to the cloth flag after it is removed from the burrow.

3) Plastic bags (approx. 20-40 cm^2 or 8-15 inches) (ziplock type are best)

4) Insect repellent (DEET) to spray on clothes and exposed skin on arms, legs, etc. Although this is recommended for safety reasons, care must be taken not to apply repellents to hands because the repellent is likely to transfer to the flagging material, thus preventing fleas from jumping onto the flag. Note: clothing also can be treated with permethrin-containing sprays but these sprays should not be applied directly to the skin.

Procedure:

1. Attach a flag to the clip on the end of the burrow swab.

2. Slowly insert the flag as far as possible down the burrow. The fleas confuse the flag with their normal host and cling to it as it passes through the burrow.

3. Slowly withdraw the flag from the burrow after approximately 30 seconds.

4. Quickly place the flag in a plastic bag.

7. Seal the bag to prevent the fleas from escaping.

8. Keep track of the number of burrows swabbed so that a burrow index can be calculated.

   Burrow index = no. fleas collected/no. burrows sampled - This value often increases dramatically during die-offs among prairie dogs, rock squirrels, California ground squirrels, or other ground squirrel species.

9. Place another flag on the swab and repeat steps 1-6 for each burrow.

10. Transport flags back to laboratory in the plastic bags. Keep the bags in a reasonably cool place to prevent desiccation of the flea samples (*Yersinia pestis* is very susceptible to death by desiccation) or death of the plague bacilli due to excessive heat (remember pick-up hoods can get very hot in direct sunlight! Fried samples will come back negative for plague every time!).

11. Place bags in a freezer overnight to kill the fleas.

12. Place the flags and loose contents of the plastic bags in a white enamel pan. Fleas may be picked from the flags and bottom of the pan with forceps.

13. Place fleas in vials containing 2% saline and a very small amount of Tween-80 detergent (<0.0001% of solution). Remember that the detergent is added to reduce surface tension and allow the fleas to sink to the bottom of the vial. Too much detergent will kill the plague bacteria and prevent successful isolation. Fleas can be submitted in 2% saline without Tween-80, but an effort should be made to submerge the fleas. If the fleas have been killed by freezing, this should not be a problem. Although not recommended for routine collecting, some investigators occasionally remove live fleas directly from the flags and place them in vials of saline. Live fleas placed in saline containing the Tween-80 detergent will be unable to float on the surface of the liquid, thus ensuring that they will drown soon after being placed in the saline. Without the detergent, surface tension can become a problem because the numerous bristles and setae found on fleas enable them to remain afloat on the surface of saline. This can be a potential safety problem because floating fleas often survive shipment and arrive at the laboratory ready to jump

onto lab personnel. Rapid freezing of the fleas obviously eliminates this problem, but adding Tween-80 to the saline also helps reduce the growth of fungi on flea samples. Dead fleas trapped in the surface tension at the air-saline interface rapidly become overgrown with fungi making identifications more difficult.

14. Vials containing 2% saline and fleas can be shipped to CDC for taxonomic identification and analysis of the fleas for *Yersinia pestis* infection. The fleas can be shipped at ambient temperature in the vials of 2% saline. For best results, ship the specimens as soon as possible because the fleas will start to decay soon after collection. Be sure and double wrap the vials in a leak-proof material and then place them in a crush-proof box or metal mailing tube for shipment to CDC.

    CDC Address by U.S. Postal System:
    CDC/Bacterial Zoonoses Branch
    c/o John Young
    P.O. Box 2087
    Ft. Collins, CO 80522

    Shipment by FedEx:
    CDC/Bacterial Zoonoses Branch
    c/o John Young
    Rampart Road (CSU Foothills Campus)
    Fort Collins, CO 80521

Literature Cited:

Carter, L., K. Gage, R. Enscore, and J. Montenieri. Undated. Procedure for flagging (swabbing) rodent burrows. Centers for Disease Control – Bacterial Zoonoses Branch, Ft. Collins, CO. 3pp.

Gage, K.L. Undated. Procedure for Flagging (Swabbing) Rodent Burrows. Centers for Disease Control. Personnel Communication. 3pp.

Seery, Dave. pers. comm. U.S. Fish and Wildlife Service, Rocky Mountain Arsenal National Wildlife Refuge, Commerce City, Colorado, phone 303-289-0537.

Young, P.J., D.J. Mead, F. Ramberg, K.M. Canestorp, and T. Vosburgh. Undated. Plague surveillance and flea communities on black-tailed prairie dog towns (abstract only).

APPENDIX C: DEVILS TOWER NATIONAL MONUMENT STANDARD OPERATING PROCEDURES FOR PLAGUE MONITORING AND RESPONSE

APPENDIX C: DEVILS TOWER NATIONAL MONUMENT STANDARD OPERATING PROCEDURES FOR PLAGUE MONITORING AND RESPONSE

PLAGUE OUTBREAK AND TREATMENT IN PRAIRIE DOG COLONIES STANDARD OPERATING PROCEDURE (UPDATED 09-07-2010)

This document identifies standard operating procedures for collection of biological samples, treatment of prairie dog colonies with pesticide, notification of cooperating agencies, and posting warning and closure signs when outbreaks of sylvatic plague occur.

I. Background

The black-tailed prairie dog is listed as a species of concern in the state of Wyoming due to drastic reductions in its numbers, loss of suitable habitat, plague and other human factors in 1973. The black-tailed prairie dog has had a continued presence in Devils Tower National Monument (DETO) for at least 100 years. During the last twenty years, the number of prairie dogs in the park has averaged between 500 and 1000 animals. In order to monitor the population and distribution in the park and determine population trends and individual colony variations, it is imperative to conduct visual counts throughout the summer on an annual basis. These numbers contribute to the overall counts of prairie dogs in the Devils Tower area.

Plague has never been demonstrated to exist in the black-tailed prairie dog population in Devils Tower National Monument. However, plague is known to occur in black-tailed prairie dogs in Wyoming. The plague might have arrived naturally to North America during the Pleistocene via the Siberian-Alaskan land bridge. More likely however, the plague was introduced about 100 years ago via flea-infested rats from Asian and European ships (Barnes 1993; Biggins and Kosoy 2001). Therefore it is considered a non-native organism and is subject to NPS policies for non-native species. The plague is caused by a bacterium (*Yersinia pestis*) and fleas are the most common vectors in the spread of the disease. Therefore the removal of fleas from colony areas during an observed plague outbreak may well stem the spread of the disease to other dogs in the colony. Some species of animals are highly or moderately resistant to plague, however, prairie dogs are highly susceptible, probably because they have not had sufficient time to evolve a defense against this introduced disease (Cully and Williams 2001). Plague is primarily transmitted via flea vectors, though carnivores can also be exposed through consumption of infected prey. Studies have demonstrated that many species of flea can transmit the disease and some species can survive for years in abandoned prairie dog burrows (Fagerlund et al. 2001, Padovan 2006).

II. Purpose and Need

Sylvatic and bubonic plague are different names for the same disease. When the disease occurs in humans, it is referred to as bubonic plague. When it occurs in wildlife, it is referred to as sylvatic plague. This plague outbreak action plan will outline steps that should be followed and contacts that should be made both within the park and with other agencies should plague be detected in Devils Tower National Monument. Prompt and proper action will be necessary to prevent the spread of this disease to protect not only human health, but also the population of black-tailed prairie dogs within Devils Tower National Monument.

III. Monitoring the Black-Tailed Prairie Dog Population and Occurrence of Fleas That Inhabit Prairie Dog Burrows

A. Black-tailed Prairie Dog Monitoring

Currently, Devils Tower National Monument has a plan in place for the weekly monitoring of the prairie dog population throughout the summer. ***Any die-offs of prairie dogs or observations of prairie dogs acting abnormally are to be reported immediately to park Resource Management staff or Law Enforcement ranger.*** That Resource Management or Law Enforcement employee should then notify the Superintendent of the possibility of a plague outbreak. Park Resource Management staff will then proceed to the area of the suspected outbreak, collect any available dead prairie dogs **(see section "IV.A. Black-tailed Prairie Dog Sample Collection" for details on how to safely collect suspected plague-killed prairie dogs),** and send them to a laboratory for testing to determine cause of death. **A plague SOP flow chart is included in section VII below.**

B. Flea Monitoring

Flea sampling will not occur on a regular basis such as does the prairie dog monitoring. When a suspected plague outbreak occurs, any dead prairie dogs will be collected as well as fleas in the area of the burrow. These samples will then be shipped to a laboratory for testing to see if they are carrying the plague or not **(see section "IV.B. Flea Sample Collection" for details on how to safely collect and store collected fleas).**

IV. If an Outbreak is Suspected: Collecting, Handling, and Shipping Prairie Dogs and Fleas

A. Black-Tailed Prairie Dog Sample Collection

If plague is suspected in the deaths of large numbers of black-tailed prairie dogs, it is imperative to collect as many viable specimens (whole animals) as possible and ship them to the Center for Disease Control laboratory in Fort Collins, Colorado, for analysis and clarification as to what actually killed the animals. Shipments should be kept to 5 dead black-tailed prairie dogs at one time. Collect as many specimens as is practical up to 15. If more than 5 dead black-tailed prairie dogs are collected at one time, keep the remaining dead animals in the resource management freezer in the basement of the Ranger Station for further testing needs, depending upon the results from the testing of the first five specimens. Keep the samples until notified by the lab that results were obtained from the first five samples and that the additional specimens will not be needed.

Materials you will need:

Data sheets	Gloves (leather or latex)
Large zip-lock freezer bags	Long sleeve shirt
Tags	Pants
Crush-proof shipping box	Insect repellent (with DEET)

As per the head of the CDC, Plague Section in Fort Collins, Colorado (Dr. Ken Gage), this is the absolute minimum personal protective equipment (PPE) that you will need to wear. However, if you feel safer wearing more PPE than suggested here (i.e., face mask, goggles, Tyvek suit, etc.), that is acceptable and encouraged.

When going to collect dead prairie dogs:

1. Prepare, review, and sign a Job Hazard Analysis (JHA) for this activity in consultation with the regional Safety officer, CDC, and NPS Public Health personnel **(see section XII for JHAs)**.

2. Ensure staff have all appropriate required and recommended PPE to safely carry out this job.

3. Apply an insect repellent that contains DEET to your exposed skin and clothes. This will prevent fleas that may jump off of the dead animal from remaining on you and potentially transmitting the plague virus to you when they make their next blood meal (i.e., YOU!). You can also use a pyrethrin-containing powder (Deltamethrin), if available to dust your

clothes; this will also keep fleas off of your body **(see section VIII for MSDS sheet for Deltamethrin information).** If you are collecting fleas, be careful to keep the powder (Deltamethrin) off of the collection rag.

4. Before you collect a carcass, prepare a tag with the following information: carcass number, species, date of collection, estimated date of death, location (both legal description and UTM is recommended), county, state, name of collector, agency or affiliation of collector, telephone number and address of collector, and a brief description of circumstances for collection. Also include this information on a **Prairie Dog Mortality Data Sheet (Section IX)**. This will assist in matching up the results in the unlikely event of a mix-up at the testing facility or in the packaging of the animals.

5. Next, take one of the large zip-lock freezer bags, turn it inside out, and insert your gloved hand into the bag. Grasp the carcass in your hand, quickly fold the bag over the carcass, roll the bag on the ground, away from your body, to expel the air, and seal the ziplock.

6. Immediately place in a second ziplock bag, put in the tag, roll and seal the second bag.

7. As soon as possible after collection and bagging, put the animal in the resource management freezer in the basement of the Ranger Station.

Preparing prairie dogs for shipping:

1. Select a biological sample shipping box that is constructed of heavy duty, crush-proof cardboard and has a solid Styrofoam container inside (also stored in the basement of the Ranger Station).

2. Carcasses must be individually labeled and bagged in a minimum of 3 ziplock bags. Be sure that all frozen prairie dog bags still have the tags attached.

3. Next, make copies of the data sheets. Put the originals in an envelope inside a zip-lock bag, and place in the shipping box on top of the bagged dogs.

4. Pack absorbent packing material around carcasses (crumpled newspaper, etc).

5. Carcasses should be frozen or packed with frozen ice packs or dry ice (no wet ice).

6. Seal the box with clear packing tape.

7. Before shipping the samples, call Dr. Ken Gage (970-221-6450) to inform him that we are shipping some samples to his lab. You should also notify George Larson (Public Health Officer) of PHS-NPS at Yellowstone National Park (307-344-2273) of what is going on and that we will begin treatment of burrows with Deltamethrin (see below), so he can respond appropriately.

8. If shipping U.S. Postal Service, mark the container with “Biomedical Material and ship to:

CDC/Bacterial Zoonoses Branch
c/o Mr. John Young
P.O. Box 2087
Ft. Collins, CO 80522

If shipping FedEx, mark the container "Diagnostic Biomedical Material" and ship as hazardous material (requires a special form). Ship to:

CDC/Bacterial Zoonoses Branch
c/o John Young
Rampart Road (CSU Foothills Campus)
Fort Collins, CO 80521

Shipping by FedEx Overnight is the best way to get the samples to the lab. Shipments via FedEx are to be coordinated with the mail clerk.

B. Flea Sample Collection

If plague is suspected in the deaths of large numbers of black-tailed prairie dogs, it is imperative to collect as many viable flea specimens as possible and ship them to the Center for Disease Control laboratory in Fort Collins, Colorado, for analysis and clarification as to what actually killed the animals.

Materials you will need:

Insect repellent (with DEET)	Collection vials
Plumber snake	Saline
White flannel cloth (approx. 10 in^2)	Collection forms
Large zip-lock freezer bags	Long sleeve shirt
Tweezers	Pants
Gloves	Crush-proof shipping box

Tyvek suit is also acceptable PPE for keeping fleas off of your body

As per the CDC-Plague Section in Fort Collins, Colorado (Dr. Ken Gage), this is the absolute minimum PPE that you will need to wear. However, if you feel safer wearing more PPE than suggested here (i.e., face mask, goggles, etc.), that is acceptable and encouraged.

When going to collect fleas:

1. Prepare, review, and sign a JHA for this activity in consultation with the regional Safety officer, CDC, and NPS Public Health personnel **(see section XII for JHAs)**.

2. Ensure staff have all appropriate required and recommended PPE to safely carry out this job.

3. Apply an insect repellent that contains DEET to your exposed skin and clothes. This will prevent fleas that may jump off of a dead prairie dog from remaining on you and potentially transmitting the plague virus to you when they make their next blood meal (i.e., YOU!). You

can also use a pyrethrin-containing powder (Deltamethrin), if available to dust your clothes; this will also keep fleas off of your body. HOWEVER, be careful to keep the powder (Deltamethrin) off of the collection rag so as not to kill the fleas you are collecting in this manner.

4. Next, make sure to sample from burrows that appear active, or where dead prairie dogs have been collected/observed. Attach the cloth to the alligator clip on the end of the plumber's snake. Slowly insert the cloth as far as possible into the burrow and allow it to remain in the burrow for about 30 seconds. Have a large zip-lock freezer bag ready. Slowly withdraw the cloth, immediately place it in the bag, and secure the top with your gloved hand.

5. Holding the bag closed, squeeze the alligator clip to release the cloth. Pull the cable from the bag and zip the closure on the bag to close it. Repeat this procedure with different cloths and bags at as many burrows as seems prudent based on the amount of die-off observed. It is imperative to get as representative a sample as possible, instead of sampling from only a few burrows in the affected colony.

6. Be sure to label the bags with the location of collection, date of collection, name of collector, county and state in which they were collected.

7. Keep track of the number of burrows swabbed so that a burrow index can be calculated. Burrow index = no. fleas collected/no. burrows sampled - This value often increases dramatically during die-offs among prairie dogs.

8. When done collecting the fleas, transport flags back to laboratory in the plastic bags. Keep the bags in a reasonably cool place to prevent desiccation of the flea samples (*Yersinia pestis* is very susceptible to death by desiccation) or death of the plague bacilli due to excessive heat (Remember pick-up hoods can get very hot in direct sunlight! Fried samples will come back negative for plague every time!).

9. Place the bags in the resource management freezer located in the basement of the Ranger Station basement overnight to kill the fleas.

To prepare the fleas for shipping:

After 24–48 hours in the freezer, the fleas should be dead, and they can be sorted. You will need: a metal tray or some other light-colored background to work on, tweezers, collection vials, and saline. Fill out the Prairie Dog Mortality/Flea Collection Data Sheet **(Section IX)** as you go along. This is the same data sheet you fill out when collecting dead prairie dogs. The data sheet has spaces for date collected, date picked, and location descriptions. For best results, ship the specimens as soon as possible because the fleas will start to decay soon after collection.

1. Starting with a bag collected at one location, empty the bag onto your tray or light-colored background, ensuring that every bit of dirt, etc., comes out of the bag.

2. Pick up the cloth and carefully examine it for fleas on both sides. Fleas are usually 1/16–1/8" long, and brownish-red in color, with long back legs. They often look shiny. Run your fingers down the cloth to brush off any debris clinging to it, and put it back in its bag.

3. Now, examine the tray to see what fell off the cloth or out of the bag. Often, most of the fleas are found here in the tray. If fleas are found, pick them up with the tweezers and place them in a vial. Label the vial with the same location as was on the bag.

4. Empty the tray between each sample rag.

5. For each sample, write on the data sheet the number of fleas found, even if it is zero.

6. Once all the bags have been gone through, fill each vial with 2% saline and a very small amount of Tween-80 detergent (<0.0001% of solution) to preserve the fleas. Remember that the detergent is added to reduce surface tension and allow the fleas to sink to the bottom of the vial. Too much detergent will kill the plague bacteria and prevent successful isolation. Fleas can be submitted in 2% saline without Tween-80, but an effort should be made to submerge the fleas. If the fleas have been killed by freezing, this should not be a problem. Dead fleas trapped in the surface tension at the air-saline interface rapidly become overgrown with fungi making identifications more difficult. Cap them tightly and place duct tape or electrical tape around the lids to ensure a tight seal.

7. Wrap the taped vials in bubble wrap and place in a crush-proof box with blue ice or dry ice and absorbent material in case the vial breaks or leaks.

8. Place all the sealed vials into a crush-proof mailing box. Make copies of the data sheets. Put the originals in an envelope inside a plastic bag and place inside the shipping box.

9. Seal the box with clear packing tape and label it “DIAGNOSTIC SPECIMENS.”

10. Prior to shipping the samples, give Dr. Ken Gage a call to inform him that we are shipping some samples to his lab. Dr. Gage’s phone number is 970-221-6450. You should also notify George Larson (Public Health Officer) of PHS-NPS at Yellowstone National Park (307-344-2273) of what is going on so he can be ready to respond if plague is detected from the samples.

11. If shipping U.S. Postal Service, mark the container with “Biomedical Material” and ship to:

    CDC/Bacterial Zoonoses Branch
    c/o Mr. John Young
    P.O. Box 2087
    Ft. Collins, CO 80522

    If shipping FedEx, mark the container “Diagnostic Biomedical Material” and ship as hazardous material (requires a special form). Ship to:

    CDC/Bacterial Zoonoses Branch

c/o John Young
Rampart Road (CSU Foothills Campus)
Fort Collins, CO 80521

Shipping FedEx Overnight is the best way to get the samples to the lab. Shipments via FedEx should be coordinated with the administrative mail clerk.

C. Burrow Dusting Protocol

If plague is suspected in the deaths of the prairie dogs, then Resource Management staff will immediately start treatment of affected burrows before any test results come back, but after sample collection is completed. As per DO12 handbook Chapter 3 Section 4 E (3), which states, *Removal of individual members of a non-threatened /endangered species or population of pests and exotic plants that pose an imminent danger to visitors or an immediate threat to park resources*, we have the authority to act in such a manner. The following protocol should be followed.

Notify George Larson (Public Health Officer) of PHS-NPS at Yellowstone National Park (307-344-2273) to apprise him of our decision to apply pesticide to the burrows and the methods we will use to accomplish the task.

Until we hear back from the CDC and/or Public Health Department, Resource Management staff should dust the affected burrows (those where dead prairie dogs were found) with insecticidal dust (Deltamethrin). Not all burrows in a colony will need to be treated. If the affected burrows occur within 100 feet of an area that receives frequent use by visitors and/or staff, all burrows within 100 feet of the frequent-use area should receive treatment. Burrows not treated should be monitored in the event that dead prairie dogs begin appearing in or around them. If this occurs, then these burrows should be treated, and the 100-meter radius area should be treated.

A store of bubonic plague warning or closure signs will be kept on hand in the basement of the Ranger Station. Deltamethrin will not be purchased and stored on site. Local sources to purchase Deltamethrin from will be identified and verified each spring so that it can be ordered and on hand in less than one day when needed. Personal protective equipment, including respirators, goggles, disposable coveralls, and gloves, is located either in the Ranger Station basement or in cold storage in the Maintenance Building. Disposable face shields should be used for each dusting event. It is also important to wear full PPE (pants, long sleeve shirts, chemical resistant gloves, Tyvek suit, face shield, and goggles) when applying the Deltamethrin. Care should be taken when applying the insecticide on windy days to prevent the dust from blowing toward the person applying it.

A hand-held duster and/or shaker can will be located in the basement of the Ranger Station along with all other materials associated with prairie dog management activities. No applicator certification is required to apply Deltamethrin; however, it is advised that the person applying the powder be familiar with all safety protocol, and take the necessary steps to prevent being exposed to the powder and ensure that the NPS IPM coordinator is notified.

Materials you will need:
Appropriate PPE (face mask, chemical resistant gloves, Tyvek suit, eye protection)
Deltamethrin pesticide
Backpack sprayer or shaker can
Insect repellent

To apply the Deltamethrin:

1. Prepare, review, and sign a JHA for this activity in consultation with the regional Safety officer, CDC, and NPS Public Health personnel **(see section XII for JHAs)**.

2. Ensure staff have and wear all appropriate required and recommended PPE to safely carry out this job.

3. Fill the shaker can or hand-held duster to the appropriate level with Deltamethrin.
4. Thoroughly apply the dust to adequately cover the mound and around the mound's perimeter (18" from outer edge). Approximately 4 grams of Deltamethrin are required to treat a single burrow (D. Biggins, Pers. Commun.).
5. Re-apply once a day for 5 days for light rodent populations.

D. Communication Protocol

All research and other human activity in close proximity to the affected burrows should be immediately suspended until the extent of the outbreak is defined and treatment efforts have been completed.

Until we hear back from the CDC and/or Public Health Department, Law Enforcement staff should mark the affected area with warning/closure signs (See **Section X.** for sample closure signs).

A **draft press release** is below (**Section XI**) for disseminating information to the public and NPS and concession employees. Simply fill in the dates, and what closures, if any, have been enacted. This information should be immediately communicated to the Public Information Officer or Superintendent's designee for release to the media. A briefing statement to provide information on the location of the outbreak, actions we are implementing, and the phone number of the Chief of Resource Management should be included in the release. The park's Superintendent should develop this briefing with input from Resource Management staff. The Superintendent will handle dissemination of information to the media. It is important to get the information out to the public early, before rumors start to develop.

A **copy of the warning/closure signs** (**Section X.**) should be distributed to interpretive staff at the visitor center (VC), Entrance Station, and park information boards along with information pertaining to the event so it can be passed on to visitors. Contact the on-duty law enforcement ranger and arrange for a meeting with campground hosts. They should be briefed in order to provide the public and campers with accurate information, including orders to stay out of the

colonies and to keep their pets inside or on leashes away from prairie dogs. Information regarding other animals that can also harbor the plague organism should also be disseminated to the public so visitors do not contract plague while attempting to feed ground squirrels, chipmunks, or other rodents. The intent of this meeting should be to inform, NOT to alarm people!

Law Enforcement personnel should be notified to strictly enforce the leash law so as to prevent spreading the disease to domestic pets and then to humans.

Signs should be posted at campground entrances, at all loop entrances, and at the entrances of both men's and women's restrooms.

V. Detection Determination
A. If Plague is NOT Detected

If plague is not detected, your efforts have not been in vain. Hopefully, along with the negative plague results there will be a report specifying what, if any, cause of death was detected from the lab tests. If die-off is still occurring, it would be advisable to continue to collect prairie dog and flea samples and ship them to the CDC in case the plague organism was simply not detected in the previous samples, or in order to determine what is actually killing the prairie dogs.

b. If Plague IS Detected

If the lab report comes back with positive results for the plague, then immediately notify the Superintendent, all park personnel, and call NPS Public Health Officer George Larson at 307-344-2273. John will respond, conduct a site visit to the affected colony, and make recommendations as to potential closures in conjunction with the Superintendent and Resource Management staff, depending on where the colony is located relative to human activity. He will also make recommendations regarding whether or not it is necessary to dust the burrows with Deltamethrin. It may be necessary to issue a press release to describe the situation and explain why closures are going into effect.

If plague is verified, the resource manager, in cooperation with NPS public health officials and CDC, should immediately notify, and make plague contingency recommendations to, the following: landowners and wildlife agency personnel in the affected area, state Department of Agriculture, USDA-Wildlife Services, NRCS, veterinarians, and local government personnel that deal with animal control, and the general public through local media sources. The NPS public health officials and CDC should be consulted on the need for insecticide treatment at this time to control fleas in burrows, and therein reduce the potential for further plague infections.

When the Public Health Department's representative arrives at the park (usually 18–24 hours after being notified of a positive outbreak), they should meet with Division Chiefs to be briefed on the actions taken. Once the assessment has been completed, the course of action to be followed should be determined with all members of the leadership team and the Public Health representative.

If, at any time of the assessment, the public health representative recommends the closure of any facilities, the posting of closure signs will be initiated immediately. Closures should be made on a site-by-site basis.

The continued monitoring of the colonies in and around the park for further prairie dog die-offs will be crucial in determining the spread, or lack thereof, of the plague outbreak. If animals in other colonies begin to die off then sampling should be conducted to verify if plague is the causative agent or not.

The outbreak will be considered contained when no more prairie dog die-off is observed and when the park receives direction to lift restrictions from the Public Health Officer. At that time, all closed or restricted access areas will be reopened, closure signs will be removed and replaced with warning signs, and Resource Management personnel will continue to monitor the affected colony for prairie dog die-off. The re-initiation of any suspended activities in the area of the affected colony will be reassessed and decisions made by the park management team in conjunction with the Public Health Officer.

Post-plague monitoring of prairie dog colonies should be conducted annually in March or April (or more frequently, if possible) to document the rate of re-colonization and verify occupied acreage. Initial monitoring, which will take place from one to several years, should consist of windshield surveys. When visual surveys indicate prairie dog colonies are recovering, a quantitative survey method should be initiated. The recommended method, due to widespread use, particularly on black-footed ferret reintroduction sites, is transecting using the Biggins method (Biggins et. al. 1993) that equates active and inactive burrow densities to population density.

The resource manager and staff should evaluate the extent of the impact of the epizootic as it affects the acreage and distribution objectives in the management plan. The group should determine whether or not there is a need to modify prairie dog management in the plague area, and potentially elsewhere in the park, if occupied acreage is below the objectives in the management plan.

VI. Literature Cited

Barnes, A.M. 1993. A review of plague and its relevance to prairie dog populations and the black-footed ferret. Pages 28-37 in Proc. of the Symp. on the management of prairie dog complexes for the reintroduction of the black-footed ferret. U.S. Dept. of Interior, U.S. Fish and Wildlife Serv. Biol. Rept. 13.

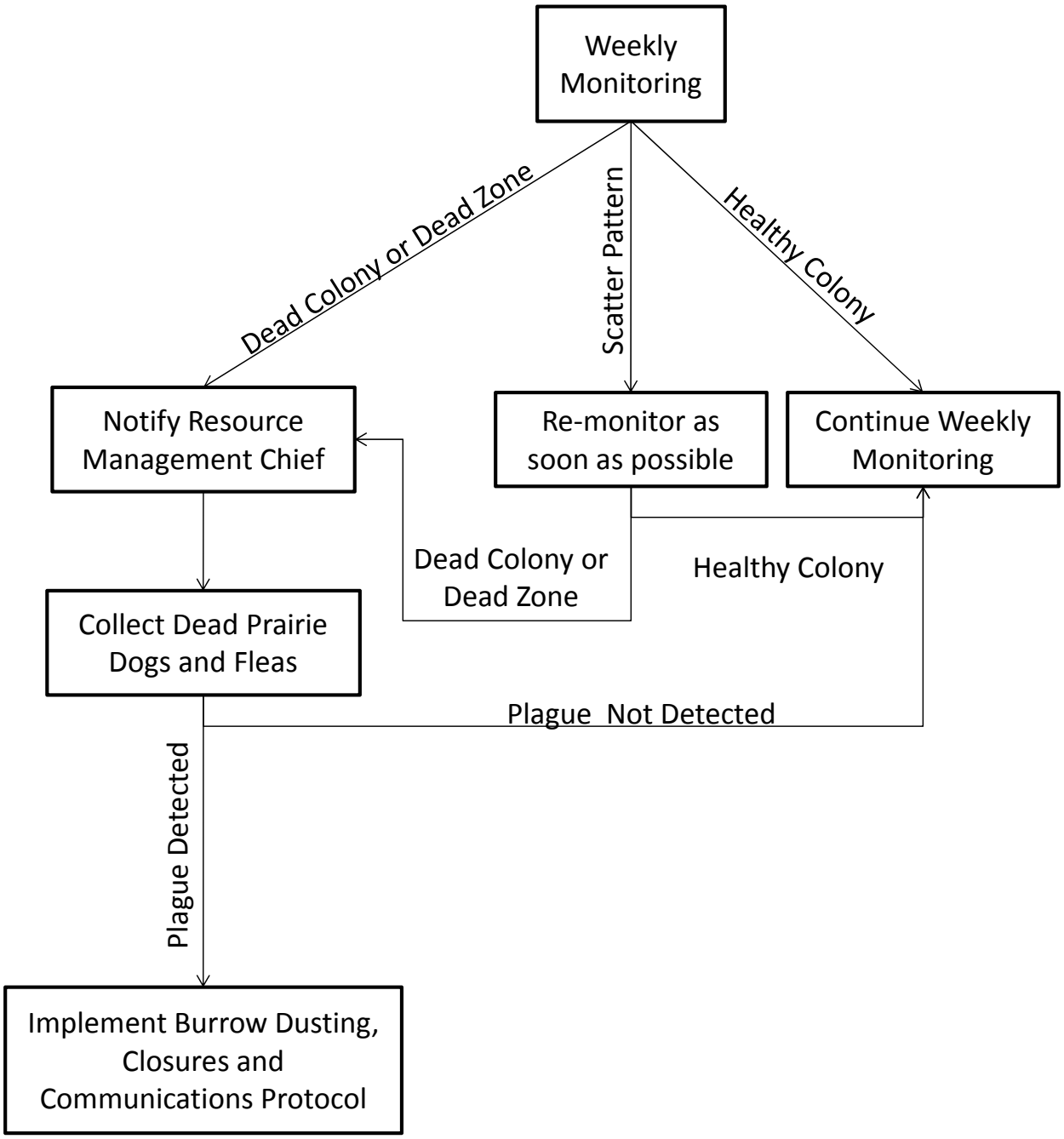
Biggins, D.C., B.J. Miller, L.R. Hanebury, B. Oakleaf, A.H. Farmer, R. Crete and A. Dood. 1993. A technique for evaluating black-footed ferret habitat in Management of prairie dog complexes for reintroduction of the black-footed ferret, U.S. Fish and Wildlife Service, Biological Report 13.

Cully, J. F., Jr. and E. S. Williams. 2001. Interspecific comparisons of sylvatic plague in prairie dogs. Journal of Mammalogy 82(4): 894-905.

Fagerlund, R.A., P.L. Ford and P.J. Polechla, Jr. 2001. New records for fleas (Siphonaptera) from New Mexico with notes on plague-carrying species. Southwestern Naturalist 46: 94-96.

Padovan, D. 2006. Infectious Diseases of Wild Rodents. Corvus Publishing Co, Anacortes Washinton.

VII. Plague SOP Flow Chart.



*See Appendix B for definitions of healthy and dead colonies, scatter pattern and dead zone.

VIII. Material Safety Data Sheet – Deltamethrin.

Material Safety Data Sheet - LC Laboratories Cat. No. D-6153 - page 1
Revision Date: June 6, 2008

1. IDENTIFICATION OF SUBSTANCE:
Trade name: Deltamethrin
Product Number: D-6153
Manufacturer/Supplier:
LC Laboratories
165 New Boston Street
Woburn, MA 01801 USA
+1-781-937-0777 Fax: +1-781-938-5420

2. COMPOSITION/DATA ON COMPONENTS:
Chemical Name: (*S*)-α-Cyano-3-phenoxybenzyl (1*R*)-cis-3-(2,2-dibromo-vinyl)-2,2-dimethylcyclopropanecarboxylate
Synonyms:
Hazardous Ingredient: Deltamethrin
CAS Registry Number: 52918-63-5
Molecular Weight: 505.20
Molecular Formula: $C_{22}H_{19}Br_2NO_3$

3. HAZARDS IDENTIFICATION:
Hazard Description: Highly Toxic (USA) Toxic (EU)
Dangerous for the environment
Harmful in contact with skin; readily absorbed through skin system
Toxic by inhalation
Very toxic if swallowed
May cause sensitization by inhalation and skin contact
Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment
Target organ(s): central nervous system, cardiovascular system
Information pertaining to particular dangers for man and environment:
HMIS Ratings: Health =1 Flammability =0 Reactivity =0

4. FIRST AID MEASURES:
After Inhalation: If inhaled, remove to fresh air; if breathing is difficult, give oxygen; if breathing stops, give artificial respiration
After skin contact: flush with copious amounts of water; remove contaminated clothing and shoes; call a physician
After eye contact: flush with copious amounts of water; assure adequate flushing by separating the eyelids with fingers; call a physician
After swallowing: if swallowed, wash out mouth with copious amounts of water; call a physician

5. FIRE FIGHTING MEASURES:
Suitable extinguishing agents: water spray, carbon dioxide, dry chemical powder or foam
Protective equipment: wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Unusual fire hazard: may emit toxic fumes under fire conditions

6. ACCIDENTAL RELEASE MEASURES:

Person-related safety precautions: cordon off area of spill; wear self-contained breathing apparatus, protective clothing and heavy rubber gloves

Measures for cleaning/collecting: absorb solutions with finely-powdered liquid-binding material (diatomite, universal binders); decontaminate surfaces and equipment by scrubbing with alcohol; dispose of contaminated material according to Section 13

7. HANDLING AND STORAGE:

Information for safe handling: avoid contact with skin, eyes and clothing; material may be an irritant

Storage: store solid and solutions at -20 ºC

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION:

Personal protective equipment as follows:

Breathing equipment: NIOSH/MSHA-approved respirator

Protection of hands: chemical-resistant rubber gloves

Eye protection: chemical safety goggles

9. PHYSICAL AND CHEMICAL PROPERTIES:
Form:
Color:
Odor: none
Melting point/Melting range:
Danger of explosion: none
Solubility in / Miscibility with water: not soluble
Solvent content: none
Organic solvents: soluble in DMSO, ethanol, or acetone

10. STABILITY AND REACTIVITY:
Stability: avoid acids and bases
Thermal decomposition / conditions to be avoided: protect from light and heat
Dangerous products of decomposition: thermal decomposition may produce toxic gases such as carbon monoxide and carbon dioxide

11. TOXICOLOGICAL INFORMATION:
RTECS #: GZ1233000
Acute toxicity: none known
Primary irritant effect:
On the skin: none known
On the eye: not known; may be an irritant

12. ECOLOGICAL INFORMATION:
General notes: no data available

13. DISPOSAL CONSIDERATION:
Dispose of in accordance with prevailing country, federal, state and local regulations

14. TRANSPORT INFORMATION:
DOT:
Proper shipping name: none
Non-Hazardous for transport: this substance is considered to be non-hazardous for transport
IATA class:
Proper shipping name: none
Non-Hazardous for transport: this substance is considered to be non-hazardous for transport

15. REGULATIONS:
Code letter and hazard designation of product:
Hazard-determining components of labeling:
EU Risk And Safety phrases:
S26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice
S28: After contact with skin, wash immediately with plenty of water
S29: Do not empty into drains
S36/37/39: Wear suitable protective clothing, gloves, and eye/face protection

S45: In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible)
S53: Avoid exposure - obtain special instructions before use
R21: Harmful in contact with skin
R23: Toxic by inhalation
R27/28: Very toxic in contact with skin and if swallowed

16. OTHER INFORMATION:

The above information is believed to be correct based on our present knowledge but does not purport to be complete. For research use only by trained personnel. The burden of safe use of this material rests entirely with the user. LC Laboratories disclaims all liability for any damage resulting from use of this material.

IX. Prairie Dog Mortality/Flea Collection Data Sheet

Prairie Dog Mortality/Flea Collection Data Sheet

Carcass/Burrow Number:_____

Species (circle one):
Black-tailed Prairie Dog
White-tailed Prairie Dog
Utah Prairie Dog
Gunnison Prairie Dog
Mexican Prairie Dog

Collection Date: _____ Collector Name:_____

Estimated Date of Death: _____ Collector Affilitation/Agency: _____
Collector Telephone Number:_____
Date of Flea Picking: _____ Collector Address: _____
_____

General Location Description:_____

_____

_____

_____

UTM: _____N _____E

Township_____Range_____Section_____

County: _____ State:_____

Circumstances of Collection:_____

_____

_____

_____

_____

_____

_____

X. Three Sample Signs for Posting in Areas of Plague Detection

CAUTION

SYLVATIC PLAGUE HAS BEEN FOUND IN PARK PRAIRIE DOG POPULATIONS
PLEASE EXERCISE THE FOLLOWING PRECAUTIONS DURING YOUR VISIT:

- Stay out of all areas that have been CLOSED by order of the Superintendent.
- DO NOT go near or poke into any rodent holes or prairie dog burrows.
- DO NOT handle any wild animals. Avoid dead or sick animals.
- Pets are NOT allowed on the trails or in the backcountry, especially cats.
- If you observe dead animals, contact a ranger or notify the visitor center as soon as possible.

What is Sylvatic Plague?

Plague is an acute infectious disease which primarily affects rodents, including prairie dogs. Plague can be passed to humans by wild rodents and by their fleas. The incubation period is usually 2-5 days but can be as short as 1 day or as long as 12 days.

What are the symptoms?

- Feeling sick all over.
- Sudden onset of fever.
- Headache, nausea, vomiting, diarrhea.
- Painful and swollen glands in the groin, armpits, and neck.

Plague is curable when treated in time.

Prompt diagnosis and treatment with antibiotics can stop the disease.

For more information, contact the park:
National Park Service
Devils Tower National Park

CAMPGROUND/FACILITIES NOTICE

Prairie Dogs, chipmunks, ground squirrels and other wild rodents in this area may be infected with plague. Plague can be transmitted by an animal bite or fleas.

- Avoid all contact with prairie dogs, chipmunks, ground squirrels and other wild rodents.

- Do not feed or play with wild animals.

- Avoid fleas by protecting pets with flea collars and keeping pets on a leash and out of prairie dog colonies.

- See a physician if you become ill within one week of your visit to this area. Plague is a treatable disease.

- Do not touch sick or dead animals

For further information contact:
National Park Service
Devils Tower National Park

WARNING
AREA CLOSED
(Name of Area)

Sylvatic plague has been found in prairie dog populations in the (name of area) area. Please exercise the following precautions during your visit to the park:

- Stay out of areas that have been CLOSED by order of the superintendent
- DO NOT go near or poke anything into rodent holes or prairie dog burrows
- DO NOT handle any wild animals, living or dead

What is Sylvatic Plague?

Plague is an acute infectious disease which primarily affects rodents, including prairie dogs. Plague can be passed to humans by wild rodents and their fleas. The incubation period for the disease in humans is usually 2-5 days, but can range from 1 day to as long as 12 days.

What are the symptoms?

General flu-like symptoms, including headache, fever, and swollen glands in the groin, armpits, or neck.

PLAGUE IS CURABLE WHEN TREATED IN TIME!

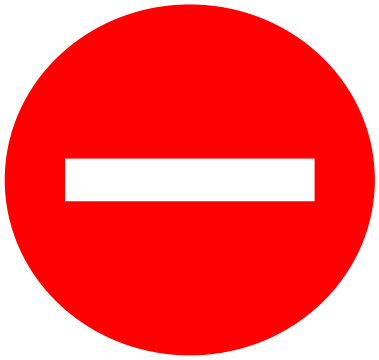
If you develop these symptoms within 7 days of possible exposure, notify your doctor.

(Map of closed area)

The area marked above is CLOSED until further notice.

IF YOU HAVE QUESTIONS, CONTACT A PARK RANGER OR CALL THE PARK AT.

(307) 467-5283.



XI. Sample Press Release

Draft Press Release for Plague Occurrence at Devils Tower National Monument

Date:

National Park Service
U.S. Department of the Interior

Devils Tower National Monument

PO Box 10
Devils Tower, WY 82714

307 467-5283 phone
307 467-5350 fax

DEVILS TOWER NATIONAL MONUMENT

News Release

Date FOR IMMEDIATE RELEASE 2010-0X

Devils Tower Facilities Temporarily Closed to Prevent Plague Transmission

To prevent transmission the sylvatic (bubonic) plague from black-tailed prairie dogs (*Cynomys ludovicianus*) to the visiting public, the National Park Service (NPS) will temporarily close pullouts near the prairie dog colony, the campground loop A, the amphitheater and the South Side and Valley View Trails beginning XXXXXXXXX. When outbreaks of the plague are suspected, such closures are necessary and established under the monument's Prairie Dog Management Plan Standard Operating Procedure for Plague Outbreak.

The closure is implemented to protect the visiting public from possible exposure to plague bacterium (*Yersinia pestis*) that is occasionally present in fleas on black-tailed prairie dogs. Transmission of the plague bacterium from prairie dogs to humans is rare and unlikely to occur except in the event of direct prairie dog-human interaction.

The remainder of facilities at Devils Tower will remain open. Visitors can get more information about plague, prairie dogs and closures at entrance station, visitor center, or administration building.

NPS staff will continue to survey the population to determine presence or absence of plague bacterium in the prairie dog colony and will be treating the colony to kill fleas. Areas will be reopened following treatment of all prairie dog burrows and a lack of detection of additional plague carrying fleas.

For further information on the plague closures and outbreaks, please contact the monument's chief of resource management at (307) 467-5283 ext 212.

-END-

XII. Job Hazard Analyses

Insert DETO job hazard analyses for dead prairie dog and flea collection and burrow dusting when developed.

APPENDIX D: PROTOCOLS FOR ESTABISHING PHYSICAL BARRIERS

APPENDIX D: PROTOCOLS FOR ESTABLISHING PHYSICAL BARRIERS FROM CITY OF FORT COLLINS AND CITY OF BOULDER

The following information is from the City of Boulder Open Space Operations Center (66 South Cherryvale Rd., Boulder, CO 80303, phone: (303)441-4142). Prairie Dog Visual Barrier Setup Guidelines.

Visual barriers help control the spread of prairie dog colonies by providing a physical boundary that prairie dogs are hesitant to cross. Although they are not a complete solution to the problem of confining prairie dogs to specific areas, they are an important component of an effective IPM program. In concern with other techniques visual barriers can provide a humane and passive means of controlling prairie dogs. In order to be effective the following guidelines should be kept in mind:

1) Prairie dogs seem to respond to holes where light can pass through the visual barrier by clawing and chewing at the fabric. Therefore, no light passage can be allowed along the bottom edge, along the seams or as a result of holes in the fabric. Proper installation and subsequent maintenance should prevent this. Holes in the fabric may be patched with duct tape and seams may be re-worked or sealed with tape. The lower six inches of fabric should be buried to form a "light-tight" seal.
2) Visual barriers are not effective when family units are split by the barrier. When burrows can be found on both sides of the barrier, the prairie dogs will continue to use the underground system of tunnels and burrows regardless of the fabric barrier.

Construction

The construction of visual barriers is not formal or standard. The methods will change as we gain experience. For the time being the following progression seems to make the most sense:

1. Excavate a narrow (width of a Pulaski blade) shallow (approximately six inches) trench in the soil directly under the strands of the existing fence. This can be done with a pick or pick-mattock in most areas. Be careful not to hit the fence wire while using the tools to prevent unpredictable recoil of the tool from fence wires. Put the excavated material on the side of the fence where you have access to it once the barrier is in place as you will need to bury the fabric. In cases where the fence has not yet been constructed, a trencher can be used to excavate the furrow.
2. Unroll a length of visual barrier material along the fenceline. You may need to cut the material if there is no available wooden post at the end of the roll, or if you are unable to stretch the material to an adjacent wooden post. Next, unroll a strand of high tensile fence (HTF) wire which will be used as the anchor wire along the bottom of the barrier. Smooth braided wire can also be used, but does not work as well. The wire should be at least six to ten feet longer than the piece of visual barrier material. The extra wire is necessary for attaching both ends to wooden posts.

3. Attach the smooth wire to the beginning and ending wooden posts. Then stretch the width with a fence stretcher tool until it is fairly taut and secure the wire to the posts as close as possible to the bottom of the trench.
4. Measure the height of the visual barrier when it is attached to the smooth wire in the trench. If no existing strand is available at the top or within one inch of the top of the fabric with will be necessary to place a strand of HTF wire at the right height. Secure the HTF to two end posts but do not staple the wire to the correct height on the wooden support posts until step 7. Seldom is a wire at "just the right height". In most cases it is preferable to install a "new" wire at the appropriate height.
5. Secure long rubber pieces over the stables on wooden posts to prevent abrasion of the fabric against fence clips, protrusions on the t-post, or barbs on the fence wires. This step is not always necessary if the barrier is attached to the side of the posts opposite the other fences wires.
6. Make an accordion pleat at the end of the visual barrier fabric, overlapping 8-10 inches four to six times. The end of the material should be folded on top of the leading edge. This thickened section will be secured to a wooden post with staples. Making sure the bottom edge of the fabric is flush with the ground, hammer the staples first through the top grommet and into the fence post. Then secure the bottom grommet. Several staples may be hammered between the top and bottom to secure this anchor point. Note: the staples should be oriented vertically (i.e. one tine above not next to the other).
7. From this point the fabric will be attached to each of the wooden posts in succession. Someone can begin attaching the grommets along the fabric hems to the appropriate wires with plastic cable ties or hog rings. (If a new HTF strand was used, you may now raise the wire to the appropriate height and stable it to the wooden post with the fabric already attached.) Two people may then tighten the fabric until slack is removed and stable the fabric to fence posts. Use duct tape to reinforce the fabric in places where is cannot be stapled to the grommet. In some cases the crew may feel that it is necessary to better secure the barrier to the fence post. Place a strip or square of rubber over the fabric for protection and staple through the rubber into the post.
8. At the end of the length of fabric, fold the fabric over and secure it as described in step 6.
9. In places where the bottom wire does not sit on the bottom of the trench, use rebar stakes to sink the wire into the trench bottom. The wire may be stapled to the base of the wooden posts to further secure it.
10. Fill the trench with the excavated material so that no light shows through the fence. IF necessary, fill any prairie dog holes along the fenceline with soil and rocks. It may be necessary to take fill from the field to close gaps where light penetrates under the barrier.
11. Each of the wood droppers on HTF fence is secured with metal clips. The end of these clips can tear the fabric. As a last step, bend the ends of the clips away from the fabric so they do not poke holes in the material.

Tool List	Equipment List
Fence stretchers	Visual barrier material
Fence pliers	Cable ties
Linesman pliers	Smooth braided wire
Framing and sledge hammer(s)	Rebar stakes
Pulaskis	Rubber strips and patches

Pick, Pick-Mattock
Shovels
McLeods (for raking dirt)
File to sharpen tools
Knives (for cutting fabric)
Tape measure
Apron with pockets
Duct tape (tan if possible)
Gloves
Safety Equipment

Fencing staples

<u>HTF Equipment</u>
Ratchets
Ratchet tool
Crimper
Nicopress sleeves
Spinning jenny and wire

The following information is from the City of Fort Collins, Natural Resources Department, Community Planning and Environmental Services (281 N. College Ave, P.O. Box 580, Fort Collins, CO, 80552-0580, Phone: (970)221-6600). Prairie Dog Visual Barrier Setup Guidelines.

PRAIRIE DOG VISUAL BARRIER SETUP GUIDELINES

Visual barriers help control the spread of prairie dog colonies by providing a visual blockage that prairie dogs are hesitant to approach. Although they are not a complete solution to the problem of confining prairie dogs to specific areas, they are an important component of an effective integrated prairie dog management program. In concern with other techniques visual barriers can provide a humane and passive means of controlling the prairie dogs movements. In order to be effective the following guidelines should be kept in mind:

1) Prairie dogs seem to respond to holes where light can pass through the visual. Therefore, when installing artificial barriers no light passage can be allowed along the bottom edge, the seams or as a result of damage to the barrier. Proper installation and subsequent maintenance should prevent this.
2) Visual barriers are not effective when the barrier separates family units or "coteries." When connected burrows can be found on both sides of the barrier, the prairie dogs will continue to use the underground system of tunnels and burrows and move through the aboveground barrier.
3) The installation of visual barriers is not formal or standard. The methods will change as we gain experience. Current techniques range from the installation of vertical vinyl barriers, 36 inches high, attached to existing fences or erected separately, to the use of vegetation, topography, and horizontal barriers.

Installation of vertical barriers

City of Fort Collins, Natural Areas Program:

1. Artificial barriers are usually installed near property lines, with the intent of establishing a modest "prairie dog-free buffer zone." Select the best location possible by staying near the property line, considering existing topography and the type of native vegetation that will be used to create an aesthetically appealing permanent barrier.
2. Prairie dogs must be removed from the buffer zone, **making certain that coteries do not overlap the barrier.**
3. An olive-colored vinyl barrier, 36 inches tall with a grommet every 3 feet on both the top and bottom is erected. A 3 inch trench can be formed to place the bottom of the vinyl into but is not necessary in all situations, **remember that light cannot show through under the barrier when work is completed.**
    A. If a trench is used, caution should be given to not trample the excavated soil because it will be reused to backfill the bottom of the barrier.
    B. If a trench is not used backfill material needs to be onsite and used to place along the soil surface and the bottom of the barrier, like a bead of caulking.
4. The support structure for the artificial barrier needs to be constructed using 5 feet wooden posts, t-posts, smooth wire.

A. The wooden posts should be placed at both the beginning and end of the structure and every 100 feet between.
    1. Wooden posts should be installed to form a 3 feet wide H-post configuration.
    2. This configuration is further strengthened using smooth wire that is tightened from the top corner of each post to the bottom of the other forming an X.
B. T-posts are them placed every 10 feet from the 1st H-post to the last H-post, facing the knobs away from the side that the barrier will be attached to.

5. Smooth wire can then be stretched from one end of the support structure to the other at the height of the barrier to be installed.
    A. The wire is wrapped around the end wooden post and stapled, using fencing staples.
    B. The wire is then attached to the t-post using fencing ties.
6. The vinyl barrier can now be attached to the support structure **on the wind ward side.**
    A. The top is attached to the wire using hog rings or plastic tie-wraps at each grommet.
    B. The bottom is secured using heaving landscaping pins at each grommet to anchor it to the ground before backfilling.

Options:

1. Artificial horizontal barriers can be installed in conjunction with the vertical vinyl barrier to discourage animals from tunneling directly under structure using 1 inch mesh and 35 inches wide poultry wire.
    a. The wire should be buried 3 inches below the soil surface and extend out from the vinyl 2 ½ feet overlapping the bottom of the vertical barrier 6 inches on the prairie dog side of the barrier.
2. Native vegetation can then be planted in the area between the artificial barrier and the property line to establish a permanent barrier.
    a. Bare-root native shrubs selected for the site are planted 1 foot apart in rows that are 2 feet apart, offsetting every other row of plants to create an 8 foot wide barrier.
        i. Plastic weed barrier material, (4mil), is place on the ground before the shrubs are planted and removed after the first 3 to 5 years.
        ii. Mulch is placed over the weed barrier.
        iii. Shrubs are watered weekly, during the growing season, or as needed for the first 2 to 3 years.
        iv. Shrubs are weeded once during the growing season and pruned early in the dormant season for the first 2 to 3 years. Pruning encourages bushier growth
    b. Other native vegetation is currently being experimented with.
        i. Vines work well along fences.
        ii. Common cattails and coyote willow work well along ditch banks.
3. A mix of native tall grasses and wildflowers can also be established between the artificial and living barriers.
    a. Grasses should be mowed twice during the growing season until established.
    b. Wildflowers should not be added until after the grasses are established.

APPENDIX E: PRAIRIE DOG TRAPPING/HANDLING/TRANSPORTING PROTOCOL

APPENDIX E.
PRAIRIE DOG TRAPPING/HANDLING/TRANSPORTING PROTOCOL

Adapted for Devils Tower National Monument (DETO) from:
HUBBELL TRADING POST NATIONAL HISTORIC SITE (HUTR)
PRAIRIE DOG TRAPPING/HANDLING/TRANSPORTING PROTOCOL
KEVIN CASTLE, NPS WILDLIFE VETERNARIAN

Short instructions; details below.

1. Develop JHA for this activity.
2. Buy/borrow traps.
3. Identify active burrows.
4. Prebait closed traps in position (2-3 days) at burrow entrances.
5. Set open, baited traps.
6. Transport animals to new location and release at appropriate site.
7. Repeat trapping at burrow(s) until all animals are captured or are trap-shy.
8. Move traps to another active burrow.

Details:

Equipment

-Tomahawk or other wire traps (14 x 14 x 40 cm or 15 x 15 x 50 cm). Number depends on # of burrows/systems, but should try to have 3-4 per burrow/system. Buy, or borrow from IPM, state?
-Rolled oats or horse sweet feed mixture for bait. Peanut butter makes a big mess, so I do not recommend it for this project
-Leather gloves, dedicated clothing (only worn for trapping) or coveralls
-Insect repellent

Procedures

Prebaiting period (2-3 days)
Allows time for the animals to become accustomed to the unfamiliar objects, and allows the traps to "weather" and acquire odors associated with the area.
-Place closed traps in position near burrow entrances.
-Spread bait around and inside traps, and drop a small amount into burrow entrances.
Replace/refresh bait each morning and evening as needed.

Trapping

Prairie dogs and most other ground squirrels are active during the day. Plan to open traps well before sunrise, so you don't disturb "early risers". In some instances, traps can be opened at night, when pdog activity has stopped, but there is a good chance a nocturnal species may be caught or may trip the trap, and you may be faced with releasing a skunk or other critter that will be a challenge to take out. By mid-June, young of the year should be weaned; if they are seen on the surface they are likely able to feed themselves.

Clean as much leftover bait as possible from around the traps. Wear leather or latex gloves when handling bait that may have been partially chewed or defecated upon. Open the trap door and

carefully place a small pile of bait in the trap, beyond the treadle, away from the open door. Alternatively, place the bait and then open the door.
Traps should be checked from a distance, if possible, every hour, or more frequently in hot or cold, wet weather. Trap covers can be employed, but will decrease trap success, and make it more difficult to see if anything is in the trap. Once you approach the traps, your chance of catching animals decreases greatly, so try not to disturb them unless necessary.

If the pdogs become trap-shy, you may need to remove traps for a few days, prebait, then trap again. We can be in touch and give recommendations.

Proper trap positioning
Look for tracks in the dirt, fresh feces, and open holes that are indicative of active burrows. Place traps as level as possible, within 1-2 m of the opening, with the open door facing a burrow. Don't actually block the burrow opening! Pdogs are less likely to climb *up* into a trap, so if you can't get them level, then a downward slope is better than an upward slope. If there is a high mound around the burrow, place the trap at a low spot. Try to "bury" the wire on the cage bottom, by moving the trap back and forth on the ground while setting it in place. Make sure you don't get too much dirt under the treadle, or it will not trip, even if an elephant enters the trap.

Health and Safety Measures
Because plague may be present near DETO, additional precautions should be taken when setting traps and handling/moving pdogs. Please contact me if you have any questions about this.
-Wear long pants, long-sleeve shirt, and gloves; apply DEET-containing product to clothing
-Be aware of sick pdogs and of fleas. Contact Wildlife Health (K. Castle, 970-219-0104) if you see sick/dead pdogs at any time
-Minimize handling; ideally you never have to touch animals, but can transport them in the trap.
-Transport animals in the bed of a pickup if possible or otherwise arrange to carry them outside a vehicle

-Wash hands with soap and water or an alcohol-based sanitizer if water is not available.
-Do not eat, drink, or smoke when handling animals.

Questions:
Determine exclusion techniques (prior to trapping!)
Do this year; trap next year?

Where get traps?

APPENDIX F: LITERATURE SOURCES

APPENDIX F: LITERATURE SOURCES

Literature may be found at the park library or resource files, additional sources may include local universities (and their interlibrary loan process) and other local agencies. Local libraries may also be able to provide literature or be able to get literature through interlibrary loans. Information can also be readily found on in internet by using any number of search engines, such as www.google.com. A limited selection of literature is also on file at the Intermountain Regional Office in Denver (IMRO-Denver) either in electronic or hard copy files, which may be requested (see list below). Additional sources include:

- NPS Electronic Technical Information Center (www.etic.nps.gov)
- NPS Library Online Catalog – Voyager (www.library.nps.gov)
- Journal Storage (www.jstor.org) Contact Bonnie Semro at IMRO-Denver for log-in procedures (Ph. 303-969-2854).
- USGS Library website: (www.usgs.gov or http://library.usgs.gov/)
- USFS Prairie Dog Literature website: (http://www.fs.fed.us/rt/nebraska/gpng/literature/litpdog.html)
- USGS Sage Map website: http://sagemap.wr.usgs.gov

Intermountain Regional Office
Natural Resources

Prairie Dog Literature

Hard Copy on file at IMRO (copies available upon request)

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PDF or electronic files (included in prairie dog management plan template Literature and Information files)

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U.S. Fish and Wildlife Service. 1991. Utah prairie dog recovery plan. U.S. Department of the Interior, Denver, Colorado. 41pp. (.pdf file)

Utah Prairie Dog Recovery Implementation Team. 1997. Utah prairie dog interim conservation strategy. 26pp. (.pdf file)

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APPENDIX G: COST ESTIMATES FOR TREATMENT OPTIONS

APPENDIX G: COST ESTIMATES FOR TREATMENT OPTIONS

Cost Estimates for Plague Treatment Options:

Costs associated with park conducted dusting of prairie dog burrows to control fleas:

- Personnel time (costs depend on size of area to be treated, number of personnel working on project, grade of employees, overtime if necessary, etc.)
- Vehicle expenses (if separated from other activities)
- Equipment and materials:

Deltamethrin insecticide – approximately $55 for 5 lb. container (1 lb. will treat approximately 1,000-2,000 ft^2 depending on application rate)	
Dust Applicators – e.g. Solo Mod. 450 motorized backpack mister	$675
and Solo Dusting attachment for Mod 450	$ 67
Tyvek suits (with hood, each)	$ 7
Nitrile gloves (9 mil, box of 25)	$ 28
Rubber boot covers (disposable, pair)	$ 5
Full-face respirators	$180-250
Respirator Filters (box of 1or 2)	$ 3-7
Duct Tape (roll, each)	$ 7

Note: Other types of dusting applicators may be available for purchase, or you may be able to borrow dusting equipment from other parks or agencies.

Commercial pesticide applicator companies may be available to conduct burrow dusting for flea control. Work with the IPM Coordinator to ensure all NPS requirements and needs are met by contractors. It will be necessary to work with Administrative staff to adhere to contracting guidelines for this service prior to hiring a contractor.

Zinc-phosphide treated grain baits and gas cartridges are typically available from U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services (USDA-APHIS-WS). These are sometimes available at little or no cost to landowners and land management agencies working cooperatively with APHIS.

Cost Estimates for Installation of Temporary Visual Barrier:

Costs associated with park conducted installation of temporary visual barrier based on major stores (Home Depot, Sears and specialty fencing supply stores.

- Personnel time (costs depend on size of area to be treated, number of personnel working on project, grade of employees, overtime if necessary, etc.)
- Vehicle expenses (if separated from other activities)
- Equipment and materials:

Visual barrier material (10 heavy duty weed cloth)	$70-75/100 ft
Posts	$5/post
Cable ties	$12/100
Smooth braided wire	$90/2000 ft
Rebar stakes	$6/20 ft
Rubber strips and patches	$7
Fencing staples	$12/5 lbs
Fence stretchers	$52
Fence pliers	$8-14
Linesman pliers	$3
Framing hammer	$27
Sledge hammer(s)	$22
Pulaskis	$30
Pick, Pick-Mattock	$20
Shovels	$20
McLeods (for raking dirt)	$50
File to sharpen tools	$5
Knives	$20
Tape measure	$9
Apron with pockets	$18-20
Duct tape (tan if possible)	$6
Gloves	$2-6
Ratchets	$3-6
Crimper	$45-120
Nicopress sleeves	$17.95/100
Spinning jenny and wire	$50-75

Many of the tools are already be available at Devils Tower National Monument or can be borrowed from another park unit.

APPENDIX H: PRAIRIE DOG POINTS OF CONTACT

APPENDIX H: PRAIRIE DOG POINTS OF CONTACT (March 2005)

COORDINATORS

Agency/Organization	Name	Address	Phone	Fax	E-Mail
Western Assoc. of Fish & Wildlife Agencies, Interstate Prairie Ecosystem Coordinator	(position is currently vacant)				
U.S. Fish & Wildlife Service, Grasslands Coordinator	Pat Mehlhop	134 Union Blvd. Denver, CO 80228 -or- P.O. Box 25486 Denver Federal Ctr. Denver, CO 80225-0486	303-236-4215	303-236-0027	pat_mehlhop@fws.gov

FEDERAL & STATE WILDLIFE AGENCIES

State	Agency	Name	Address	Phone	Fax	E-Mail
Arizona	Fish & Wildlife Service	Steve Spangle, Field Supervisor	Ecological Services Field Office 2321 W. Royal Palm Rd., Suite 103 Phoenix, AZ 85021-4951	602-242-0210 ext. 244	602-242-2513	steve_spangle@fws.gov
		John Nystedt	Ecological Services Suboffice 323 N. Leroux St, Ste. 101 Flagstaff, AZ 86001	928-226-0614 ext. 104	928-226-1099	john_nystedt@fws.gov
		Doug Duncan	Ecological Services Suboffice 201 N. Bonita, Suite 141 Tucson, AZ 85745	520-670-6150 ext. 236	520-670-6155	doug_duncan@fws.gov
Arizona	AZ Game & Fish Department	Duane Shroufe, Director	2221 West Greenway Rd. Phoenix, AZ 85023-4399	602-942-3000		dshroufe@azgfd.gov
		Terry Johnson, Endangered Sp. Coordinator	2221 West Greenway Rd. Phoenix, AZ 85023-4399	602-789-3707	602-789-3926	teebeej@azgfd.gov
		Bill Van Pelt	2221 West Greenway Rd. Phoenix, AZ 85023-4399	602-789-3573	602-789-3926	bvanpelt@azgfd.gov
		Tim Snow	555 N. Greasewood Rd. Tucson, AZ 85745	520-388-4449		tsnow@azgfd.gov
		Jared Underwood, (Non-game Small Mammal Coordinator)	2221 W. Greenway Rd. Phoenix, AZ 85023	602-789-3394		junderwood@azgfd.gov

Colorado	Fish & Wildlife Service	Susan Linner, Field Supervisor	Ecological Services Field Office 134 Union Blvd., Suite 650 Lakewood, CO 80228	303-236-4774	303-236-4005	susan_linner@fws.gov
		Sandy Vana-Miller	Ecological Services Field Office 134 Union Blvd., Suite 650 Lakewood, CO 80228	303-236-4748	303-236-4005	sandy_vana-miller@fws.gov
		Al Pfister	Western Colorado Field Office 764 Horizon Drive, Building B Grand Junction, CO 81506-3946	970-243-2778 ext. 29	970-245-6933	al_pfister@fws.gov
Colorado	CO Division of Wildlife	Director	6060 Broadway Denver, CO 80216	303-291-7208	303-294-0874	
		Eric O'Dell (BTPD)		303-472-4340		eric.odell@state.co.us
		Amy Seglund (GPD)	2300 S. Townsend Ave. Montrose, CO 81401	970-252-6014		amy.seglund@state.co.us
		Pam Schnurr (WTPD)	711 Independent Ave Grand Junction, CO 81505	970-255-6180		pam.schnurr@state.co.us
Montana	Fish & Wildlife Service	Mark Wilson, Field Supervisor	Ecological Services Field Office 100 North Park Street, Suite 320 Helena, MT 59604	406-449-5225	406-449-5339	mark_wilson@fws.gov
		Lou Hanebury	Ecological Services Suboffice 2900 4th Avenue North, Room 301 Billings, MT 59101	406-247-7367	406-247-7364	lou_hanebury@fws.gov
		Randy Matchett, Senior Wildlife Biologist	USFWS – Charles M. Russell NWR Box 110, 333 Airport Road Lewistown, MT 59457	406-538-8706 ext. 227	406-538-7521	randy_matchett@fws.gov
		Jane Roybal, Service Tribal Aid Biologist	Lewiston, MT	406-538-2391		jane_roybal@fws.gov

Montana	MT Dept. of Fish, Wildlife & Parks	Jeff Hagener, Director	1420 East 6th Avenue P.O. Box 200701 Helena, MT 59620-0701	406-444-2186	406-444-4952	
		Heidi Youmans	1420 East 6th Avenue P.O. Box 200701 Helena, MT 59620-0701	406-444-2612	406-444-4952	hyoumans@mt.gov
		Allison Puchniak	2300 Lake Elmo Dr. Billings, MT 59105	406-247-2966	406-248-5026	apuchniak@mt.gov
New Mexico	Fish & Wildlife Service	Susan MacMullin, Field Supervisor	Ecological Services Field Office 2105 Osuna, NE Albuquerque, NM 87113	505-248-7476	505-248-7471	susan_macmullin@fws.gov
		Maureen Murphy	Ecological Services Field Office 2105 Osuna, NE Albuquerque, NM 87113	05-761-4715	505-346-2542	maureen_murphy@fws.gov
New Mexico	NM Department of Game & Fish	Bruce Thompson, Director	P.O. Box 25112 Santa Fe, NM 87504	505-476-8008		bthompson@state.nm.us
		Chuck L. Hayes	P.O. Box 25112 Santa Fe, NM 87504	505-476-8101	505-476-8128	lhayes@state.nm.us
		Jim Stuart	P.O. Box 25112 Santa Fe, NM 87504	505-476-8101	505-476-8128	jstuart@state.nm.us
Texas	Fish & Wildlife Service	Tom Cloud, Field Supervisor	Ecological Services Field Office 711 Stadium Drive East, Suite 252 Arlington, TX 76011	817-277-1100	817-277-1129	tom_cloud@fws.gov
		John Hughes	Ecological Services Suboffice P.O. Box 713 Canadian, TX 79014	806-323-6636	806-323-6754	john_p_hughes@fws.gov

Texas	TX Parks & Wildlife Department	Robert L. Cook, Executive Director	4200 Smith School Rd. Austin, TX 78744	512-389-4802	512-389-4814	robert.cook@tpwd.state.tx.us
		Mike Berger, Wildlife Division Director	4200 Smith School Rd. Austin, TX 78744	512-389-8575		mikeberger@tpwd.state.tx.gov
		Duane Schlitter, Wildlife Diversity Program Leader	3000 IH-35 South, Suite 100 Austin, TX 78741	512-912-7041	512-912-7058	duane.schlitter@tpwd.state.tx.us
		John Young, State Mammalogist	3000 IH-35 South, Suite 100 Austin, TX 78741	512 389-8048		john.young@tpwd.state.tx.us
		Heather Whitlaw, Wildlife Diversity Specialist	P.O. Box 42125 Texas Tech University Lubbock, TX 79409-2125	806-742-6888 ext. 242	806-742-2280	heather.whitlaw@tpwd.state.tx.us
Utah	Fish and Wildlife Service	Laura Romin	2369 West Orton Circle, Suite 50 West Valley City, UT 84119	801-975-3330 ext. 142	801-975-3331	laura_romin@fws.gov
		Renee Chi	2369 West Orton Circle, Suite 50 West Valley City, UT 84119	801-975-3330 ext. 135	801-975-3331	renee_chi@fws.gov

Utah	Utah Division of Wildlife Resources	Director	1594 W. North Temple, Suite 2110 P.O. Box 146301 Salt Lake City, UT 84114-6301	801-538-4702		
		Alan Clark	1594 W. North Temple, Suite 2110 P.O. Box 146301 Salt Lake City, UT 84114-6301	801-538-4881	801-538-4745	alangclark@utah.gov
		Kevin Bunnell, Mammals Coordinator	1594 W. North Temple, Suite 2110 P.O. Box 146301 Salt Lake City, UT 84114-6301	801-538-4758	801-538-4709	kevinbunnell@utah.gov
		Amy Seglund	475 West Price River Dr., Suite C Price, UT 84501	435-636-0271	435-637-7361	amyseglund@utah.gov
		Tony Wright				tonywright@utah.gov
Wyoming	Fish & Wildlife Service	Brian Kelly, Field Supervisor	Ecological Services Field Office 4000 Airport Parkway Cheyenne, WY 82001	307-772-2374 ext. 34	307-772-2358	brian_t_kelly@fws.gov
Wyoming	WY Game & Fish Department	Terry Cleveland, Director	5400 Bishop Boulevard Cheyenne, WY 82006	307-777-4501	307-777-4650	terry.cleveland@wgf.state.wy.us
		Reg Rothwell	5400 Bishop Boulevard Cheyenne, WY 82006	307-777-4588	307-777-4650	reg.rothwell@wgf.state.wy.us
		Martin Grenier	260 Buena Vista Lander, WY 82520	307-332-2688	307-332-6669	martin.grenier@wgf.state.wy.us
		Bob Oakleaf	260 Buena Vista Drive Lander, WY 82520	307-332-2688	307-332-6669	bob.oakleaf@wgf.state.wy.us

FEDERAL AGENCIES – WASHINGTON D.C. AND REGIONAL OFFICES

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Wash. DC	Fish & Wildlife Service	Nancy Green	Division of Endangered Species 4401 N. Fairfax Drive, Room 452 Arlington, VA 22203	703-358-2171	703-358-2324	nancy_green@fws.gov
		Jill Parker		703-358-2452	703-358-2210	jill_parker@fws.gov
Wash. DC	USDA Forest Service	Marc Bosch	Forest Service, WFW Staff Mailstop 1121 1400 Independence Avenue, SW Washington, DC 20250	202-205-1220	202-205-1599	mbosch@fs.fed.us
Wash. DC	Bureau of Land Management	Peggy Olwell	1849 C Street, Suite 204 Washington, DC 20240	202-452-7764 ext. 3764	202-452-7702	peggy_olwell@blm.gov
		Eric Lawton	1849 C Street, Suite 204 Washington, DC 20240	202-452-7760 ext. 3760	202-452-7702	eric_lawton@blm.gov
Wash. DC	National Park Service	Gary Johnston	1849 C Street NW Washington, DC 20240	202-513-7175	202-371-2131	gary_johnston@nps.gov
		Margaret Wild, DVM, Wildlife Veterinarian	1201 Oak Ridge Dr., Ste. 200 Fort Collins, CO	970-225-3593	970-225-3585	margaret_wild@nps.gov
		Jenny Powers, DVM, Wildlife Veterinarian	1201 Oak Ridge Dr., Ste. 200 Fort Collins, CO	970-267-2122	970-225-3585	jenny_powers@nps.gov
Wash. DC	Bureau of Indian Affairs	Gary Rankel	Office of Trust Responsibilities 1849 C Street, NW, MS 4513-MIB Washington, DC 20240	202-208-4088	202-219-0006	don_reck@bia.gov
Wash. DC	USDA-NRCS	Howard Hankin	NRCS-ECS, Room 6158-S POB 2890 Washington, D.C. 20013-2890	202-690-0082	202-720-2646	howard.hankin@usda.gov
		Randy Gray	NRCS-ECS, Room 6158-S POB 2890 Washington, D.C. 20013-2890	202-690-0856	202-720-2646	randy.gray@usda.gov
Wash. DC	Bureau of Land Management	Cal McCluskey	1387 South Vinnell Way Boise, ID 83709-1657	208-373-4042	208-373-3805	cal_mccluskey@blm.gov

Wash. DC	USDA/APHIS/ Wildlife Services	Seth R. Swafford	4700 River road, Unit 87 Riverdale, MD 20737	301-734-3570	301-734-5157	Seth.swafford@usda.gov
		Thomas DeLiberto	4101 LaPorte Ave. Fort Collins, CO 80521	970-266-6088	970-266-6089	Thomas.J.Deliberto@aphis.usda.gov
Regional	Bureau of Land Management	Bruce Durtsche	Denver Federal Center Building 50 P.O. Box 25047 Denver, CO 80225-0047	303-236-6310	303-236-6450	bruce_durtsche@blm.gov
Regional	Fish & Wildlife Service	Luela Roberts	500 Gold Avenue, SW, Room 4012 Albuquerque, NM 87103	505-248-6654	505-248-6922	luela_roberts@fws.gov
Regional	Bureau of Indian Affairs	Diane Mann-Klager	115 Fourth Ave. SE Aberdeen, SD 57401	605-226-7621 ext. 4228	605-226-7358	DianeMann-Klager@bia.gov currently email not active
Regional	National Park Service, Midwest RO	Dan Licht	Suite 210, E. St. Joseph St. Rapid City, SD 57701	605-341-8202	605-341-2819	dan_licht@nps.gov
Regional	National Park Service, Intermountain Region	Cay Ogden, Wildlife Ecologist	12795 W. Alameda Parkway Lakewood, CO 80228	303-969-2929	303-969-2644	cay_ogden@nps.gov
		Gerald McCrea, IPM Regional Coordinator	P.O. Box 728 Santa Fe, NM 87504	505-988-6024	505-988-6025	gerald_mccrea@nps.gov
		Craig Hauke, Colorado Plateau IPM Coordinator	Canyonlands National Park	435-719-2132	435-719-2300	craig_hauke@nps.gov
		Joseph Winkelmaier, Regional U.S. Public Health Service Consultant	Santa Fe, NM	505-988-6040	505-660-8516	joseph_winkelmaier@partner.nps.gov
		Adam Kramer, U.S. Public Health	Grand Canyon National Park 823 N. San Francisco, Ste. C	928-226-0168	928-226-0129	adam_kramer@partner.nps.gov

		Service Consultant George Larsen U.S. Public Health Service Consultant	Flagstaff, AZ 86001 Yellowstone National Park	307-344-2273	307-344-2279	george_larsen@contractor.nps.gov
Regional	USDA Forest Service	John Sidle	125 North Main Street Chadron, NE 69337-2234	308-432-0391	308-432-0309	jsidle@fs.fed.us
Regional	U.S. Army	Bert Bivings	HQ Forces Command AFEN-ENE Fort McPherson, GA 30550	404-464-7659		bivingsb@forscom.army.mil
Regional	U.S. Air Force	Daniel Friese	HQ AFCEE/TDI 3300 Sidney Brooks Brooks City-Base, TX 78235-5112	210-536-3823	210-536-3890	Daniel.Friese@brooks.af.mil
Regional	USDA-APHIS-WS	Jeff Green	2150 Centre Ave, Bldg. B Mailstop 3W9 Ft. Collins, CO 80526	970-494-7453	970-494-7455	jeffrey.s.green@aphis.usda.gov

OTHER AGENCIES

State	Agency	Name	Address	Phone	Fax	E-Mail
Arizona	AZ Dept. of Agriculture	Sheldon Jones Director	1688 West Adams Phoenix, AZ 85007	602-542-4373		
Arizona	USDA-NRCS	Steve Smarik Environmental Specialist	230 N. First Ave, Suite 509 Phoenix, AZ 85003-1706	602-280-8785	602-280-8795	steve.smarik@az.usda.gov
Colorado	Centers For Disease Control and Prevention	Kenneth Gage John Young Marty Schriefer Rusty Enscore John Montenieri	CDC/Bacterial Zoonoses Branch P.O. Box 2087 Ft. Collins, CO 80522	970-221-6450 970-221-6444 970-221-6479 970-221-6452 970-221-6457	970-221-6476 970-221-6476 970-221-6476 970-221-6476 970-221-6476	 jyoung2@cdc.gov mschriefer@cdc.gov
Colorado	U.S. Army	Gary Belew Richard Bunn	DECAM 1638 Elwell Street Fort Carson, CO 80913-4356 DECAM 1638 Elwell Street Fort Carson, CO 80913-4356	719-526-1694 719-579-9342	719-526-2091	Gary.belew@carson.army.mil Rick.bunn@carson.army.mil
Colorado	U.S. Air Force	Floyd Hatch	Buckley AFB, CO 80011	720-847-6937	720-847-6159	floyd.hatch@buckley.af.mil
Colorado	USFWS	Kara Altvater	Buckley AFB, CO 80011	720-847-6158	720-847-6159	Kara.altvater@buckley.af.mil
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Colorado	U.S. Geological Survey Biological Resources Div.	Dean Biggins	2150 Centre Ave., Building C Fort Collins, CO 80526	970-226-9467	970-226-9230	dean_biggins@usgs.gov
Colorado	USDA-NRCS	Tony Puga, Resource Conservationist	655 Parfet Street Room E200C Lakewood, CO 80215-5517	720-544-2821	720-544-2962	anthony.puga@co.usda.gov
Montana	MT Dept. of Agriculture	Monte Sullins	321 South 24th Street W Billings, MT 59102	406-652-3615		

State	Agency	Name	Address	Phone	Fax	E-Mail
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Montana	Bureau of Indian Affairs	Jerry Kaiser Allan Hanley	Rocky Mountain Region 316 N 26th Street Billings, MT 59101 P.O. Box 69 Crow Agency, MT 59022	406-247-7946 406-638-4411	406-247-7990	jerrykaiser@bia.gov allanhanley@bia.gov
New Mexico	NM Dept. of Agriculture	Frank DuBois Director	MSC 3189 Box 30005 Las Cruces, NM 88003-8005	505-646-3007		
New Mexico	USDA-NRCS	David Seery State Biologist	6200 Jefferson NE Albuquerque, NM 87109	505-761-4486	505-761-4462	david.seery@nm.usda.gov
New Mexico	Bureau of Land Management	Rand French Paul Sawyer	Roswell Field Office 2909 West Second Street Roswell, NM 88201 P.O. Box 27115 Santa Fe, NM 87502	505-627-0272 505-438-7516	505-627-0276	rand_french@nm.blm.gov paul_sawyer@nm.blm.gov
Oklahoma	OK Dept. of Agriculture	John Steuber	P.O. Box 528804 Oklahoma City, OK 73152	405-521-3864		
Oklahoma	USDA-NRCS	Steve Tully State Biologist	100 USDA, Suite 206 Stillwater, OK 74074	405-742-1239	405-742-1201	stephen.tully@ok.usda.gov
Texas	TX Dept. of Agriculture	Mike McMurray	1700 North Congress Avenue Austin, TX 78701	512-475-1678		mmcmurry@agr.state.tx.us
Texas	Fish & Wildlife Service	Lynn Nymeyer	Buffalo Lake NWR P.O. Box 179 Umbarger TX, 79091	804-499-3382		lynn_nymeyer@fws.gov
Utah	Bureau of Land Management	Steve Madsen	P.O. Box 45155 Salt Lake City, UT 84145-0155	801-539-4058	801-539-4058	steve_c_madsen@blm.gov

State	Agency	Name	Address	Phone	Fax	E-Mail
Wyoming	WY Dept. of Agriculture	Justin Williams Ag Program Director	2219 Carey Avenue Cheyenne, WY 82002	307-777-7067	605-777-6593	jwilli7@state.wy.us
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Wyoming	Bureau of Land Management	Dave Roberts	5353 Yellowstone Rd. P.O. Box 1828 Cheyenne, WY 82003	307-775-6099	307-775-6082	dave_a_roberts@blm.gov
Wyoming	Fish & Wildlife Service	Mike Lockhart	National BFF Conservation Center, 410 E. Grand Avenue, Suite 315 Laramie, WY 82070	970-897-2730		mike_lockhart@fws.gov
Wyoming	USDA-NRCS	Gerald Jasmer, State Resource Conservationist	Federal Building, Room 3124 100 E. B St, Casper, WY 82601	307-233-6768	307-233-6795	gerald.jasmer@wy.usda.gov
Maryland	U.S. Army	Steve Sekscienski	US Army Environmental Center Attn: SFIM-AEC-EQN 5179 Hoadley Rd. Aberdeen Proving Grounds Aberdeen, MD 21010	410-436-1560	410-436-1680	steven.sekscienski@aec.apgea.army.mil
Maryland	U.S. Food & Drug Administration	Dr. Shannon Jordre	Division of Compliance Food and Drug Administration/CVM, HFV-235 7519 Standish Place Rockville, MD 20855	240-276-9229	240-276-9241	shannon.jordre@fda.gov

TRIBES

Tribe	State	Name	Address	Phone	Fax	E-Mail
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Crow Tribe	Montana	Bill Eastman Director F&W Dept.	Crow Tribal Fish & Game P.O. Box 159 Crow Agency, MT 59022	406-638-3826	406-638-7283	bille@crownations.net
Gros Ventre & Assiniboine Tribes (Ft. Belknap)	Montana	Harold Main	Route 1, Box 66 Harlem, Montana 59526	406-353-2205 ext. 470 or 406-353-4801	406-353-2889	
Northern Cheyenne Tribe	Montana	Desmond Rollefson	P.O. Box 128 Lame Deer, MT 59043	406-477-6506	406-477-6210	

OTHER INTERESTED PARTIES

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Black-footed Ferret Recovery Foundation	Aaron Clark	P.O. Box 249 Wheatland, WY 82201	307-322-1811	307-322-1815	rabbitcreek@vcn.com
	Archie Reeves	410 East Grand Avenue, Suite 213 Laramie, Wyoming 82070	307-742-0848	307-742-0872	
Colorado State University	Bill Andelt	Dept. of Fishery & Wildlife Biology 109 Wagar Building Fort Collins, CO 80523	970-491-7093	970-491-5091	billan@cnr.colostate.edu
	Mike Antolin	Department of Biology	970-491-1911	970-491-0649	antolin@lamar.colostate.edu
Denver Zoological Foundation	Brian Miller	2900 East 23rd Avenue, Gate 7 Denver, CO 80205-5735	303-376-4944	303-376-4901	zooconservation@denverzoo.org
Environmental Defense	Ted Toombs	2334 N. Broadway Boulder, CO 80304	303-447-7210	303-440-8052	ttoombs@environmentaldefense.org
Forest Guardians	Nicole Rosmarino	312 Montezuma, Suite A Santa Fe, NM 87501	505-988-9126 ext. 156		nrosmarino@fguardians.org
National Fish & Wildlife Foundation	Greg Watson	1120 Connecticut Ave., N.W., #900 Washington, DC 20036	202-857-0166	202-857-0162	watson@nfwf.org
	Jane Van Gunst	28 Second Street, 6th Floor San Francisco, CA 94105	415-778-0999 Ext. 221	415-778-0998	jane.vangunst@nfwf.org
National Wildlife Federation	Steve Torbit	2260 Baseline Road, Suite 100 Boulder, CO 80302	303-786-8001 ext. 17	303-786-8911	torbit@nwf.org
	Sterling Miller	240 North Higgins, Suite #2 Missoula, MT 59802	406-721-6705	406-721-6714	millers@nwf.org
New Mexico Cooperative Fish & Wildlife Research Unit	Andrea Ernst, Scott Schrader	New Mexico State University P.O. Box 30003, MSC 4901 Las Cruces, NM 88003-003	505-646-1084 505-646-5022	505-646-1281	ernstae@nmsu.edu schrader@nmsu.edu
Predator Conservation Alliance	Jonathan Proctor	2900 E. 23rd Ave., Gate 7 Denver, CO 80205-5735	303-376-4982	303-376-4806	jonathan@predatorconservation.org
Rocky Mountain Bird Observatory	Tammy Vercauteren, Seth Gallagher	230 Cherry Street Fort Collins, CO 80521	970-482-1707	970-472-9031	tammy.vercauteren@rmbo.org

Organization	Name	Address	Phone	Fax	E-Mail
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	Kevin Honness	P.O. Box 1118 Fort Pierre, SD 57532	605-843-2842	605-223-3292	honness@wcenet.com
University of Maryland	John Hoogland	301 Braddock Rd.-Appalachian Lab Frostburg, MD 21532	301-689-7130	301-689-7200	hoogland@al.umces.edu
Wildlife Management Institute	Len Carpenter	4015 Cheney Dr. Ft. Collins, CO 80526	970-223-1099	970-204-9198	lenc@verinet.com
Wildlife Systems	Jon Sharps	P.O. Box 346 Rodeo, NM 88056	520-558-1999		
Yale University Yale School of Forestry & Environmental Studies	Tim Clark	Sage Hall 205 Prospect Street New Haven, CT 06511	203-432-6965	203-432-3817	

LOCAL AND ADJACENT AGENCY (List and Contact Information)

Landowner	Address				Contact	Phone Number
IPY Ranch LTD	PO Box 50	Devils Tower	WY	82714	George White	307-467-5540
Bear Lodge Cattle Company	PO Box 155	Devils Tower	WY	82714	Ogden Driskill	307-465-5555
Clifford P Thurman					Ralph Thurman	307-620-0063
Frank Sanders	PO Box 24	Devils Tower	WY	82714	Frank Sanders	307-467-5267
Cummings	PO Box 70	Devils Tower	WY	82714	Shirley Cummings	307-467-5561

APPENDIX I: ENVIRONMENTAL SCREENING FORM

APPENDIX I: ENVIRONMENTAL SCREENING FORM