
**U.S. Department of the Interior
National Park Service**



**Badlands National Park, North Unit
Pennington and Jackson Counties, South Dakota**

Black-Tailed Prairie Dog Management Plan

Environmental Assessment

August 2007



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Executive Summary

The U.S. Department of Interior, National Park Service (NPS) proposes to implement a comprehensive black-tailed prairie dog management plan for the North Unit of Badlands National Park where prairie dog populations have increased from approximately 2,070 acres in 1979 to 6,363 acres in 2006, or 11% of the approximately 60,000 acres of available suitable habitat. The principal objectives of the management plan are to ensure that the black-tailed prairie dog is maintained in its role as a keystone species in the mixed-grass prairie ecosystem on the North Unit, while providing strategies to effectively manage instances of prairie dog encroachment onto adjacent private lands. The plan also seeks to manage the North Unit's prairie dog populations to sustain numbers sufficient to survive unpredictable events that may cause high mortality, such as sylvatic plague, while at the same time allowing park managers to meet management goals for other North Unit resources. Primary considerations in developing the plan include conservation of the park's natural processes and conditions, identification of effective tools for prairie dog management, implementing strategies to deal with prairie dog encroachment onto adjacent private lands, and protection of human health and safety. The plan was designed to be fully consistent with the North Unit General Management Plan and NPS Management Policies 2006, as well as the Badlands NP Weed Management Plan, Fire Management Plan, and Bison Management Plan. Because of ongoing NPS negotiations with the Oglala Sioux Tribe regarding cooperative management of Badlands National Park's South Unit, this plan addresses prairie dog management in the North Unit only.

The impacts of three management alternatives were analyzed in detail in the plan environmental assessment: 1) a No Action alternative that would continue current prairie dog management, 2) management of prairie dogs to achieve resource objectives and resolve conflicts in four zones that comprise the North Unit, and 3) management limited to excluding prairie dogs in a buffer zone adjacent to private lands.

Alternative A: Continue Current Management (No Action Alternative)

Under the No Action alternative, no changes would be made in the current strategy or methods of black-tailed prairie dog management in the North Unit of Badlands National Park. Current prairie dog management allows for natural fluctuations of prairie dog populations throughout the North Unit, with efforts to mitigate prairie dog encroachment onto adjacent private lands limited to live-trapping and relocation and live-trapping for special programs, such as predator recovery or disease research programs.

Impacts to prairie dogs and to wildlife species that depend directly on prairie dogs or the habitat they create (including impacts to endangered and threatened species such as the black-footed

ferret) are likely to be long-term, minor to moderate, and beneficial because prairie dog populations are likely to continue to expand on the North Unit except where adjacent land conflicts require control. (Note that a substantial parkwide decline in the prairie dog population due to disease such as sylvatic plague would likely have long-term adverse impacts on prairie dogs and dependent species.) Impacts to prairie vegetation would be long-term, minor to moderate, and beneficial locally, as prairie dogs play an important role in maintaining the diversity of plant communities in the vicinity of the colony sites. However, if recent drought conditions in the region persist and prairie dog populations continue to expand, impacts to prairie grazers such as bison are likely to be long-term, moderate, and adverse because forage resources needed by both species would become exhausted.

Control measures would continue to limit economic impacts to agricultural producers on adjacent private lands from encroaching prairie dogs competing for livestock forage. However, because the efficacy of the available prairie dog control tools is low, the potential for long-term, minor to moderate, and adverse economic impacts would remain as it is now and may increase as prairie dog colonies expand. Impacts to soils are likely to be long-term, moderate, and beneficial in the area of and immediately adjacent to the prairie dog colony, and negligible parkwide. Impacts to human health and safety are likely to be negligible. Park staff would continue to use live-trapping which poses virtually no health or safety risks. However, continued colony expansion elsewhere on the park may slightly elevate the still extremely limited human health risk to park staff or the public if an outbreak of sylvatic plague occurs in the North Unit. Impacts to park operations are likely to be long-term, minor to moderate, and adverse, due to the potential for prairie dog colony expansion during extended periods of drought which may increase the likelihood that other park management goals and objectives would be compromised.

Impacts to the park's paleontological and archaeological resources are likely to be negligible and adverse, due to the possibility that the burrowing activities of expanding colonies of prairie dogs might affect these resources. Impacts to local air quality resources adjacent to large prairie dog towns are likely to be short-term, minor, and adverse from airborne dust. Impacts to wilderness values and visitor use and experience are likely to be long-term, negligible to minor, and beneficial, due to the continued presence of the prairie dog as a component of the North Unit's prairie ecosystem. Impacts to local water resources are likely to be long-term, negligible, and beneficial, due to increased rainfall absorption rates of disturbed soils near the prairie dog colony.

Alternative B: Prairie Dog Management Zones (NPS Preferred Alternative)

Under this alternative, the park would address prairie dog management requirements on all areas of the North Unit in four management zones: a prairie dog buffer zone, a bison management zone, a prairie dog free-range zone, and a prairie dog control zone. An array of lethal and non-lethal control methods and management techniques would be used as appropriate, including zinc phosphide bait, live-trapping for special programs, live-trapping and relocation, fencing, and vegetation barriers.

1. Prairie Dog Buffer Zone

In this one-quarter mile buffer on park lands adjacent to private lands, prairie dog control would be initiated by private landowner complaint. If 80% of the problem prairie dog colony lies within the buffer zone and encroachment is evident, the entire prairie dog colony would be controlled. All other buffer towns would be managed so that the aggregate buffer zone acreage does not exceed the estimated 2006 acreage of prairie dog colonies in the buffer zone.

2. Bison Management Zone

In the bison management zone, prairie dog populations would be managed to balance their food needs with the forage requirements of the bison. Prairie dog populations would be allowed to fluctuate naturally in densities and acreage until the point that the acreage of prairie dogs plus the acreage used by the bison herd exceeds roughly one-half, or 50-60%, of the available suitable habitat for both species.

3. Prairie Dog Free Range Zone

In this zone, prairie dog populations would be allowed to fluctuate naturally in numbers and in total acreage of colonies. Any prairie dog control would be limited to administrative areas where prairie dog colonies conflict with other park management goals or objectives.

4. Prairie Dog Control Zone

In this zone, prairie dogs would be managed to occupy from 7 to 15% of the available suitable habitat (currently they occupy 7% of suitable habitat in this zone). This zone includes the remainder of North Unit lands that are not managed under one of the other three zones.

Under Alternative B, impacts to prairie dogs and wildlife resources that depend directly on the prairie dogs (including endangered and threatened species) are likely to be long-term, minor to moderate, and beneficial throughout the majority of the North Unit, as their current acreages within the management zones are below the point at which control would take place. Control of specific prairie dog colonies would likely lead to long-term, minor to moderate, adverse impacts on prairie dogs and wildlife resources that depend directly on a controlled prairie dog colony. Impacts to ungulate grazers such as bison are likely to be long-term, minor to moderate, and beneficial due to the establishment of suitable habitat allocation thresholds in the bison management zone. Impacts to vegetation would be similar to those under Alternative A, but thresholds would limit overgrazing of forage resources in the bison management zone. Economic impacts to agricultural producers on adjacent lands are likely to be less adverse than under Alternative A, due to the greater number and efficacy of control techniques available under Alternative B and the establishment of the Buffer Zone. Impacts to park operations are likely to be long-term, minor, and beneficial by the adoption of management zones which would best limit the degree that prairie dog colony expansion conflicts with other park management goals and objectives.

Because prairie dog populations would be controlled in all but the free-range zone, any adverse impacts to soils, air quality, water resources, human health and safety, visitor use and experience, wilderness values, paleontological resources, and archaeological resources, are likely to be reduced over the long term compared to those described under Alternative A throughout the majority of the North Unit

Alternative C: Prairie Dog Exclusion in Boundary Buffer Zone

Under this alternative, all prairie dog colonies within the one-quarter mile buffer between park lands and adjacent private lands would be eliminated. All available means of prairie dog control would be employed to initially remove prairie dogs from the exclusion zone and maintain the area free of prairie dogs in the long-term. Prairie dogs would also be controlled with all available lethal and non-lethal tools where they might damage park infrastructure. In all other respects, Alternative C would be the same as Alternative A, in that all other prairie dogs in the North Unit would be allowed to fluctuate naturally in numbers and in total acreage.

Impacts to prairie dogs and to species that depend directly on prairie dogs (including endangered and threatened species) would be similar to Alternative A throughout the majority of the North Unit, as they would be allowed to fluctuate naturally in these areas with little control. Impacts to those same wildlife resources in the exclusion zone are likely to be long-term, moderate to major, and adverse, due to the complete removal of prairie dogs. However, wildlife species that favor undisturbed prairie would benefit here. Impacts to ungulate grazers such as bison would be the same as Alternative A - long-term, minor to moderate, and adverse, particularly if drought conditions in the region persist. Impacts to vegetation are likely to be similar to those under Alternative A, with the exception of the exclusion zone, where complete removal of prairie dogs would also remove the associated plant diversity found in the vicinity of prairie dog colonies. In the long-term, there would be no economic impacts to agricultural producers on adjacent private lands because the buffer would be maintained free of prairie dogs. Impacts to park operations are likely to be long-term, minor, and adverse, because of the continual effort required to maintain the exclusion zone free of prairie dogs, as well as the potential for prairie dogs to conflict with other park goals and objectives throughout the majority of the North Unit.

Impacts to soils, air quality, water resources, human health and safety, visitor use and experience, wilderness values, paleontological resources, and archaeological resources, would be the same as those described under Alternative A throughout the majority of the North Unit.

Note Regarding Public Comment

This Black-Tailed Prairie Dog Management Plan/Environmental Assessment (EA) will be in public review for 30 days. If you wish to comment on the Plan/EA, please send your comments to the name and address below. Please note that anonymous comments may not be considered. Although names and addresses of people who submit comments will become part of the public record, we will withhold publication of your name and address in the Final Plan/EA if you request us to do so at the beginning of your comment. We will make all submissions from organizations, from businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses available for public inspection in their entirety.

Superintendent
Badlands National Park
25216 Ben Reifel Road
P.O. Box 6
Interior, SD 57750

E-mail comments to:
BADL_planning@nps.gov

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Chapter 1 – Purpose and Need

1.1 Introduction

Located in southwestern South Dakota, Badlands National Park combines a stark landscape of sharply eroded buttes, pinnacles, and spires with the largest federally protected native mixed-grass prairie ecosystem in the United States. The black-tailed prairie dog (*Cynomys ludovicianus*) is considered a keystone species of the mixed-grass prairie because it significantly affects ecosystem structure, function, and composition, and its impact on the prairie is not wholly 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. Nevertheless, until 2001, prairie dogs were designated a pest species and their numbers were heavily controlled by the state of South Dakota because of their effects on livestock grazing and croplands.

Recent prairie dog population increases have exacerbated resource management conflicts within the park and on private lands along the park boundary that need to be addressed by a new black-tailed prairie dog management plan.

This Environmental Assessment (EA) evaluates the potential environmental impacts of a comprehensive National Park Service Black-Tailed Prairie Dog Management Plan for the North Unit of Badlands National Park. This Plan/EA document has been prepared in accordance with the following requirements:

- The National Environmental Policy Act (NEPA) of 1969, which requires an environmental analysis for Federal projects that may potentially impact the quality of the human environment
- Council of Environmental Quality Regulations at 40 Code of Federal Regulations (CFR) 1500-1508, which specify in detail the requirements of NEPA for Federal agencies
- National Park Service Conservation Planning, Environmental Impact Analysis, and Decision Making; Director's Order (DO) #12 and NEPA Handbook

The CEQ regulations and NPS DO#12 guide officials in the decision-making process with respect to major federal actions, and include requirements to provide a forum for the general public as it relates to proposed alternatives. NEPA studies focus on analyzing the impacts of particular courses of action faced by park officials. In the case of the Environmental Assessment, there are three primary purposes:

- 1) *To help determine whether the proposed alternative would have a significant impact on the environment, requiring an Environmental Impact Statement (EIS).*
- 2) *To aid in compliance with NEPA when an EIS is not required.*
- 3) *To facilitate the preparation of an EIS if one is required.*

As a National Park Service Unit, Badlands National Park is guided by requirements set forth in the 1916 Organic Act, which directs the National Park Service to “conserve the scenery, natural processes, historic objects, and the wildlife therein, and to provide for the enjoyment of the same in such manner and by such means as would leave them unimpaired for the enjoyment of future generations” (16 USC, sec.1, et. seq.). Additionally, guiding legislation for National Park Service officials include the Clean Air Act, the Endangered Species Act, the Redwood Act of

1978, and the National Park Service Omnibus Management Act of 1998, the latter of which supports the incorporation of scientific analysis and methodology into the decision-making process for federally proposed actions.

1.2 Badlands National Park Description

Badlands National Park is located in the southwestern South Dakota counties of Shannon, Jackson, and Pennington. The western edge of the park is approximately 35 miles southeast of Rapid City, South Dakota (Figures 1.1 and 1.2). Nearby communities include Wall, Interior, and Scenic. Average yearly visitation to the Park is approximately 1,000,000 people. Additional federal lands in the vicinity of Badlands National Park include Buffalo Gap National Grassland, Minuteman Missile National Historic Site, Mount Rushmore National Memorial, Wind Cave National Park, Jewel Cave National Monument, and Black Hills National Forest.

The 242,756 acres encompassed by Badlands National Park are divided into two units: the North Unit and the South Unit. The approximately 110,000-acre North Unit consists of all park lands north of the Pine Ridge Reservation boundary. The South Unit is located within the Pine Ridge Indian Reservation and is jointly managed by the National Park Service and the Oglala Sioux Tribe. Issues within the South Unit would be covered in the South Unit General Management Plan and therefore are not addressed in this document.

The surface features of the park are characterized by the White River Badlands geologic land forms, a series of deep canyons, sharply-rising spires, and flat-topped table lands formed by the geologic processes of deposition and weathering. Additionally, Badlands National Park is characterized by a rolling, mixed-grass prairie ecosystem. When viewed within the context of the neighboring Buffalo Gap National Grassland, the two areas constitute the largest protected mixed-grass prairie ecosystem in the United States. Geologic and fossil resources present at Badlands National Park include one of the world's largest Oligocene fossil beds, dating between 23 and 34 million years old. The Oligocene was characterized by the expansion of grasslands, prairie ecosystems and associated grazing animals.

In addition to black-tailed prairie dog, Badlands National Park is home to a variety of other wildlife species, including mule deer, pronghorn, coyote, and a bison herd of approximately 600 animals. Additionally, special status species within the park include the state threatened swift fox and the federally endangered black-footed ferret, both of which are part of reintroduction programs within the park and are closely associated with the black-tailed prairie dog. Additionally, although the burrowing owl does not have special species status, it is a park species of management concern also associated with prairie dog colonies (NPS, 2006a).

The cultural resources of Badlands National Park represent eleven thousand years of human settlement patterns and cultural adaptations to the physical environment of the park. The park has evidence of continued Lakota spiritual use, and native people utilized park lands centuries before its designation as a National Monument in 1939. Several areas of the park, particularly in the South Unit, contain high spiritual significance for the Lakota people (NPS, 2006a).

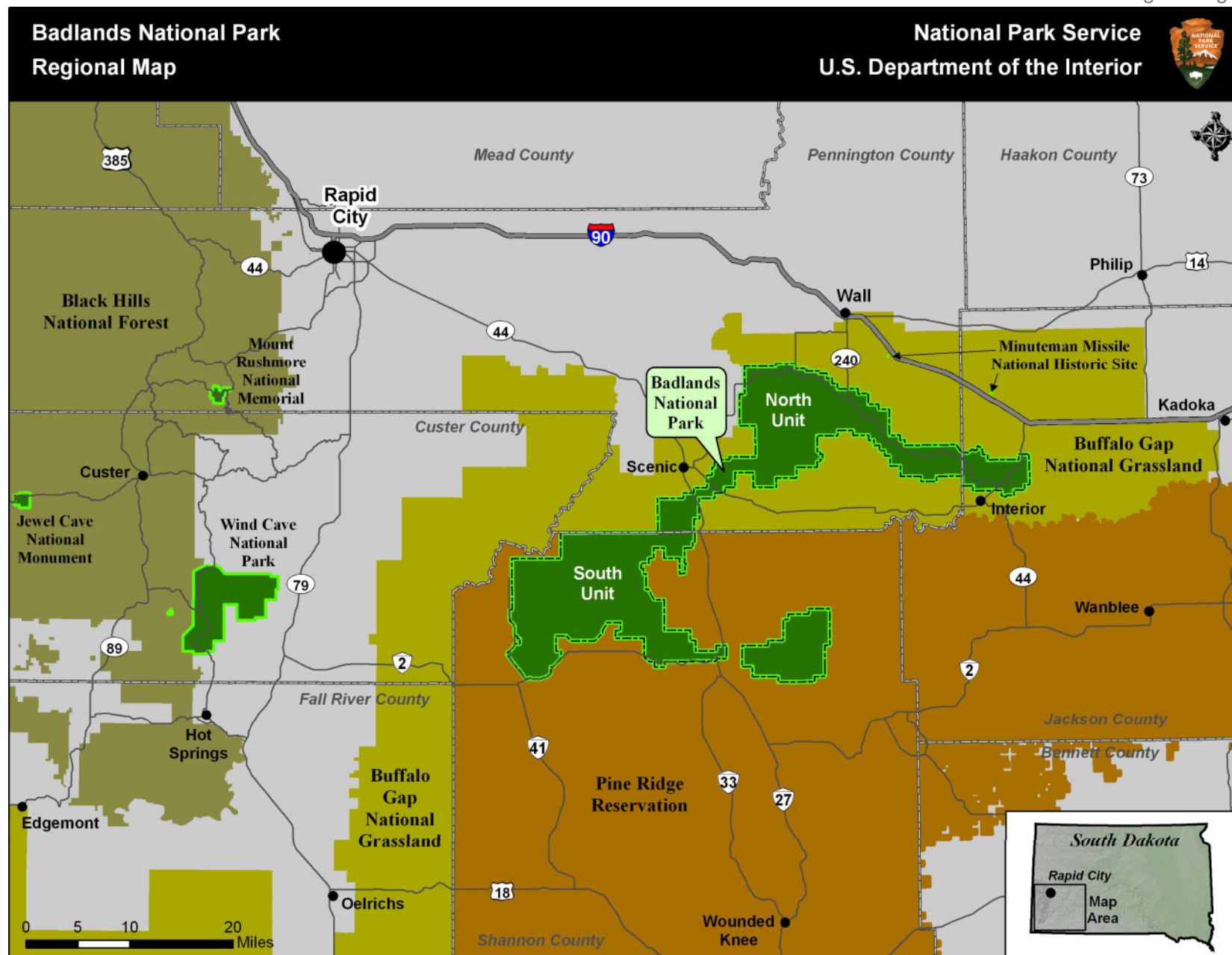


Figure 1.1: Regional Location of Badlands National Park

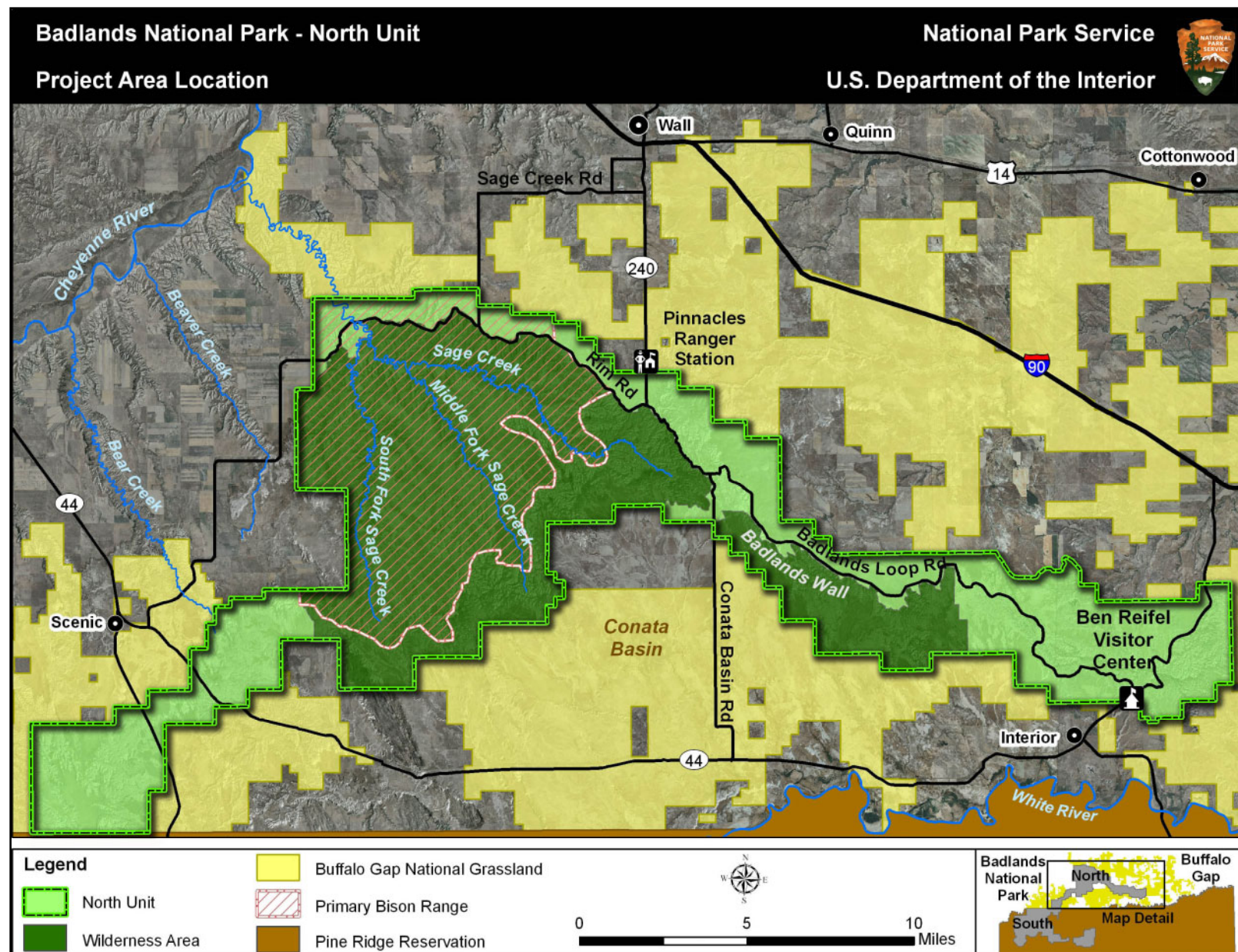


Figure 1.2: Project Area, North Unit, Badlands National Park

1.3 Park Mission, Purposes, and Goals

Badlands National Park was established as a National Monument in 1939 to protect the fossil resources and geologic land forms of the White River Badlands. The mission of Badlands National Park is defined in the North Unit General Management Plan of 2006:

“Badlands National Park preserves a diversity of significant resources for the education and inspiration of a world audience. These resources are a blending of the best known Oligocene fossil deposits contained within archetypical Big Badlands formations, a rich and varied cultural history spanning from paleo-Indian occupation through the early twentieth century homesteading period, and a fine expanse of a mixed-grass prairie ecosystem. Other qualities, most notably the wilderness character, clean air, quiet, solitude, vastness, and natural processes, provide visitors with a setting for exploration and appreciation through such experiences as hiking, camping, wildlife viewing, scenic drives and vistas, research and educational opportunities, and quiet contemplation.”

The Strategic Management Plan for Badlands National Park (NPS, 1999) identifies key mission goals or statements of desired future conditions:

- The natural and cultural resources and associated values in Badlands National Park are protected, restored, and maintained in good condition and managed within their broader ecosystem and cultural context.
- Badlands National Park contributes to knowledge about natural and cultural resources and associated values. Management decisions are based on adequate scholarly and scientific information.
- Visitors safely enjoy the facilities, services, and appropriate recreational opportunities at Badlands National Park and are satisfied with their availability, accessibility, diversity, and quality.
- Park visitors and the general public understand, appreciate, and support the preservation of Badlands National Park and its resources for this and future generations.
- Badlands National Park adopts current management practices, systems and technology to accomplish its mission.
- Badlands National Park increases its managerial resources through initiatives and support from other agencies, organizations, and individuals.

Additionally, the North Unit General Management Plan of 2007 identifies major purposes of the Park:

- To protect the unique landforms and scenery of the White River Badlands.
- To provide for scientific research of the paleontological and geological resources of the White River Badlands.
- To preserve the flora, fauna, and natural processes related to the mixed-grass prairie ecosystem that is characteristic of Badlands National Park.
- Preservation of the Badlands Wilderness Area.
- To interpret the archaeological and historical resources found within Badlands National Park, with special emphasis on the Sioux Nation and the Lakota People.

1.4 Purpose of the Proposed Action

The purpose of implementing a revised black-tailed prairie dog management plan for the North Unit of Badlands National Park is to ensure that park managers have the comprehensive set of strategies, tools, and methods they need to address prairie dog management objectives that continue to vary over time and in different parts of the park. The revised plan will replace the current plan's limited management guidelines, and would be employed in concert with other management strategies to ensure the plan complies with other long-term park objectives. Specific management plan objectives include:

- Establish and maintain a minimum population size and distribution of black-tailed prairie dogs in the park sufficient to continue to fulfill their role as a keystone species in the Badlands National Park prairie ecosystem and to allow for natural fluctuations in the park population where possible.
- Ensure that the black-tailed prairie dog population does not conflict with other park objectives, including maintenance of a bison population of 500-600 animals in the existing bison range.
- Continue to monitor prairie dog colony size and population density to ensure long-term viable populations and management objectives are being met.
- Implement “good neighbor” policies that recognize the concerns of neighboring landowners and eliminate boundary conflicts when and where prairie dog populations expand across the park boundary.
- Identify appropriate control methods for black-tailed prairie dog population control as well as methods to foster population growth and colony expansion when needed.

1.5 Need for the Proposed Action

With the revised management plan, NPS seeks to adopt an approach to prairie dog management that addresses two major but sometimes competing needs. The first need is to maintain the park's prairie dog population in the long-term and thereby also maintain its major role in the park's prairie ecosystem. The second need is to control prairie dog populations on the park where control is required to be responsive to neighboring landowners concerned about prairie dog encroachment on their private lands, to protect park infrastructure, or meet other park management goals and objectives.

As a keystone member of the prairie ecosystem, the health and viability of the black-tailed prairie dog affects populations of many other species that inhabit the same environment. At least nine species depend directly on the prairie dog to sustain their populations, and many others are associated opportunistically with prairie dogs (NPS, 2006a). Prairie dogs are a food source for species such as ferruginous hawk, and golden eagle while their burrows provide shelter for species such as the burrowing owl. For the swift fox and black-footed ferret, prairie dogs provide both food and shelter. Sharps and Uresk (1990) found that over 40% of all land vertebrates west of the Missouri River are associated with prairie dog towns. The decline of black-tailed prairie dogs across its historical range increases the need to maintain viability of the prairie dog population within the park. The black-tailed prairie dog once occupied an area of the Great Plains spanning 11 states and extending into Canada and Mexico (Figure 1.3). Today, the black-tailed prairie dog occupies only about 1 to 2% of its native range (USFWS, 2000).



Figure 1.3: Historical Range of Black-Tailed Prairie Dog, North America

In contrast to the need to maintain the prairie dog population on the Park is the need for control at certain locations in the park. Recent prairie dog colony expansions along the park boundary have created conflicts with some neighboring private landowners who use their land for cattle grazing and other agricultural activities. Additionally, prairie dog colony expansion at specific locations within park boundaries has created conflicts with other park missions, goals, and objectives. For example, prairie dog expansion conflicts with the use of certain areas as bison holding pens.

There is also a need for a revised management plan to address the potential for prairie dogs to pose risks to the safety and health of park visitors. There is some risk that the burrowing activities of prairie dogs may compromise park infrastructure or the integrity of the ground surrounding a large prairie dog town. Furthermore, if sylvatic plague occurs in the park, human exposure to the infected animals or fleas (which infected the prairie dog) may cause a potential health hazard. However, most public health officials believe that the chance of humans contracting plague from prairie dogs or the fleas that are hosts of the virus is extremely low (City and County of Denver, No date). Moreover, close to 100% of prairie dogs in a colony infected with sylvatic plague will die in a short period of time, and fleas that may transmit the disease prefer to bite other animals instead of humans (City and County of Denver, No date). Despite the apparent low risk to human safety, the revised management plan is needed to provide strategies for dealing with this issue.

In summary, control would be warranted where specific prairie dog colonies conflict with other park missions, expand onto private lands adjacent to park boundaries, or pose a risk to public safety or health. This document evaluates circumstances under which control of prairie dogs may be warranted and the direct, indirect, and cumulative impacts of such control.

1.6 Desired Future Condition of the Black-Tailed Prairie Dog Population

Under this prairie dog management plan, NPS would seek to maintain a Badlands North Unit prairie dog community that is large enough to fulfill their keystone role in the prairie ecosystem within the constraints of the park boundary and, at a minimum, of sufficient size to recover from declines caused by events such as disease outbreak. At the same time, the population would be able to coexist with other park resources; not compromise other park goals and objectives; and not encroach onto adjacent private lands.

To achieve the goals of this plan, natural processes would be allowed to continue wherever possible. It is understood that prairie dog towns are not static and they would be allowed to expand and contract largely unimpeded. However, there are areas of suitable prairie dog habitat where prairie dog colony expansion would not be allowed, such as developed zones within the park (i.e. campgrounds, building grounds) and identified zones adjacent to private landowners who do not want prairie dogs on their property. Measures would be taken to control prairie dogs in the areas where they conflict with other park management goals or with adjacent private landowners.

Because prairie dogs would be managed such that the vegetative resources of the park maintain a full, healthy native plant species composition, forage production would be sufficient to maintain both prairie dogs and ungulate grazers including bison.

Visitors would continue to be able to view the foraging activities and social behaviors of prairie dogs within the context of their native habitat. NPS interpretive signs would continue to be

available to assist visitors in understanding the keystone role of the prairie dog in the mixed-grass prairie ecosystem. The Roberts Prairie Dog Town (located in the far northern section of the park) is the primary educational and interpretive prairie dog town for visitors to observe prairie dog behavior, and would be largely unaffected by any of the management alternatives. As of 2006, there were at least seven black-footed ferrets living on the Roberts Prairie Dog Town. To protect the high value of the town as well as the ferrets, the park would seek to perform any measures to control encroachment onto adjacent private land across the boundary on the private land instead of within the park.

There is no current USFWS-recommended minimum occupancy of available suitable habitat for black-tailed prairie dogs. However, a minimum of 5 to 10% occupancy on Federal lands was recommended by two scientists, a USFWS biologist and a private research biologist, in a paper entitled “Black-Tailed Prairie Dog Status and Future Conservation Planning” (Mulhern and Knowles, 1995). This paper was presented at a symposium sponsored by the U.S. Forest Service Rocky Mountain Forest and Range Experiment Station, where researchers gathered to discuss how elements of rangeland diversity were being conserved. Mulhern and Knowles (1995) further suggested that Federal land managers should assume a greater share of the responsibility of managing for the long-term persistence of black-tailed prairie dogs and that, by achieving these objectives, resource managers may be able to determine what constitutes a functioning prairie dog ecosystem. This may aid in future conservation efforts of black-tailed prairie dogs as well as other wildlife species that are associated with prairie dog habitat.

While no Federal agency has recommended black-tailed prairie dog occupancy levels on the basis of suitable habitat percentages, they have stressed the importance of maintaining current population levels and distribution of prairie dogs. The Multi-State Conservation Plan for the Black-Tailed Prairie Dog, which set target objectives for the U.S., recommends at a minimum maintaining the current occupied acreage (Luce, 2003). Additionally, a recently published USFS issue paper stressed the importance of increasing active prairie dogs on Federal lands, primarily to aid in the recovery of the black-footed ferret on the National Grasslands (USFS, 2007).

Geographic Information System (GIS) analysis of land cover and slope characteristics conducted by NPS personnel reveals that of the 109,900 acres in the North Unit, approximately 60,000 acres are characterized as available suitable habitat for black-tailed prairie dog (Figure 2.1). This establishes the minimum acreage of black-tailed prairie dog colonies within the North Unit as approximately 3,000 acres (5% of 60,000 acres). If the parkwide prairie dog population declined to 5% of available suitable habitat or below, park resource managers would enact measures to restore prairie dogs within the interior portions of the North Unit. Currently, prairie dogs occupy 6,363 acres, or approximately 11% of available suitable habitat.

While there is no specific parkwide percent of maximum prairie dog occupancy defined in this plan, prairie dog acreage ranges defined by zones under Alternative B, the preferred alternative, allows the park to evaluate the potential maximum occupancy of suitable habitat on the North Unit. In the Buffer Zone, prairie dogs would be managed to not exceed their current acreage levels (515 acres). In the Control Zone, prairie dogs would be managed to not exceed 15% of available suitable habitat, or approximately 2,370 acres. In the Bison Management Zone, prairie dogs could potentially expand to 4,800 acres, depending on the acreage utilized by the bison herd. In the Free-Range Zone, prairie dogs could potentially expand into all 14,000 acres of suitable habitat. Thus, under Alternative B, the potential maximum occupancy for prairie dogs throughout the North Unit is approximately 21,685 acres, or 36% of the 60,000 acres of North

Unit suitable habitat. This far exceeds the recommended 5 to 10% prairie dog occupancy level suggested by Mulhern and Knowles (1995).

1.7 History of Black-Tailed Prairie Dog Management in Badlands National Park

For several decades, Badlands National Park implemented sporadic, case-by-case management of prairie dogs within the park with the underlying premise of allowing for natural fluctuations of the population within park boundaries. In 1979, a prairie dog management plan was developed by the park to keep prairie dog colonies along the park boundary from encroaching onto private lands. However, because of National Park Service concerns about the use of poison as a control measure in wildlife management strategies at that time, the plan was not implemented. The history of prairie dog management on the park since 1979 reflects the influence and dynamics of competing state, regional, and range-wide interests focusing either on the importance of control or on the importance of protecting prairie dog populations.

In 1981, the Farm Bureau filed a lawsuit against the NPS and the U.S. Forest Service for the lack of prairie dog management at Badlands National Park and adjacent Buffalo Gap National Grassland. Concurrently, Badlands NP drafted a Disturbed Sites Restoration Plan, which provided for management of ranch lands that had been incorporated into the park. Because prairie dog management was a significant issue on those lands, the plan called for management of prairie dogs by chemical control. The result of the Farm Bureau lawsuit was that the court directed the National Park Service to develop a control plan for prairie dog encroachment.

In 1984, the Park and NPS Regional Office approved a Resource Management Plan that allowed for prairie dog management as directed by the 1979 Prairie Dog Management Plan and the 1981 Disturbed Sites Restoration Plan. Both the 1994 and 1999 Resource Management Plans for Badlands National Park called for continued prairie dog management under the 1979 and 1981 plans, as well as the Farm Bureau court decision, until a new prairie dog management plan could be developed.

In February 2000, the U.S. Fish and Wildlife Service determined that the black-tailed prairie dog warranted Federal listing under the Endangered Species Act (ESA), but were precluded from listing the species because of a backlog of other species in greater need of protection (USFWS, 2000). Nevertheless, until the end of 2004, the NPS treated the black-tailed prairie dog as a "Candidate Species" under ESA, discontinuing control except to meet needs for prairie dogs for the swift fox and black-footed ferret reintroduction programs. Use of the EPA-approved rodenticide zinc phosphide was prohibited during this time. The black-tailed prairie dog's status was re-evaluated and, in August of 2004, the Secretary of the Interior removed the species from the listing process (USFWS, 2004).

In 2005, Badlands National Park sought NPS approval for limited use of zinc phosphide to control prairie dogs encroaching on private lands along the park boundary. The request was not approved at the regional level pending park completion of a comprehensive prairie dog management plan. Park staff worked with Defenders of Wildlife and the affected landowners to delay control until a plan could be developed. In 2006, the park obtained the funding needed and proceeded to develop the plan.

Historical documentation shows that in 1979 black-tailed prairie dogs occupied approximately 2,070 acres in 55 towns in the North Unit (Figs. 1.4 and 1.5). In 2000, global positioning system (GPS) monitoring showed that black-tailed prairie dogs occupied 3,237 acres in 71 towns in the

North Unit. By 2006, total acreage of prairie dogs in the North Unit had almost doubled to 6,363 acres, distributed among 93 individual towns (Figs, 1.4 and 1.6).

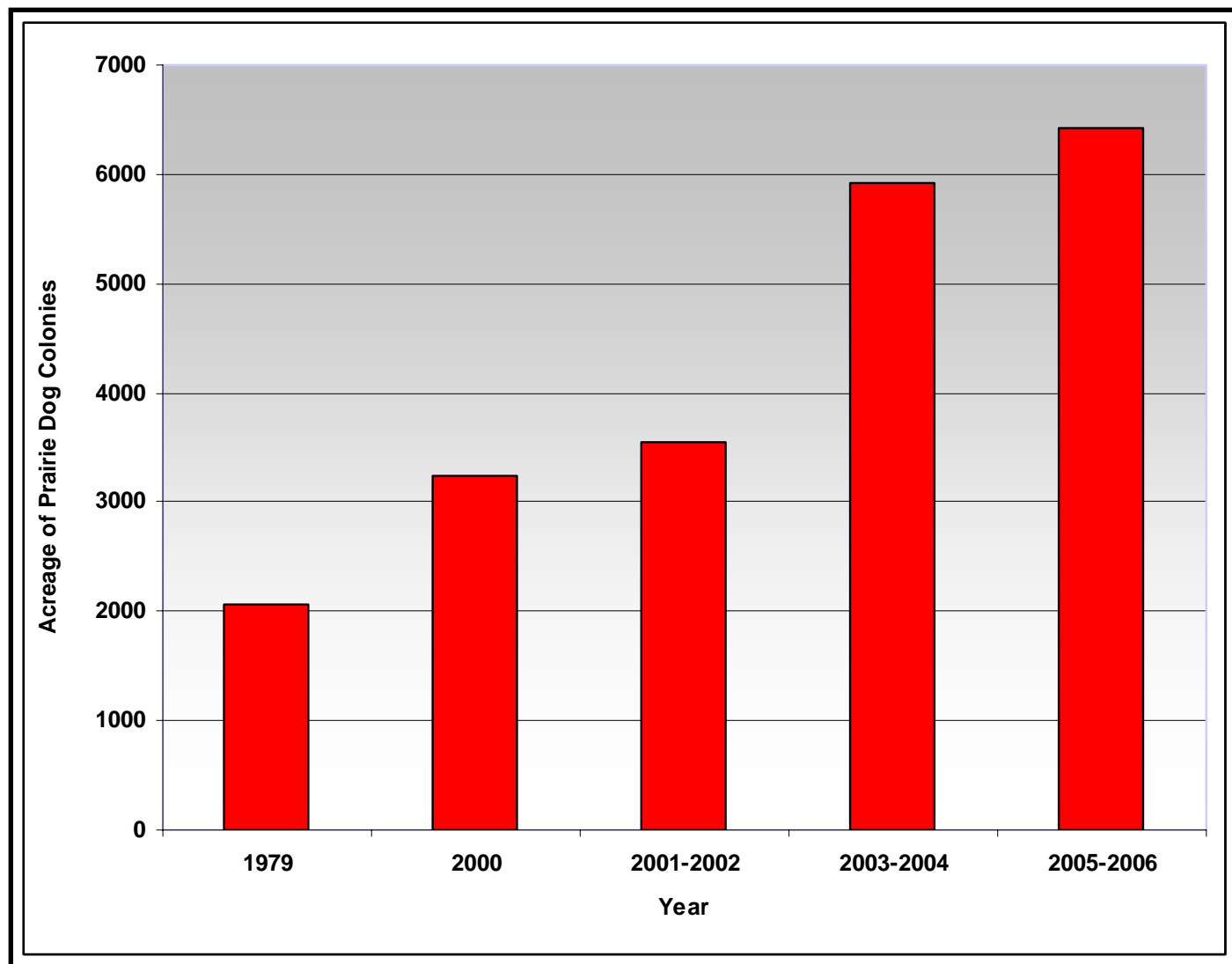


Figure 1.4: Badlands NP North Unit Prairie Dog Acreage, 1979 and from 2000 to 2006

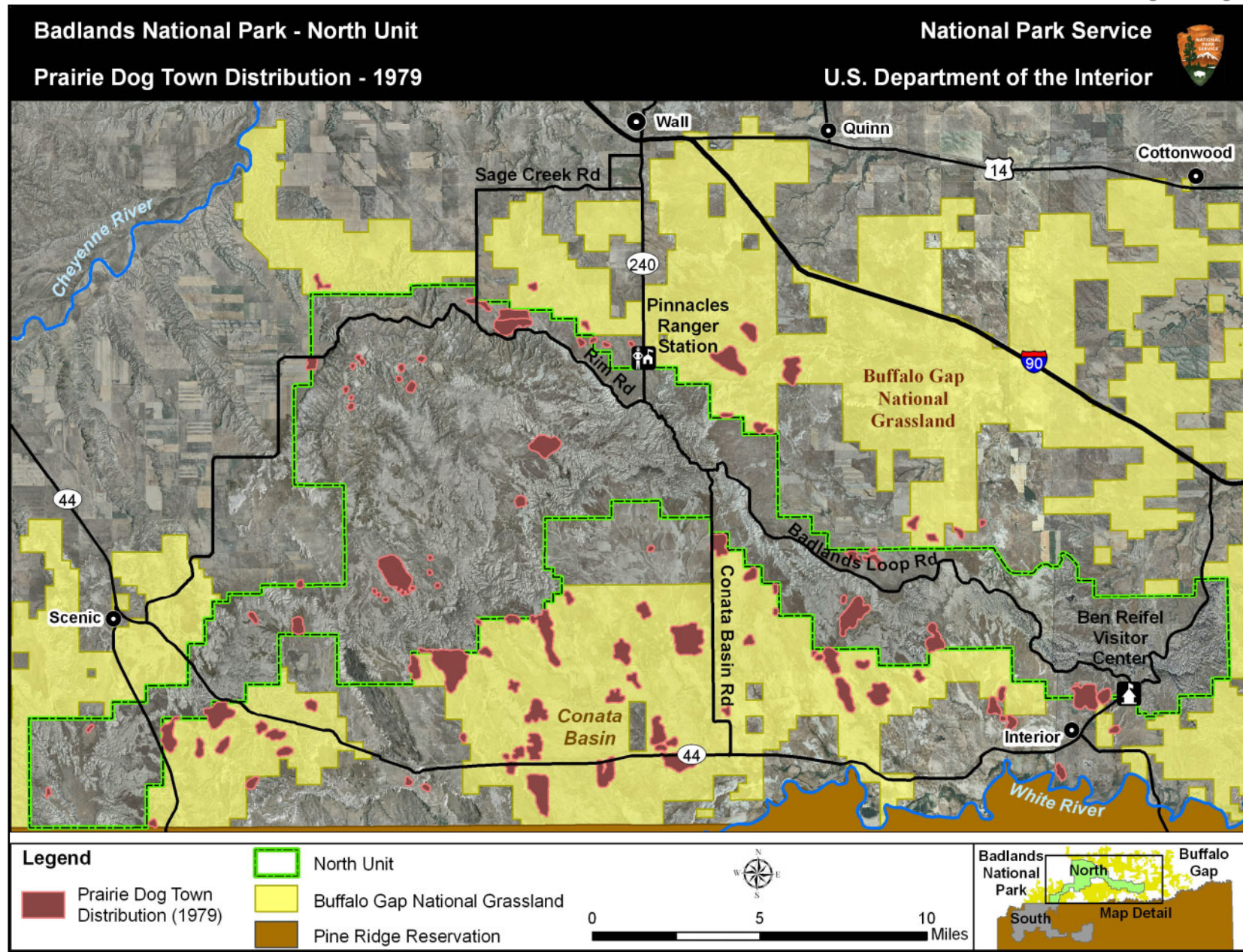


Figure 1.5: Prairie Dog Town Distribution, 1979, North Unit, Badlands National Park

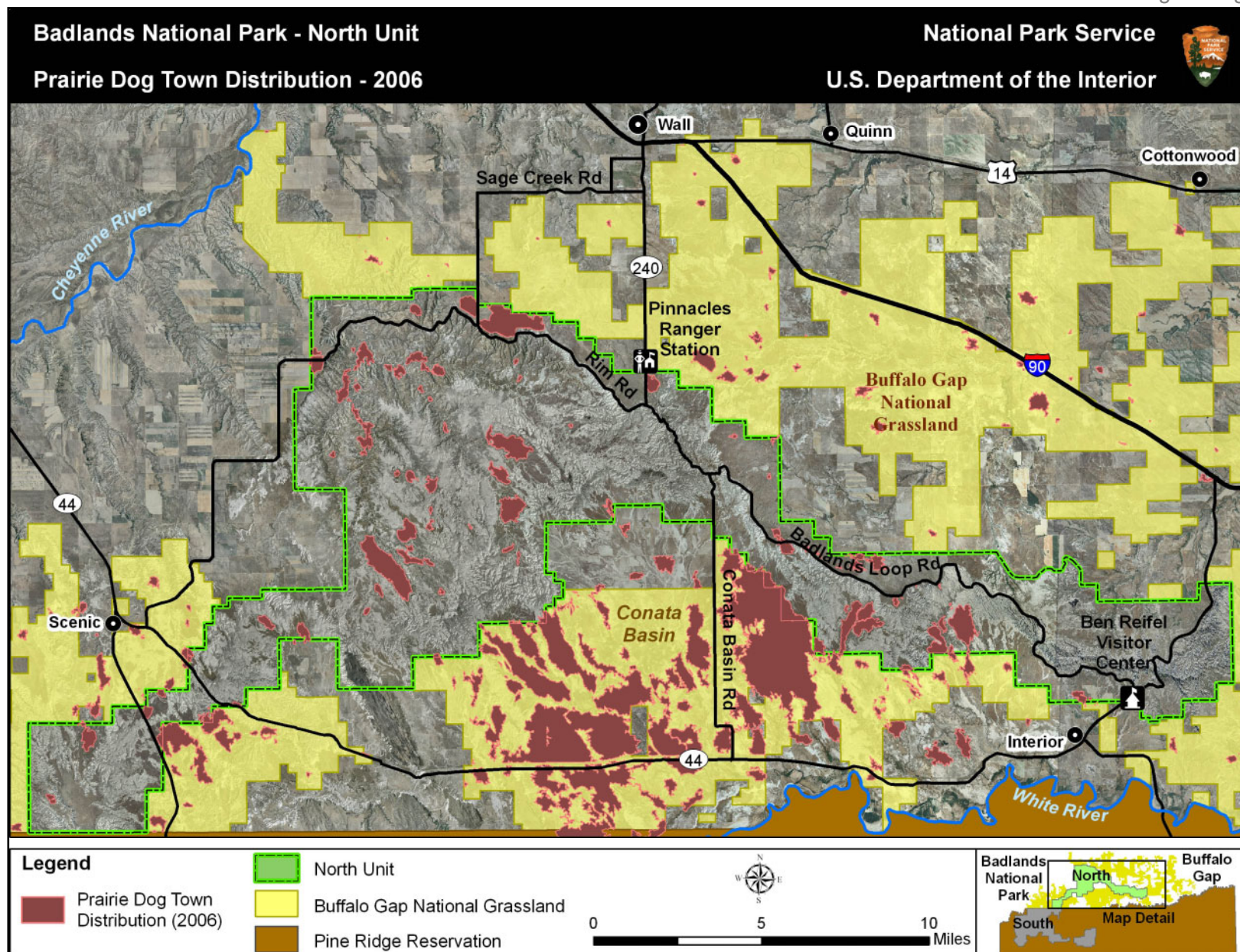


Figure 1.6: Prairie Dog Town Distribution, 2006, North Unit, Badlands National Park

1.8 Related Plans and Policies

Badlands National Park, North Unit, General Management Plan

In April 2007, the National Park Service announced the availability of the Record of Decision (ROD) for the Final General Management Plan/Environmental Impact Statement (GMP/EIS) for Badlands National Park, North Unit. A separate GMP is being developed for the guidance and management of the South Unit of Badlands National Park and is scheduled to be completed in three years. Under the selected alternative, NPS will provide expanded opportunities for visitors to use the North Unit:

- The number of locations where visitors could obtain park information and orientation will be increased with new visitor contact stations added near Pinnacles and in the town of Scenic.
- More hiking trails and routes will be designated in various parts of the park.
- Education pavilions will be added in the Conata picnic area and west of County Road 502 along with a group campground.
- Additional studies and environmental documents will be developed, as appropriate, to examine alternative road alignments for the Loop Road at Cedar Pass.
- NPS will recommend expanding the park's boundaries in two locations to enhance resource protection and offer additional visitor experiences. One boundary expansion will incorporate approximately 5,400 acres along South Dakota Highway 44. The other recommended addition will be 4,500 acres along the western edge adjacent to the wilderness area.

The selected action and three other alternatives were analyzed in the draft and final GMP/EIS. The full range of foreseeable environmental consequences was assessed. Among the alternatives the NPS considered, the selected action best achieves a high standard of natural and cultural resource protection with improved opportunities for visitors in the park. Furthermore, the selected action responds to the changing visitation pattern the park has been experiencing. In recent years, western South Dakota has become more of a destination for visitors with Rapid City serving as the hub for this visitation. This shift in tourism patterns has increased the number of park visitors entering the park through the western entrances. The selected action also provides needed improvements for park operations, such as areas for additional park housing and research support. The park is located in a rural area and housing for employees is limited in the surrounding communities. In addition, the park has developed a good relationship with the natural resources research community but has limited facilities for supporting these efforts. The selected action would address the need to provide facilities for park operations and research. The selected action also meets national environmental policy goals and will not result in the impairment of resources and values.

Badlands NP Bison Management Plan

Bison were restored to the park in 1963, and more were released in 1983. The healthy herd now numbers approximately 600 head of bison. Excluding the acreage of the badlands formations, the herd has access to roughly 40,000 acres in the North Unit. They roam primarily in the Sage Creek and Tyree Basins. Bison management requires that certain parts of the park that border private and public grazing lands are fenced to prevent animals from migrating onto these lands. (Refer to Fig. 1.2 for the approximate bison management range boundary). The constraints of available water and forage require maintaining the herd at approximately 500-600 animals, which is estimated to be approximately one-third of the range capacity. The portion of

the bison herd in excess of this number are rounded up annually and transferred to Tribal governments and other agencies to supplement their herds. The potential exists to expand the bison range along the Loop Road in the North Unit, which would increase public viewing opportunities and enlarge the area that is subject to a more natural grazing regime.

Badlands NP Fire Management Plan

In 2004, the National Park Service issued the Fire Management Plan for Badlands National Park. The preferred alternative (Integrated Fire Management Alternative) incorporated wildland fire use as a management tool to preserve and restore the native prairie ecosystem. Prescribed fire would be used for fuel reduction along park boundaries and developed areas, as well as to achieve resource management goals. Wildland fire would be allowed to burn in interior portions of the park under specific conditions. Wildland fires burning in undesired conditions would be suppressed. With respect to the black-tailed prairie dog, it was determined that the preferred alternative would have minimal negative effects on the overall park population. Because prairie dogs prefer disturbed areas as well as areas with low vegetation, prescribed fire would benefit prairie dog colony expansion. Care must be taken in planning and executing prescribed fire to reduce potential for prairie dog movements toward the park boundary where there is private land. This is the current and active plan for the North Unit.

Badlands NP Weed Management Plan

In 2003, NPS issued the Integrated Weed Management Plan and Environmental Assessment for Badlands National Park. The preferred alternative (Proactive Management with Limited Aerial Application), allowed for prevention, early detection and eradication, chemical control, biological control, mechanical control, fire, and research of weed populations. Additionally, limited aerial application of herbicide would be used to contain and reduce weed populations that cannot be effectively treated with other chemical application methods as defined by specific criteria. Relative to prairie dog populations within the park, this alternative would cause negligible harassment to the species as a result of noise and intrusion into home range habitat. However, aerial treatments would cause a greater and faster decrease of thistle in areas where thick infestation is causing reductions in prairie dog town acreages. Thus, aerial application would encourage prairie dog town expansion. This is the current and active plan for the North Unit.

NPS Prairie Dog Management Policy

The NPS policy described here was issued to superintendents at Badlands, Fort Larned, Scotts Bluff, Theodore Roosevelt, and Wind Cave National Parks by the Regional Director, Midwest Region concerning maintaining healthy black-tailed prairie dog communities.

“National Park Service (NPS) Management Policies provide that “While Congress has given the Service the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the Park Service must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise.” In addition, Section 4.4.2 of the Management Policies specifies:

“The Service may intervene to manage individuals or populations of native species only when such intervention will not cause unacceptable impacts to the populations of the

species or of the components and processes of the ecosystems that support them, and when at least one of the following conditions exist:

Management is necessary because a population occurs in an unnaturally high or low concentration as a result of human influences (such as loss of seasonal habitat, the extirpation of predators, and/or the creation of highly productive habitat through agriculture or urban landscapes) and it is not possible to mitigate the effects of the human influences;

- to protect specific cultural resources of parks;
- to accommodate intensive development in portions of parks appropriate for, and dedicated to, such development;
- to protect rare, threatened, or endangered species;
- to protect human health as advised by the U.S. Public Health Service (which includes the Centers for Disease Control and the NPS Public Health Service Program);
- to protect property in cases in which it is not possible to change the pattern of human activities;
- to maintain human safety in cases in which it is not possible to change the pattern of human activities"

"Based on National Park Service-wide policy, NPS recognizes the prairie dog as an integral part of the Great Plains ecosystem and will not consider them a 'pest' until intervention thresholds have been established by management and subsequent monitoring indicates that such thresholds have been exceeded.

On August 18, 2004, the U.S. Fish and Wildlife Service (USFWS) removed the black-tailed prairie dog from the list of candidate species under the Endangered Species Act. The USFWS determined that prairie dog numbers were not low enough to warrant listing and that recently developed protection strategies by state agencies were adequate to conserve the species.

The Service recognizes the black-tailed prairie dog as a keystone species in the Great Plains ecosystem. Furthermore, prairie dogs are a feature visitor attraction in many park units and there is public support for the conservation of prairie dogs within states in the Northern Great Plains. Prairie dog communities support diverse biological assemblages and are critical to ecosystem process and function. Therefore, parks should allow for natural prairie dog abundances, distribution, and conditions wherever possible.

Any park with prairie dog conservation issues must complete a park prairie dog conservation plan that clearly articulates park goals for maintaining healthy prairie dog populations. A primary audience for the plans should be our neighbors and partners. The plan should also include how to reach prairie dog conservation goals while meeting other resource management objectives and address the methods we propose for achieving desired conditions. A prairie dog conservation plan should evaluate various control measures (if deemed necessary) and be subject to National Environment Policy Act and all other appropriate compliance and consultation requirements. Any proposed removal of animals is allowable only when such intervention will not cause unacceptable impact to the larger population or to other components or processes of the prairie dog ecosystem.

The removal of the black-tailed prairie dog from the candidate list does not absolve park units of Endangered Species Act requirements. Parks need to assure that their actions do not jeopardize listed species such as the black-footed ferret. Furthermore, parks should do all that they can to conserve viable prairie dog populations so that listing is not necessary in the future” (NPS, 2004a).

South Dakota Black-Tailed Prairie Dog Conservation and Management Plan

In February 2005, the South Dakota Department of Game, Fish, and Parks and the South Dakota Department of Agriculture released the final version of the state prairie dog management plan. The state plan provides strategies for the management of prairie dogs on state and private lands, particularly those adjacent to public lands. The current policy of the state is to provide prairie dog control assistance to private landowners adjacent to public lands on an annual basis if there is evidence that the prairie dogs are expanding from public lands.

Black-Tailed Prairie Dog Conservation and Management on the Nebraska National Forest

In August 2005, the U.S. Forest Service released the Black-Tailed Prairie Dog Conservation and Management Plan on the Nebraska National Forest and Associated Units. The preferred alternative called for “prairie dog conservation concurrent with population management through non-lethal methods and expanded rodenticide use along property boundaries (within a .5 mile boundary management zone for the Buffalo Gap National Grassland).” Key components included:

- expansion of the prairie dog colony complex in the Conata Basin black-footed ferret reintroduction habitat,
- implementation of landowner adjustments to facilitate prairie dog population growth,
- modified prairie dog shooting closures in the Conata Basin black-footed ferret reintroduction habitat,
- third party solutions with willing landowners, and
- rodenticide use in boundary management zones as a control measure for prairie dog populations that encroach onto adjacent private lands.

The multi-year drought in southwest South Dakota and northwest Nebraska has caused land managers to take another look at black-tailed prairie dog management on the Buffalo Gap and Fort Pierre National Grasslands in South Dakota and the Oglala National Grassland in Nebraska.

Despite adding the use of rodenticide in “boundary management zones” next to private land where there are complaints, the Forest Service was concerned that with continuing drought and continuing prairie dog colony expansion the full range of multiple uses may not be achievable without setting upper and lower limits on prairie dog acreages. To maintain the limits, the Forest is now proposing to allow the expanded use of rodenticide on selected colonies in the interior national grassland areas.

The Forest Service emphasizes the point that the purpose is not to exterminate prairie dogs. The endangered black-footed ferret depends almost entirely upon prairie dogs for its survival and the most successful recovery program is on the Buffalo Gap National Grassland. Specific criteria would be used to determine if, and where, rodenticide would be used to control prairie dogs.

The Draft Environmental Impact Statement (DEIS) published in May of 2007 analyzes five alternatives, including one drafted by local governments and one that closely reflects the South Dakota Prairie Dog Management Plan. To date, none of the alternatives have been selected as the preferred alternative. There is a 45-day comment period on the DEIS. Comments will be analyzed and incorporated into a Final Environmental Impact Statement and Record of Decision, which the FS indicates will be completed in October of 2007. The DEIS can be accessed at: http://www.fs.fed.us/r2/nebraska/projects/EA_and_EIS/pdog/deis/index.shtml.

The U.S. Forest Service recognizes that National Forest Service lands are very important to prairie dog conservation and to other wildlife species associated with prairie dogs. Most NFS lands in the Great Plains are potential habitat for the black-tailed prairie dog. The black-footed ferret requires large complexes of prairie dog colonies. There is a great need for an increase in active prairie dog colonies on federal lands. Moreover, recent experience has demonstrated the importance of plague free prairie dog habitat to ferret recovery. Most large, active prairie dog colonies that meet these criteria are on National Grasslands and on tribal lands in South Dakota. Recent evaluations suggest that National Grasslands in the Great Plains may be key to achieving even a modest recovery of the black-footed ferret (USFS, 2007a).

Wind Cave National Park South Dakota Black-Tailed Prairie Dog Management Plan

In January 2006, Wind Cave National Park issued a Draft Prairie Dog Management Plan/Environmental Assessment. In May of 2006, after evaluating four management plan alternatives, the park chose the alternative that represented the middle range of prairie dog occupied acreage and included the existing size of the prairie dog population. The park issued a Final Prairie Dog Management Plan and Finding of No Significant Impact (FONSI). This is the current and active plan for Wind Cave National Park. Instances of prairie dogs dispersing beyond park boundaries would be addressed on a case-by-case basis in support of a good neighbor policy. Available management tools include habitat management, non-lethal control, and lethal control tools. The Wind Cave NP Plan and FONSI can be accessed at the Park's planning website at: <http://parkplanning.nps.gov/projectHome.cfm?parkId=170&projectId=11495>

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 (USFWS, 1999). The Multi-State Conservation Plan (MSCP) 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 historic 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).

Black-Footed Ferret Recovery Plan

The Black-Footed Ferret Recovery Plan outlines steps for recovery of the black-footed ferret (*Mustela nigripes*) throughout its historical range. Evidence suggests that the ferret was widely distributed and was probably common prior to the destruction of its principal prey and associate, the prairie dog (*Cynomys* spp.). An outbreak of canine distemper in Wyoming led to the removal of the last wild populations to a captive breeding facility. Despite the extreme susceptibility of the black-footed ferret to canine distemper, a strategy has been suggested in the plan to anticipate local extinction of populations reintroduced from captive-bred stock generated by the 18 remaining ferrets in captivity so that the ferrets may be returned to the wild and managed with minimum intervention.

A six-step process has been outlined to reach the program's objectives, beginning with ensuring the success of captive breeding, locating reintroduction habitat, finding other populations of ferrets, devising release strategies, managing reintroduced and other populations, and building programs for public support of the recovery effort. The recovery goals are attainable, requiring less than one-tenth of 1% of the total western rangelands (approximately 185,000-250,000 acres) to secure sufficient habitat for recovery. Initial success with captive breeding in 1987 suggests sufficient ferret stock can be produced to fill those habitats. The captive breeding program maintains about 240 individuals for breeding. Approximately 2,200 kits have been released into the wild since 1991. Today, the estimated number of ferrets in the wild is approximately 600, with a goal of 1,500 individuals by 2010. This plan is currently in the process of being updated.

1.9 Scoping

CEQ requires agencies to make "diligent" efforts to involve the interested and affected public in the NEPA process (40 CFR 1506.6), regardless of the level of impact or documentation. The extent of the public involvement will change depending on the degree of impact and interest in the proposal. Agencies must also "encourage and facilitate public involvement in decisions which affect the quality of the human environment" (40 CFR 1500.2 (d)). Scoping, or requesting early input before the analysis formally begins, is required on all EAs prepared by NPS. Issuing offices are required to involve appropriate Federal, state, and local agencies and any affected Indian tribe.

As part of the scoping process for this EA, the National Park Service held an internal scoping meeting with all interested park staff and two public scoping meetings, in Wall and Rapid City, on October 5, 2006. At the public scoping meetings, members of the general public were invited to participate and voice any relevant issues or concerns regarding the direction of the prairie dog management plan. Display boards, wall maps, and a handout provided information about relevant issues regarding the management plan, the distribution of prairie dog towns in the North Unit of Badlands National Park, a timeline highlighting historic milestones regarding the management practices of prairie dogs in Badlands National Park, and important steps in the NEPA process.

Public notices of the scoping process and opportunities to participate were provided prior to the October 5th meetings. A press release was published in local newspapers, including the Rapid City Journal. These press releases invited all interested members of the general public to participate in the October 5th public meetings. Additionally, the National Park Service mailed letters to cooperating agencies, inviting the agency staff and personnel to participate in the

public meetings. The general public and interested parties were invited to submit comments regarding the direction of the prairie dog management plan during the scoping period, which ended October 19th, 2006. Opportunities for providing comments included: verbally at the October 5th scoping meetings; postal mail; facsimile transmission; and electronic mail.

In addition to comments from the general public, comments were also received from the South Dakota Department of Fish, Game, and Parks and Defenders of Wildlife, a wildlife conservation organization headquartered in Washington, D.C. Regardless of how a specific comment was submitted or received, all comments were given equal consideration in the scoping process. Important issues relevant to the proposed action were identified by input from the general public and agency officials. Key issues included:

- **Impacts of Prairie Dog Expansion outside of Park Boundaries to Private Lands**
 - Not allowing Prairie dog expansion outside of park boundaries to private lands
 - Implementing a “good neighbor” policy on park boundaries that are adjacent to private lands
 - Impacts to privately-owned grazing habitat and economic losses incurred by citizens due to prairie dog colony expansion
 - Implementing landowner incentives and easements
- **Strategies for Management of Prairie Dogs**
 - Prairie dog management zones/buffers
 - Prairie dog acreage limits
 - Use of control measures (non-lethal and lethal) and the extent to which particular measures may be implemented
- **Importance of the Prairie Dog as an Ecological Member of Badlands National Park**
 - Importance of the prairie dog as a keystone species of the mixed-grass prairie ecosystem
 - Importance of the prairie dog in maintaining biodiversity
 - Importance of maintaining healthy range conditions
 - Beneficial impacts of prairie dog expansion to other wildlife species, including black-footed ferret populations
 - Adverse impacts of prairie dog to other park species and park objectives
 - Relationship between sylvatic plague and prairie dog population
 - Importance of the Badlands prairie dog population to the overall species community

1.10 Impact Topics

Impact topics selected for analysis were derived from agency and public scoping issues; federal laws, regulations, and orders pertaining to the environment; and on NPS Management Policies 2006. They were refined into relevant impact topics to help focus the impact evaluation in the EA. This section is brief and does not contain the level of detail found in Chapter 3: Affected Environment and Environmental Consequences. Impact topics that are not relevant or that may not be substantively affected by the alternatives are briefly described with an explanation of why they were dismissed.

Impact Topics Included in the Prairie Dog Management Plan/EA

Wildlife: Wildlife was selected as an impact topic for detailed analysis due to the likely effects of control measures to the black-tailed prairie dog and other species as a result of any particular alternative. This is particularly important due to the associative nature between the prairie dog and other mixed-grass prairie ecosystem species. The National Park Service is required to address such issues under the Organic Act and National Park Service Management Policies 2006.

Endangered and Threatened Species: Impacts to endangered and threatened species must be examined as required by the Endangered Species Act. The federally listed species black-footed ferret, swift fox, and bald eagle are known to inhabit the North Unit of Badlands National Park. Because of the predator-prey relationship these species have with the black-tailed prairie dog, endangered and threatened species have the potential to be affected by measures employed to control prairie dogs or to expand their populations.

Vegetation: The Organic Act and NPS Management Policies 2006 require Badlands National Park to protect and conserve native plants and vegetative communities. Prairie dogs influence vegetation structure through feeding on and clipping of vegetation and building their burrow structures. Thus, management strategies affecting prairie dog population may potentially affect the vegetative community in the North Unit.

Geologic Features and Processes (Including Soils and Paleontological Resources): The National Park Service is required by the Organic Act and National Park Service Management Policies 2006 to protect and conserve geologic resources, soils, and paleontological features that may be affected by proposed actions within park boundaries. Due to the unique geologic features and fossil resources found within the North Unit of Badlands National Park and because prairie dog towns have an impact on soil composition and integrity, geologic features and processes were retained as impact topics.

Wilderness Values: Badlands National Park contains 64,000 acres of designated wilderness. Under the 1964 Wilderness Act, Director's Order (DO) 41, and the National Park Service Management Policies 2006, impacts to designated wilderness as a result of proposed federal actions must be evaluated.

Socioeconomics: The socioeconomic environment of the North Unit was retained as an impact topic due to potential impacts on the local economy, particularly impacts to agricultural operations of private landowners who live in areas adjacent to park boundaries.

Visitor Experience and Human Health and Safety: Impacts related to visitor enjoyment, experience, and public health were retained as impact topics due to potential impacts from the presence of prairie dogs, as well as impacts due to control activities.

Park Operations: Impacts to park operations was retained as an impact topic due to the potential effects of prairie dog expansion into administrative and other areas and the likelihood that prairie dogs would need to be controlled in those locations.

Ethnographic Resources: Ethnographic resources, such as a component of the landscape assigned significant traditional, legendary, or cultural properties, are present in the area and acknowledged as an important aspect of the historical territory of the Oglala Sioux Tribe of the

Lakota people. Ethnographic resources were retained as an impact topic because of the role of the black-tailed prairie dog in the spiritual traditions of Native American culture. This topic is required for consideration under National Park Service Management Policies 2006 and Cultural Resources Management Guidelines.

Archaeological Resources: As with ethnographic resources, consideration of the impacts to archaeological resources from National Park Service management activities is required by a variety of laws, regulations, and guidelines. Because of the high potential for archaeological resources to exist in Badlands National Park, this impact topic was retained.

Water Resources: Water quality data is very limited in Badlands National Park. However, water resources were retained as an impact topic due to potential effects of prairie dog activities and potential management actions.

Air Quality: Air quality was retained as an impact topic because the Badlands Wilderness Area is a Class I air quality area and the Clean Air Act requires Federal agencies to protect air quality related values. Although the majority of air quality concerns in Badlands National Park arise from external sources such as vehicle emissions, large complexes of prairie dog towns that keep vegetation to a minimum may lead to an increase in the propensity for dust to develop in such complexes, particularly in light of the below average rainfall amounts experienced in the region in recent years.

Impact Topics Dismissed from Further Analysis

Soundscape: National Park Service Management Policies 2006 and Director's Order (DO) #47 require National Park Service Units to preserve to the greatest extent possible the natural soundscape of the park. It is unlikely that any of the alternative management strategies as relates to prairie dogs would have such an impact to the soundscape of Badlands National Park as to diminish visitor enjoyment.

Historic Buildings: Only one building in the North Unit of Badlands National Park has been determined eligible for inclusion on the National Register of Historic Places (Ben Reifel Visitor Center). It is unlikely that any adverse impacts would be experienced by this historic building as a result of black-tailed prairie dog management activities. Therefore, historic buildings were dismissed from further consideration.

Prime and Unique Farmlands: Prime farmlands were dismissed as an impact topic due to the general lack of prime farmlands in the North Unit of Badlands National Park. Additionally, it is not the North Unit's mission to allow, or preserve for, farming within North Unit boundaries.

Wetlands and Floodplains: Wetlands and floodplains are rare in the North Unit of Badlands National Park due to the area's topography and low precipitation. Executive Orders 11988 and 11990 require analysis of wetlands and floodplains. However, no alternatives of the prairie dog management plan propose for development, construction, or earthmoving activities that would have a detrimental impact on wetlands or floodplains. Therefore, wetlands and floodplains were not carried forth as impact topics.

Museum Collections: No park museum collections would be impacted by activities associated with the black-tailed prairie dog management plan.

Environmental Justice: General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (Executive Order 12898) require federal agencies to address any segments of the population disproportionately impacted by a proposed alternative. No minority or low-income populations would be adversely impacted by any activities associated with the black-tailed prairie dog management plan.

Indian Trust Resources: Secretarial Order 3175 requires that any anticipated impacts on Indian trust resources as the result of a proposed activity by agencies of the Department of the Interior be addressed in environmental assessments. Because all lands in the North Unit reside north of the Pine Ridge Reservation and are not held in trust by the Secretary of the Interior for the benefit of Native American people, this impact topic was removed from consideration.

Natural or Depletable Resource Requirements and Conservation Potential: No alternative associated with the black-tailed prairie dog management plan would result in resource extraction from park lands. This impact was removed from further analysis.

Cultural Landscapes: Cultural landscapes are defined in the National Park Service Management Policies 2006 and in the Cultural Resource Management Guidelines 2005, and are recognized by the National Park Service in four different categories: historic designed landscapes, historic vernacular landscapes, historic sites, and ethnographic landscapes (NPS, 2005). Prairie dog towns can be considered a component of the ethnographic landscape because of the species' role in Native American culture. However, this topic is being analyzed under the "Ethnographic Resources" impact component. Therefore, the cultural landscape as an impact topic was dismissed from further consideration.

Chapter 2 – Alternatives

The alternatives evaluated in this environmental assessment include two action alternatives and a required no action alternative that would continue with current case-by-case management. The action alternatives were designed to meet park objectives for a healthy black-tailed prairie dog population 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 biologists and resource managers utilizing agency comments and public scoping comments, while providing for strategies that would meet desired future conditions for the black-tailed prairie dog population of the North Unit. Alternatives that were not practical and that did not meet requirements for desired future considerations were dismissed from further consideration. These alternatives are addressed in the “Alternatives Considered but Dismissed” section. Excessive actions, including extermination of all prairie dogs and allowing for all potential black-tailed prairie dog territory to be inhabited, were dismissed from further consideration because these actions conflict with National Park Service policies.

Table 2.1 below represents a summary of the alternatives considered for the black-tailed prairie dog management plan.

Table 2.1: Key Components of Alternatives for Badlands NP Prairie Dog Management

Alternative	Key Components
Alternative A No Action	<ul style="list-style-type: none"> • No change to current practices • Continued monitoring and inventory • Limited live-trapping and relocation or live-trapping for special programs such as special-status species recovery or disease research programs • Natural fluctuations of park prairie dog population • No application of rodenticide
Alternative B Management Zones (NPS Preferred Alternative)	<ul style="list-style-type: none"> • Continued monitoring and inventory • ¼ mile buffer zone interior to the park boundary (land owner complaint based control and towns not receiving complaints controlled to not exceed 2006 acreage levels) • Prairie dog control zone • Bison management zone • Prairie dog free-range zone • Availability of all management tools
Alternative C Exclusion Zone	<ul style="list-style-type: none"> • Continued monitoring and inventory • ¼ mile prairie dog exclusion zone that will be controlled to completely exclude prairie dogs • All other towns in the park not in the exclusion zone would be allowed to fluctuate naturally • Availability of all management tools

2.1 Elements Common to All Alternatives

The following management strategies, including some management strategies that are part of current management, are common to all alternatives being considered:

- 1) There would continue to be bi-annual inventory and monitoring of prairie dog colonies within the park using global positioning system mapping and estimation of prairie dog densities for each of the mapped colonies. With personnel and funding permitting, one-half of the prairie dog towns would be mapped every other year and the other half in the second year. Remapping of boundary or complaint towns would occur more frequently if necessary.
- 2) All efforts undertaken to manage prairie dogs would only be taken after full consideration of the goals and strategies of the other existing park resource management plans such as the Fire Management Plan, Weed Management Plan, and draft Bison Management Plan for Badlands National Park. It is understood that actions taken under one of the various North Unit resource plans may have an affect on the others.
- 3) The park would maintain the ability to live-trap and relocate existing populations of prairie dogs to maintain the viability of this native species in the park and to maintain a minimum population. A minimum population is assumed to occupy no less than 5% of available suitable black-tailed prairie dog habitat, as described under Section 1.6, “Desired Future Condition of the Black-Tailed Prairie Dog Population”.
- 4) Any new lands acquired by the park may require efforts to prevent prairie dog expansion from the newly acquired lands’ across the new park boundary onto adjacent private lands. Preventative measures, such as interior fencing to create a vegetative barrier “buffer zone” or other measures would be taken as necessary upon acquisition to address landowner concerns.
- 5) In the past, live-trapped prairie dogs have been donated to private prairie dog restoration efforts for release outside of the park boundary, donated to the National Wildlife Health Center for use in disease studies, or humanely euthanized and used as food for other wildlife programs including the black-footed ferret and swift fox recovery programs. Park staff would maintain the ability to live-trap and relocate prairie dogs to mitigate encroachment onto private lands. Prairie dogs that are live-trapped would be:
 - relocated to interior portions of the North Unit and other prairie sites outside of the park,
 - humanely euthanized and used in support of the black-footed ferret and swift fox reintroduction programs, or
 - donated to disease research programs.
- 6) The degree of implementation of the prairie dog management plan would be dependent on available funding sources within the National Park Service.

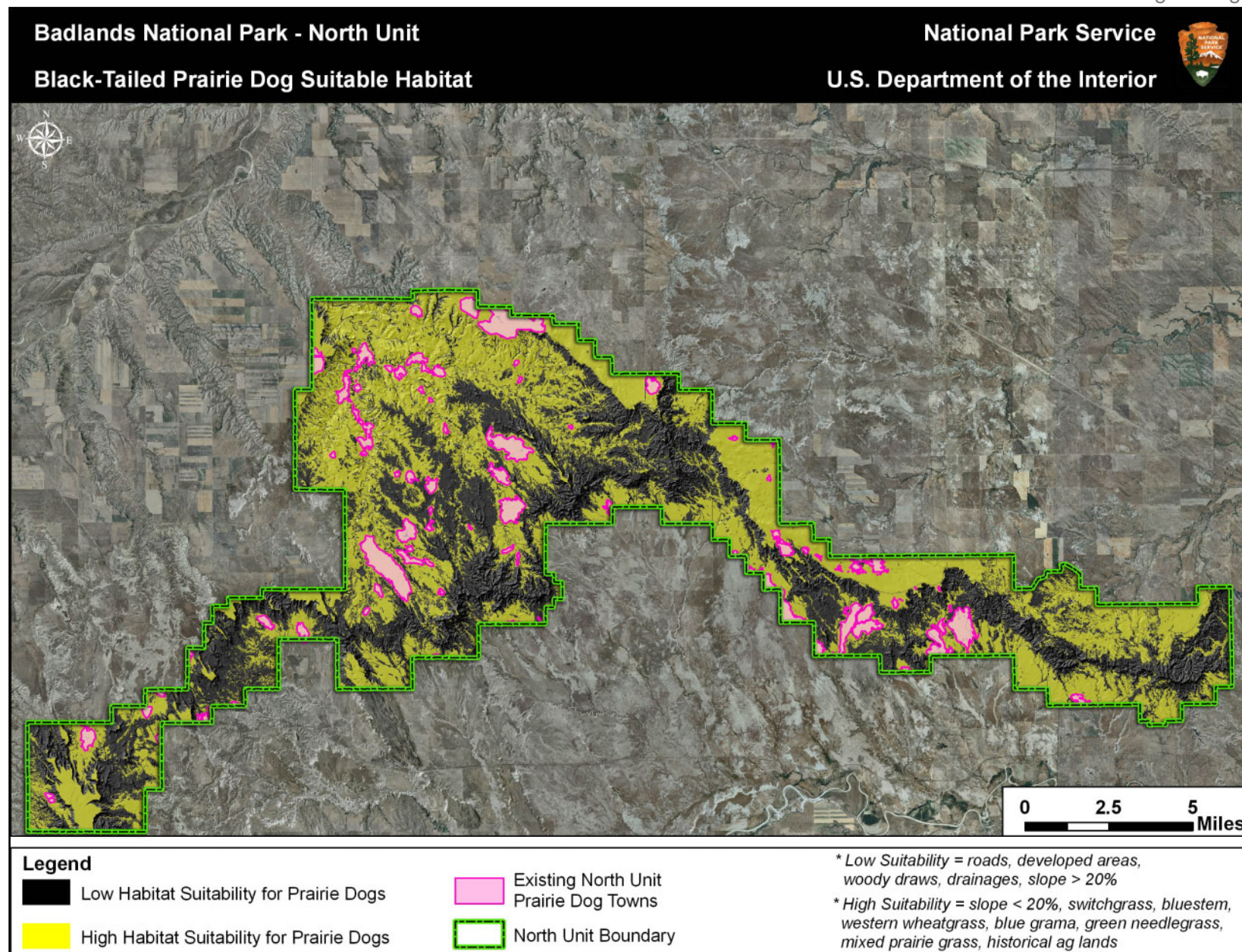


Figure 2.1: Black-Tailed Prairie Dog Suitable Habitat, North Unit, Badlands National Park

2.2 Elements Common to Both Action Alternatives

In addition to the elements common to all alternatives, the following list describes elements common to the two action alternatives, Alternatives B and C.

- 1) Park staff would have the ability to employ all methods of prairie dog control, including both non-lethal and lethal methods of control.
- 2) Park staff would have the ability to control future prairie dog expansion into administrative areas that are used for other park missions and objectives that conflict with prairie dog expansion (such as the Sage Creek Campground and the Pinnacles Ranger Station), using all available control measures.
- 4) Because the Roberts Prairie Dog Town (Figure 2.2) is such an important prairie dog town with respect to visitor interpretation and the black-footed ferret reintroduction program, any control measures performed along the boundary to address expansion of this colony onto the adjacent private land would be performed on the private lands and not within the park.
- 3) In the event that an outbreak of sylvatic plague leads to a significant decline of the black-tailed prairie dog in the North Unit of Badlands National Park, park staff would maintain the ability to employ management strategies to promote repopulation by the black-tailed prairie dog to the degree that the populations decline to less than 5% of available suitable habitat, as described under Section 1.6, “Desired Future Condition of the Black-Tailed Prairie Dog Population”.

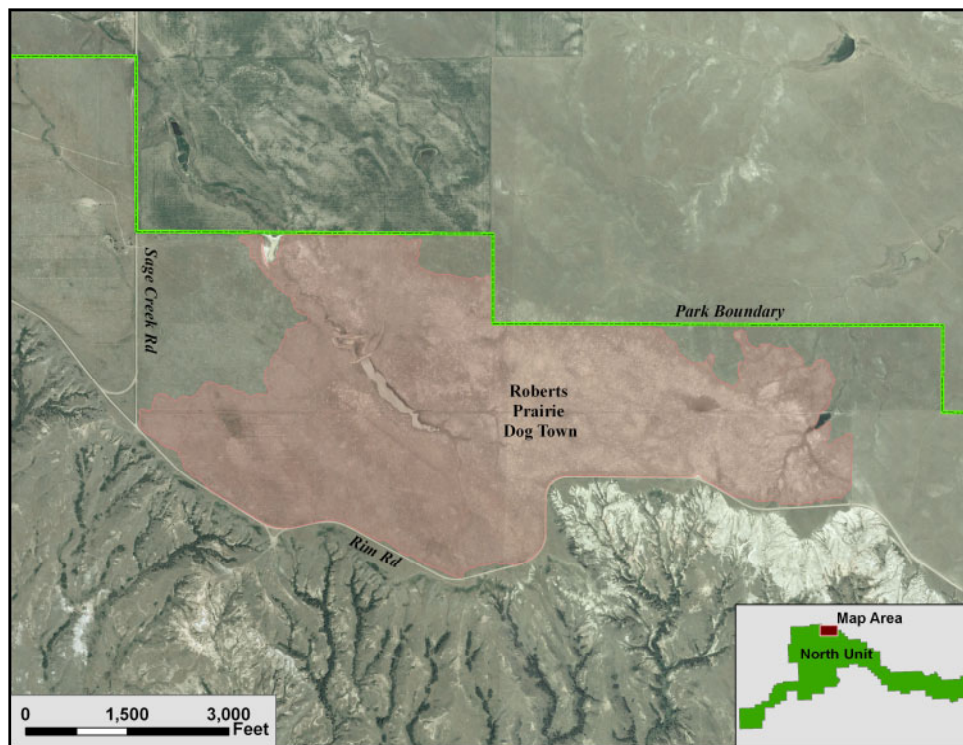


Figure 2.2: Roberts Prairie Dog Town, North Unit, Badlands National Park

2.3 Black-Tailed Prairie Dog Management Tools

Badlands National Park managers would have a variety of tools, both non-lethal and lethal, with which to manage prairie dogs under Alternatives B and C. Which tools are used in any specific situation would depend on the size and configuration of the prairie dog town at issue and any conflicts with other resource management plans. The only lethal tool available under Alternative A would be live-trapping for use in laboratory disease studies or for special-status species recovery programs.

Non-Lethal Management Tools

Live-trapping and relocation would be used to relocate prairie dogs to an area where colony expansion is less likely to require control or to establish new colonies elsewhere; to an area where the colony does not conflict with other park objectives or encroach onto adjacent private lands; or to areas outside of the park that focus on prairie dog restoration efforts.

Natural barriers, such as vegetative buffers, may be employed in containing the areal extent of prairie dog colonies. Prairie dogs have preferences in soil type, slope, and vegetation height that can be exploited to maintain current town sizes (NPS, 2006a).

Physical barriers serve the same purpose as natural barriers to limit dispersal. Examples of physical barriers include hay bales, slash, and fencing.

Park resource managers are also open to the use of *landowner incentives and conservation easements*, which would provide compensation to adjacent landowners for maintaining prairie dogs or prairie dog habitat on their lands. Any landowner incentives or conservation easements would be negotiated and funded by third-party sources outside of the National Park Service.

Lethal Management Tools

Zinc phosphide rodenticide is a lethal control that may be used under all of the action alternatives on an as-needed basis. The material is classified by USEPA as a restricted-use compound, which limits application to certified pesticide applicators only. The material is an acutely toxic, fast-acting rodenticide that is usually formulated in bait pellets or used as a coating on grain. Because target species can become bait shy when they consume a non-lethal dose, pre-baiting is usually performed by the applicator with untreated bait. Because treated areas may become repopulated, additional treatments may be required. Studies have shown that bait with a 2.0% concentration of zinc phosphide results in a 76% to 96% reduction in treated prairie dog populations (APHIS, 2003).

APHIS, or Animal and Plant Health Inspection Service (2003), states that zinc phosphide is highly toxic to mammals and some birds, therefore zinc phosphide poses both a primary and secondary hazard to non-target species. The primary hazard involves non-target animals consuming treated bait. This primary hazard can be effectively mitigated by cleaning up any inadvertently spilled bait. Secondary hazards primarily include the consumption of treated animals by predators. The degree to which secondary hazards may pose a risk to non-target species are dependent on several factors, such as the formulation of the treated bait, the behavior of the non-target species at risk, and local environmental conditions (APHIS, 2003). However, zinc phosphide does not bioaccumulate in the environment, so longer term secondary hazards to non-target species are minimal. Because the substance does not accumulate in the

muscle tissue of a treated animal, impacts to non-target species are likely to occur only if they consume a treated animal that has undigested grain in the cheek pouches or gastro-intestinal tract (APHIS, 2003). Most predatory species will not consume the gastro-intestinal tract of their prey, and many exhibit emetic (vomiting) symptoms upon zinc phosphide consumption (APHIS, 2003). APHIS has determined that the rodenticide is safe for approved uses when label restrictions are followed and that risks to non-target species are generally small when compared to other pesticides (APHIS, 2003).

Live-trapping for special programs would be a control tool used to provide prairie dogs so that they may be utilized as food for special-status species recovery programs, including the black-footed ferret and swift fox recovery programs. Live-trapping for laboratory disease research studies is also considered a lethal control measure.

Which management tool is chosen would depend on the situation and the intended result. Some controls work best or may only be employed only at specific times of the year, such as rodenticide. On the other hand, live-trapping and relocation would work year-round but is not effective for large colonies. In some cases, a combination of different control strategies may prove most effective. Use of a particular control strategy would also need to take into consideration the management of other resources.

Monitoring Plan

All action alternatives include an ongoing monitoring program to establish the extent of the prairie dog towns and the size of the population. This would ensure that the acreages and population size are consistent with the objectives of the plan (as outlined in the “Purpose and Need”). The following monitoring data would be collected: prairie dog town acreages; range productivity using transects; and prairie dog burrow counts.

Contingency Plan for Plague

Sylvatic plague (also known as bubonic plague in cases of human infection) is a disease caused by the bacterium *Yersinia pestis* and is spread by fleas. It is believed to be a contributing factor in the widespread decline of prairie dog populations throughout North America (USFWS, 2000). Although it has remained very uncommon in general across South Dakota, plague has been detected in the last 3 years in Custer and Shannon Counties (SDAIB, 2004; USFWS, 2005). A contingency plan would be developed for sylvatic plague by Badlands National Park in consultation with the U.S. Fish and Wildlife Service in a separate document.

Interpretation and Research

Under all action alternatives, visitors would continue to be able to view prairie dogs. Opportunities for research would also continue under all the action alternatives. Permits would continue to be issued and compliance enforced. Badlands National Park may occasionally offer limited funding for black-tailed prairie dog research. Badlands and Wind Cave National Parks have historically been used as control sites for studies of sylvatic plague and this would continue under all action alternatives.

2.4 Alternative A – No Action Alternative

Under this alternative, no changes would be made in the current management of prairie dogs at Badlands National Park (Figure 2.3). The existing prairie dog management plan allows for natural fluctuations of prairie dog populations within the park. Prairie dog control would be limited to live-trapping and relocation on a case specific basis to mitigate prairie dog encroachment onto private lands and to control prairie dog encroachment into administrative areas of the park (such as the Pinnacles Ranger Station) where encroachment conflicts with other park goals and objectives. Because the No Action Alternative does not include specified management zones with defined control goals, prairie dogs populations would otherwise be allowed to naturally fluctuate within all of the approximately 60,000 acres of suitable habitat in the North Unit (approximately 54% of all North Unit lands).

Although the existing prairie dog management plan for Badlands National Park allows for the use of rodenticide on a case-by-case basis, the Midwest Regional Office of the National Park Service has directed Badlands to establish a new plan before any further application of rodenticide may be used to manage prairie dogs. Under the No Action Alternative, there would be no future reductions of prairie dogs within the park utilizing rodenticide. This would limit the park in the degree of effective population control where it may be needed. Based on current rate of expansion of prairie dog populations, the park would experience increased boundary complaints with adjacent private landowners with a diminished ability to effectively manage the prairie dog population.

Under the No Action Alternative, there would continue to be annual inventory and monitoring of prairie dog colonies within the park utilizing global positioning system mapping and estimation of prairie dog densities for each of the mapped colonies. Additionally, the park would maintain the ability to live-trap and relocate existing populations of prairie dogs in order to maintain the existence of this native species in the park and to maintain a minimum population.

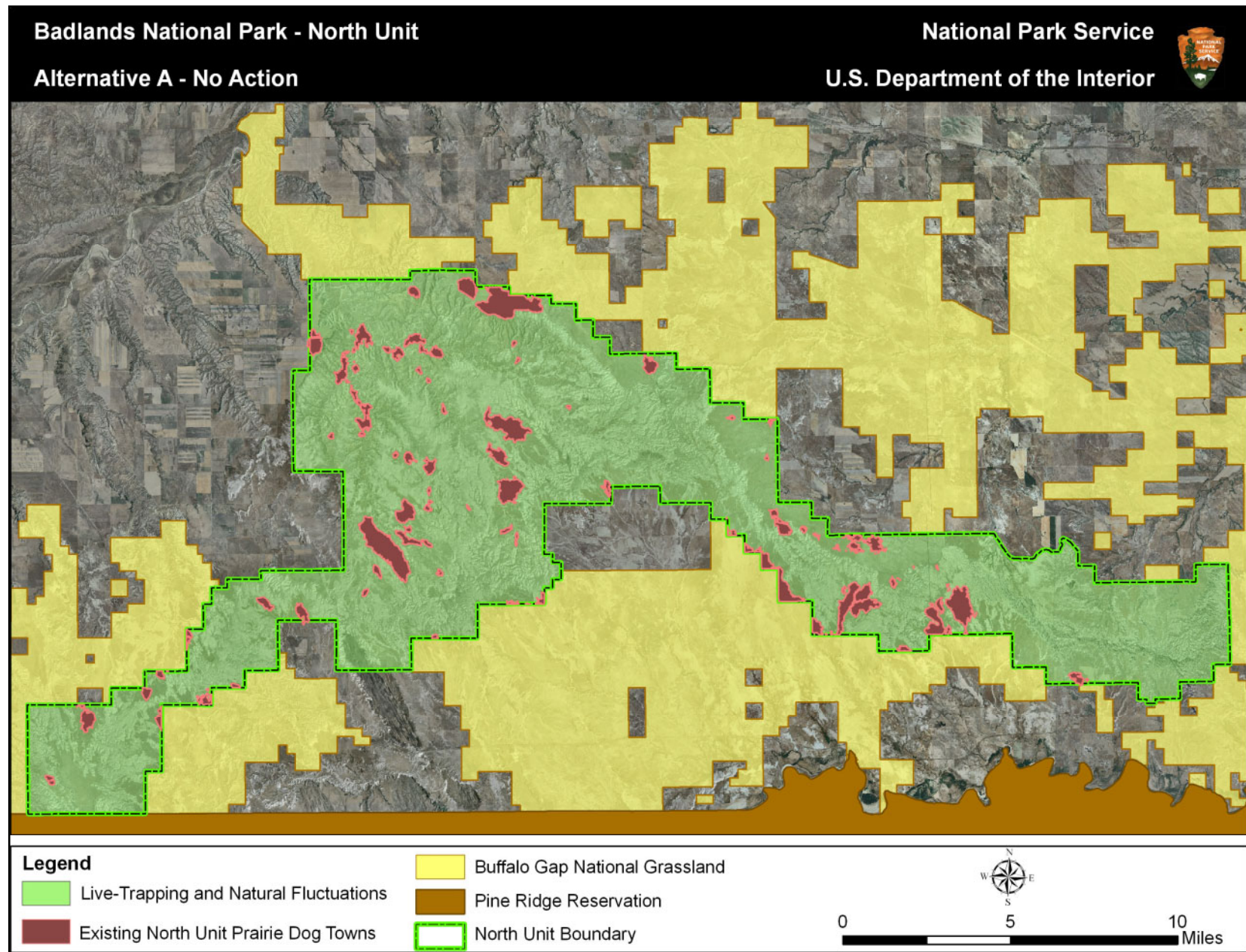


Figure 2.3: Alternative A, North Unit, Badlands National Park

2.5 Alternative B – Management Zones (NPS Preferred Alternative)

Under this action alternative, the park would designate all areas within the boundaries of the North Unit into one of four management zones—Prairie Dog Buffer Zone, Bison Management Zone, Free-Range Zone, and Prairie Dog Control Zone—and would manage prairie dogs in the different zones accordingly (Figure 2.3). This alternative is designed to focus prairie dog management activities in specific areas of the park where prairie dog expansion may create unique situations with other park resources. For example, the Prairie Dog Buffer Zone is designed to deal with the issue of prairie dog expansion onto adjacent private lands; the Bison Management Zone is designed to effectively manage competition for limited forage resources between prairie dogs and bison. Following are details of each zone:

- 1) **Prairie Dog Buffer Zone:** To define the Prairie Dog Buffer Zone, the park would delineate a one-quarter ($\frac{1}{4}$) mile buffer interior to the boundary of the park in areas where the park shares a boundary with adjacent private lands. Within this zone, prairie dog control would be initiated by private landowner complaint. Under this alternative, if 80% of a prairie dog town causing a landowner complaint is within the $\frac{1}{4}$ mile buffer and encroachment onto private land has been documented, the entire town would be eliminated. All available tools of control would be used within this zone to initially eradicate the town as well as maintain the problem location free of prairie dogs in the future. Prairie dog colonies in the buffer that do not cause adjacent landowner complaints would be managed not to exceed the current (2006) acreage levels.

The Prairie Dog Buffer Zone would constitute approximately 9,745 acres (9% of North Unit lands), of which approximately 7,200 acres is suitable prairie dog habitat. As of 2006, there were approximately 515 acres of prairie dog colonies in the Prairie Dog Buffer Zone (8% of all prairie dog colony acreage on North Unit lands).

- 2) **Bison Management Zone:** In the Bison Management Zone, prairie dog populations would be allowed to fluctuate naturally in densities and acreage until the point that the acreage of prairie dogs plus the acreage used by the bison herd exceeds roughly one-half, or 50-60%, of the available suitable habitat (for both species). This would total approximately 11,500 to 13,800 acres of the approximately 23,000 acres of available suitable habitat in this zone. The numbers used in computations for this zone are deliberately given in ranges because of the numerous variables (e.g. forage production, range condition) that the park does not have the capability to monitor at this time. Also, even though bison do graze in prairie dog towns, for management considerations we are treating the two species' grazing needs as separate and additive. The areas that would be designated as part of this zone would primarily include the interior portion of the Sage Creek Unit of the Badlands Wilderness.

The primary goal of prairie dog management within the Bison Management Zone is to conservatively manage the competition for forage resources between the bison herd and prairie dogs. Park resource managers would allocate 7,500 to 9,000 acres of available suitable habitat in this zone for a park bison herd of 500-600. As of 2006, there were approximately 2,700 acres of prairie dog towns in this zone which, when added to the acres needed by bison, equals approximately 10,200 to 11,700 acres, or 44 to 51%, of the 23,000 acres of available suitable habitat in this zone. Thus, with the bison herd currently at the level of 600 animals, prairie dog acres could be limited to the current

level or allowed to increase up to 4,800 total acres (60%) before the park would consider reducing the prairie dog population in this zone. This would be 17 to 21% of the total available suitable habitat being allocated for prairie dog towns, which is far above the minimum of 5 to 10% prairie dog occupancy of suitable habitat on Federal lands recommended by a USFWS research biologist (Mulhern and Knowles, 1995).

Control efforts would focus on prairie dog towns that have shown the most recent and largest expansion based on annual mapping activities. This methodology is proposed with the understanding that the more heavily the range is used by the bison herd, the more susceptible the range would be to prairie dog colonization. As with all alternatives, park staff would maintain the ability to control prairie dog encroachment into administrative areas of the Bison Management Zone (such as the Sage Creek Campground) where encroachment conflicts with other park goals and objectives.

- 3) **Free-Range Zone:** Within the Free-Range zone, prairie dog populations would be allowed to fluctuate naturally. The zone would include all portions of the Badlands Wilderness not designated in the Bison Management Zone, as well as the southwest portion of the North Unit outside the Badlands Wilderness Area. Prairie dog control would be limited to administrative areas where prairie dog colonies conflict with other park management goals or objectives. Because the majority of the Free-Range Zone shares a boundary with the Buffalo Gap National Grassland, allowing prairie dog populations to fluctuate naturally would have the beneficial effect of providing contiguous habitat for the black-footed ferret recovery program.

The Free-Range Zone would constitute 39,629 acres (36% of North Unit lands), of which 14,000 acres is suitable prairie dog habitat. In 2006, there were 2,058 acres of prairie dog colonies in the Free-Range Zone (32% of prairie dogs on North Unit lands). Prairie dogs currently inhabit about 5% of lands within the Free-Range Zone, and 15% of the available suitable habitat in the Free-Range Zone.

- 4) **Prairie Dog Control Zone:** Within the Prairie Dog Control Zone, which would include all North Unit lands not designated as one of the other three zones under Alternative B, prairie dogs would be managed to occupy 7 to 15% of available suitable habitat. Limiting expansion within the Control Zone would help preserve remnant areas of mixed-grass prairie vegetation that the park maintains for interpretive purposes. Additionally, the Control Zone contains administrative areas of the park (such as the Pinnacles Ranger Station, the Ben Reifel Visitor Center, and the Cedar Pass Complex) where allowing unmanaged expansion of prairie dogs would compromise other park objectives. Limiting expansion within the Control Zone would also mitigate future prairie dog expansion into certain parts of the Buffer Zone, minimizing the long-term need to continually respond to private land encroachment. Park staff will utilize control measures such as visual barriers, live-trapping and relocation, and live-trapping for use in special-status species recovery programs as tools to keep prairie dog acreage from increasing, as well as zinc phosphide treatment in specific cases where it is determined to be necessary.

The Prairie Dog Control Zone encompasses 24,839 acres (23% of North Unit lands), of which 15,800 acres is suitable prairie dog habitat. As of 2006, there were 1,114 acres of prairie dog colonies existing within the Control Zone (18% of all North Unit prairie dogs). Prairie Dogs currently inhabit 7% of the available suitable habitat in the Control Zone. Managing prairie dogs in the Control Zone at 7 to 15% of available suitable habitat would

at a minimum maintain the species at its current level, while allowing for expansion into areas where they do not conflict with other park objectives. This is consistent with what researchers have suggested should be the minimum prairie dog occupancy - 5 to 10% of available suitable habitat on Federal lands (Mulhern and Knowles, 1995).

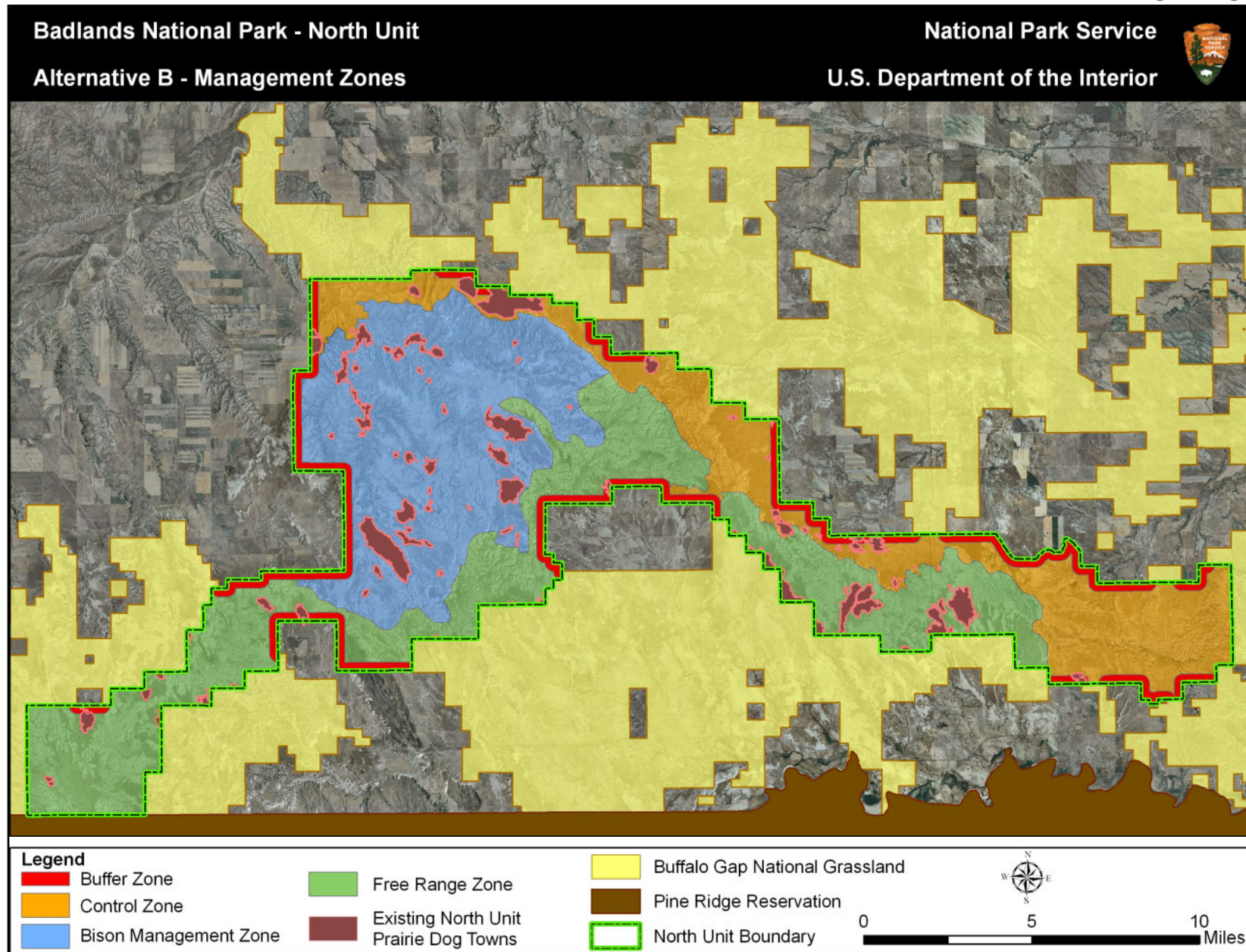


Figure 2.4: Alternative B (NPS Preferred), North Unit, Badlands National Park

2.6 Alternative C – Prairie Dog Exclusion Zone

Under this action alternative, the park would delineate a one-quarter ($\frac{1}{4}$) mile buffer interior to the boundary of the park and actively exclude prairie dog colony expansion in the Exclusion Zone (Figure 2.4). This strategy is designed to mitigate prairie dog expansion onto adjacent private lands. All available tools of control would be utilized within this zone to initially eradicate the existing prairie dogs, as well as to maintain the entire zone free of prairie dogs in the future. All other prairie dog colonies within the park boundary not encompassed by the Exclusion Zone would be allowed to fluctuate naturally in density and acreages.

The Prairie Dog Exclusion Zone encompasses 9,745 acres (9% of all North Unit lands), of which 7,200 acres is suitable prairie dog habitat. As of 2006, there were 515 acres of prairie dog colonies existing within the Exclusion Zone (8% of all North Unit prairie dogs).

2.7 Alternatives Considered but Dismissed

- 1) **One-mile prairie dog buffer within North Unit boundary:** This has been recommended to the park as a measure to manage prairie dog colonies to prevent any incursion onto adjacent private lands. Similar to Alternative C, no prairie dogs would be allowed to exist within one mile interior of the park boundary (Figure 2.6). Due to the shape and structure of the boundary surrounding the approximately 109,900 acres of the North Unit, this one mile buffer would exclude prairie dogs from 38,156 acres of potential habitat, which is 64% of the available suitable prairie dog habitat in the North Unit. This alternative would severely limit the park in accomplishing its goal of sustaining prairie wildlife and biodiversity components, and was therefore rejected.
- 2) **One-half mile prairie dog prairie dog buffer around North Unit boundary:** This alternative has been recommended to the park as a measure to manage prairie dogs in that no prairie dogs would be allowed to exist within one-half mile interior of the park boundary (Figure 2.6). Due to the shape and structure of the boundary surrounding the approximately 109,900 acres of the North Unit, this one-half mile would exclude prairie dogs from 24,903 acres of potential habitat, which is 42% of the available suitable prairie dog habitat in the North Unit. As is the case with the one mile buffer proposal, this alternative would severely limit the park in accomplishing its goal of sustaining prairie wildlife and biodiversity components and was therefore rejected.
- 3) **Allow for natural fluctuations of prairie dogs within the entirety of the North Unit:** As a National Park Service Unit, Badlands National Park is a place where, under ideal circumstances, native species and natural processes might function as they did prior to the arrival of Europeans. However, the reality is that parks are constrained by their size, by diminished or missing ecosystem components, by conflicting land uses on their boundaries, by demands for visitation, and by limited funding and staff resources. This creates the need for effective management of park resources within an array of substantial constraints, which may lead to a compromise of what might be a park ideal. At Badlands National Park, an example of this compromise is that bison must be fenced in to prevent them from crossing the boundary to graze private lands used for agriculture. Therefore, their population must be controlled by annual roundups within the capacity of the park to sustain them. The same is true for prairie dogs. While, in theory, they should be considered free-ranging wildlife able to move across boundaries, in

practice they can cause reduction of grasses that landowners desire to be available to livestock or damage to crops. This is a major issue in western South Dakota, and it requires the National Park Service to act responsibly to manage prairie dogs, like bison, to minimize impacts to park neighbors. Furthermore, allowing prairie dogs to fluctuate naturally with no management strategies will severely compromise park objectives in areas of the North Unit designated for purposes that conflict with prairie dog expansion (such as the bison pasture), particularly if recent drought conditions in the region persist.

- 4) **Manage prairie dog towns within the park in terms of appearance or solely as a standard of range health:** Park management understands that prairie dogs affect grassland vegetation with feeding and clipping that may not be directly compatible with assessments of range health in terms of agricultural production. The natural processes of a native species interacting with the landscape help to provide the biodiversity the park is mandated to protect. Prairie dogs as a native species in the Badlands ecosystem create unique environs, especially during periods of drought that may be far removed from classifications of range health as “good.” Eliminating prairie dog colonies based on the appearance or classifications of range vegetation during these times would eliminate the associated species diversity.

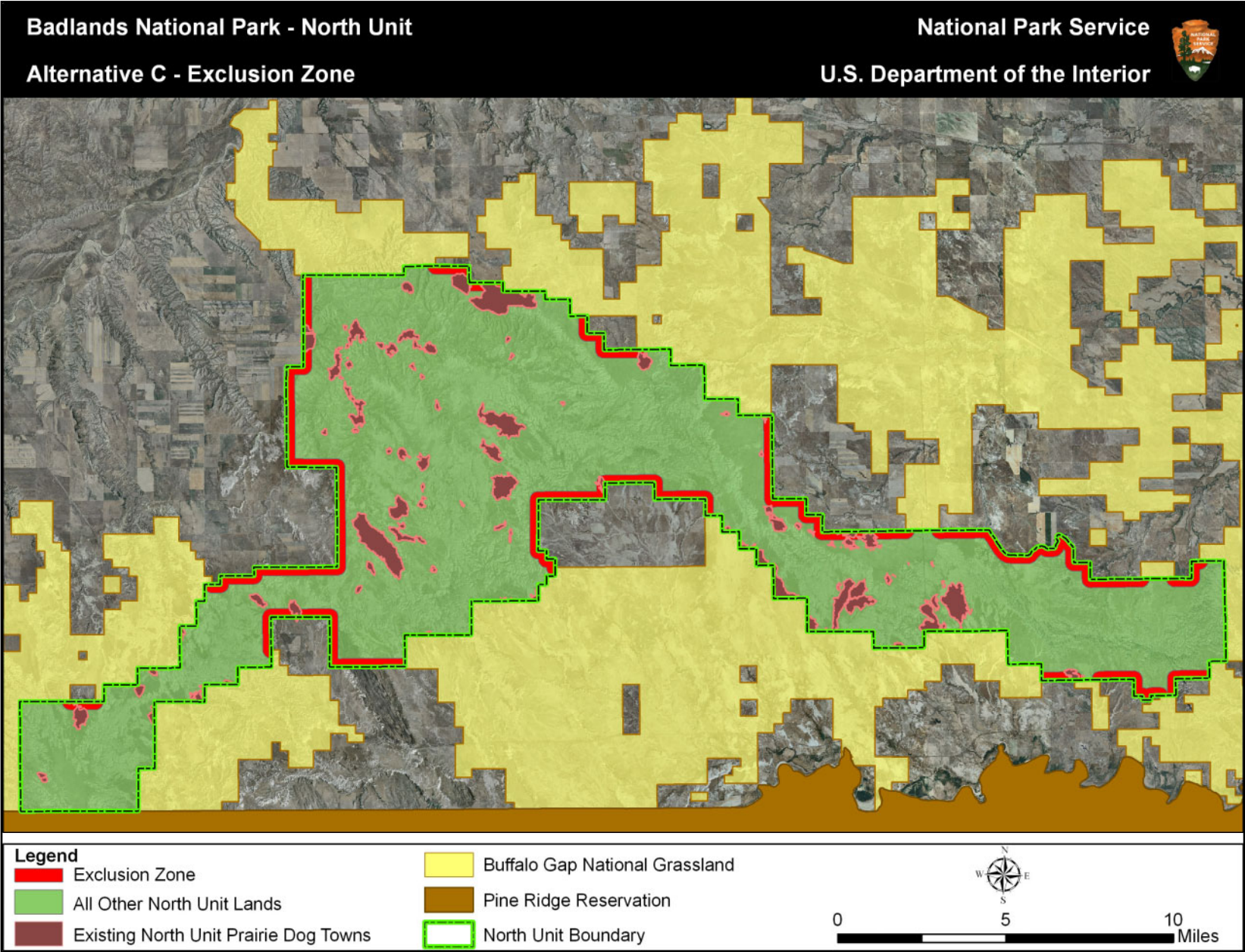


Figure 2.5: Alternative C, North Unit, Badlands National Park

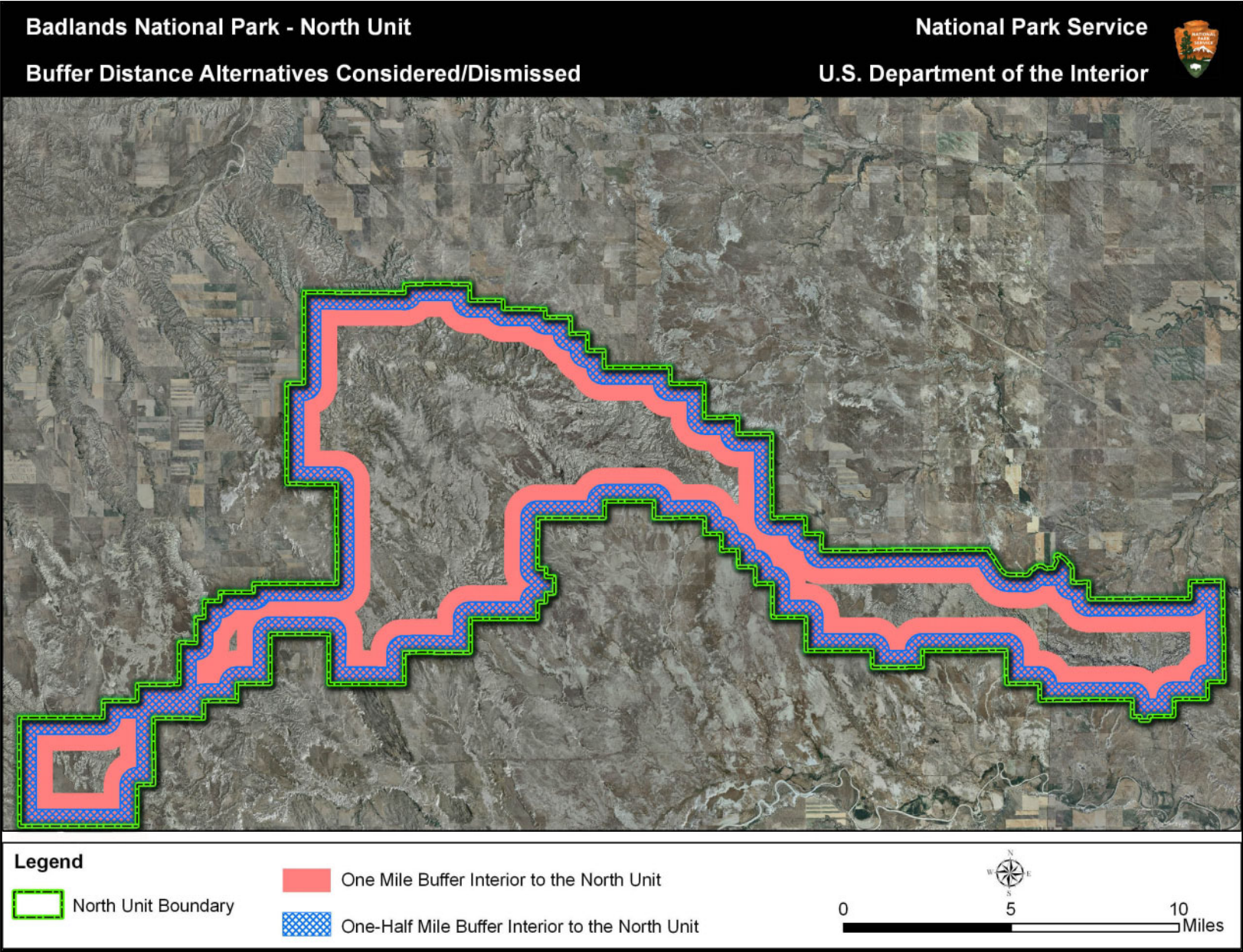


Figure 2.6: Alternative Buffer Distances Considered, North Unit, Badlands National Park

2.8 Environmentally Preferred Alternative

The National Park Service is required to identify the environmentally preferred alternative for any proposed action. This is the alternative that best promotes the national environmental policy expressed in NEPA Section 101. Guidelines for identifying this alternative are as follows:

“The environmentally preferred alternative is determined by applying the criteria suggested by the Council on Environmental Quality (CEQ), which provides direction in its guidance Forty Most Asked Questions Concerning CEQ’s National Environmental Policy Act Regulations (1981). CEQ defines the environmentally preferred alternative as: “...the alternative that causes the least damage to the biological and physical environment. It also means the alternative that best protects; preserves; and enhances historic, cultural, and natural resources.”

Alternative B, the Preferred Alternative, is the environmentally preferred alternative because it provides the National Park Service with the greatest degree of flexibility in meeting management requirements for all North Unit natural resources while minimizing impacts to prairie dogs and other biotic components of the park’s prairie ecosystem. Specifically, Alternative B would cause the least damage to the biological and physical environment and best protect, preserve, and enhance historic, cultural, and natural resources because it would:

- Foster maintenance and expansion of prairie dog colonies on major portions of the North Unit where no conflicts with other resource values or management needs are at issue, thereby assuring that prairie dogs and the species that depend on them will remain viable components of the North Unit’s prairie ecosystem for the long-term
- Provide the greatest variety of effective prairie dog control methods that can be tailored to meet control requirements for specific locations within the North Unit
- Foster a balance between the needs of bison and prairie dogs where bison are a major component of the North Unit’s prairie ecosystem
- Allow the National Park Service to most effectively address conflicts between expanding prairie dog populations and resource uses on adjacent lands while limiting that conflict resolution to only those locations where and when it is needed
- Foster the long-term protection of Native American ethnographic resources related to a fully functioning natural prairie environment
- Cause no conflict with the paleontological or geologic resources of the North Unit because it would be confined to the prairie portions of the North Unit
- Mitigate for any potential conflicts between prairie dog management and historic North Unit resources

Alternative C also offers protection to adjacent private landowners from prairie dog encroachment. However, the adoption of specific management zones in the interior portions of the park under Alternative B would allow park personnel more appropriate tools for managing the competition for forage resources between prairie dogs, bison, and other ungulate grazers. Additionally, Alternative B helps ensure the viability of other species that interact with the prairie dog population in the mixed-grass prairie ecosystem, as well as the prairie dog itself. Park personnel would be less effective in managing forage resource competition under Alternative C, particularly if drought conditions in the region persist in the long-term future. Additionally, prairie dog expansion into areas designated for other park goals and objectives would be more likely under Alternative C than under Alternative B.

Because of the limited management strategies allowed under Alternative A, it does not meet the above requirements, particularly with regard to managing competition for resources between species and the minimization of undesirable consequences from encroachment onto private lands.

Alternative B: Management Zones would be the environmentally preferred alternative in comparison to the other alternatives because it would cause the least damage to the biological and physical environment and best protect, preserve and enhance historic, cultural, and natural resource. In addition, it would also meet missions and objectives of the North Unit of Badlands National Park. Specific reasons supporting the environmentally preferred alternative are further analyzed in the Affected Environment and Environmental Consequences chapter.

2.9 Comparison of Alternatives

Management activities under Alternative A (No Action Alternative) and Alternative C (Exclusion Zone Alternative) are focused on limiting prairie dog encroachment onto adjacent private lands. Control on the interior portions of the North Unit would only consist of controlling prairie dogs that encroach into administrative areas of the park. Thus, the majority of the North Unit would be a zone of natural fluctuation. Depending on climatic conditions, it is difficult to predict the degree to which prairie dogs would expand throughout areas of suitable habitat in the North Unit. However, under Alternative B (Management Zones Alternative: NPS Preferred) maximum acreage thresholds would be established in three of the four zones. This will enable park resource managers to more appropriately address competing management issues related to prairie dog expansion, as compared to the unregulated and unpredictable management strategies of Alternatives A and C. Maximum acreage thresholds in the Buffer Zone would mitigate prairie dog expansion onto private lands. Thresholds in the Bison Management Zone would effectively manage for the competition of limited forage resources between prairie dogs and bison. Thresholds in the Control Zone would limit overall expansion into the Buffer Zone, thereby limiting the need for future control within the Buffer Zone; limit impacts of prairie dog expansion into administrative areas designed for uses; and maintain a full mosaic of mixed-grass prairie vegetation in areas where the park uses such vegetation for interpretive purposes.

Tables 2.2, 2.3, and 2.4 present a comparison of alternatives as well as the ability of each alternative to meet objectives of the prairie dog management plan. More detailed analysis supporting each conclusion is presented in Chapter 3: Affected Environment and Environmental Consequences.

Table 2.2: Comparison of Alternatives

Alternative	Alternative A - No Action	Alternative B - Management Zones (NPS Preferred)				Alternative C - Exclusion Zone	
Zone	All North Unit Lands	Buffer Zone	Bison Management Zone	Free-Range Zone	Control Zone	Exclusion Zone	All Other North Unit Lands
Acreage/Percent of North Unit	109,920 (100%)	9,745 (9%)	35,707 (32%)	39,629 (36%)	24,839 (23%)	9,745 (9%)	100,175 (91%)
Acreage/Percent of North Unit Available Suitable Habitat	60,000 (100%)	7,200 (12%)	23,000 (38%)	14,000 (24%)	15,800 (27%)	7,200 (12%)	52,800 (88%)
Existing Acreage/Percent of North Unit Prairie Dog Population	6,363 (100%)	515 (8%)	2,676 (42%)	2,058 (32%)	1,114 (18%)	515 (8%)	5,848 (92%)
Percent of Available Suitable in Zone Currently Occupied by Prairie Dogs	11%	7%	12%	15%	7%	7%	11%
Threshold at Which Control May be Employed	Encroachment onto private lands and administrative areas	Encroachment onto private lands, or total acreage or prairie dogs in buffer zone exceeds current (2006) level	Total acreage of prairie dog colonies plus acreage utilized by bison herd exceeds 60 % of available suitable habitat (approximately 13,800 acres)	Encroachment onto administrative areas	Acreages of prairie dog colonies exceeds 15% of available suitable habitat	Prairie dogs excluded from entire zone	Encroachment onto administrative areas
Available Control Measures	Live-trapping and relocation or live-trapping for special-status species recovery programs	All available control measures	All available control measures	All available control measures	All available control measures	All available control measures	All available control measures

Table 2.3: Plan Objectives and the Ability of the Alternatives to Meet Objectives

Objective	Alternative A – The No Action Alternative	Alternative B – Management Zones (NPS Preferred Alternative)	Alternative C – Exclusion Zone
Establish and maintain a minimum population size and distribution of black-tailed prairie dogs in the park sufficient to continue to fulfill their role as a keystone species in the North Unit prairie ecosystem.	The prairie dog population in the North Unit is currently not only sustainable but also growing in size and distribution. This objective would be met.	The prairie dog population in the North Unit is currently not only sustainable but also growing in size and distribution. There is no exclusion zone, and the majority of the North Unit prairie dog population would be maintained at a population size that allows them to fulfill their keystone role. This objective would be met.	The prairie dog population in the North Unit is currently not only sustainable but also growing in size and distribution. The area in which prairie dogs would be excluded is less than 10% of all North Unit lands and the remainder of the park is a free-range zone where the population would be allowed to fluctuate naturally and therefore fulfill a keystone role. This objective would be met.
Ensure black-tailed prairie dog populations do not conflict with other park objectives, including maintenance of a bison population of 500-600 animals in the existing bison range.	Under the current plan, there are no tools available to effectively manage for resource competition that may conflict with other park objectives. This objective would not be met.	Adoption of the Bison Management Zone would allow park resource management officials a tool for effectively managing competition for forage resources. Adoption of the Control Zone would effectively minimize expansion into administrative areas where prairie dogs conflict with other park goals. This objective would be met.	The only area of defined control is along the park border within the Exclusion Zone. If current drought conditions continue, the prairie dogs towns would continue to expand and may begin to compete with bison for forage in the bison management area. This objective would not be met.
Monitor prairie dog population areal size and population density to ensure long-term viable populations and management objectives are being met.	This is part of the current management plan and would continue under Alternative A. This objective would be met.	This would continue under Alternative B. This objective would be met.	This would continue under Alternative C. This objective would be met.

<p>Implement “good neighbor” policies that recognize the concerns of neighboring landowners and that would reduce or eliminate boundary conflicts when and where prairie dog populations expand across the park boundary.</p>	<p>The state of South Dakota Prairie Dog Management Plan mandates prairie dog control on private property at the request of landowners. This would continue under Alternative A; however, there are no controls in place to reduce the likelihood of prairie dog expansion onto private property from populations interior to the park.</p> <p>This objective would be met, but not to the same extent as Alternatives B & C.</p>	<p>The state of South Dakota Prairie Dog Management Plan mandates prairie dog control on private property at the request of landowners. This would continue under Alternative B. Additionally, there would be a Buffer Zone around the interior perimeter of the park to limit prairie dog expansion onto private lands. The Buffer Zone is consistent with the South Dakota Prairie Dog Management Plan in that the park will act upon landowner request.</p> <p>This objective would be met.</p>	<p>The inclusion of a Prairie Dog Exclusion Zone under Alternative C would effectively minimize encroachment onto private lands.</p> <p>This objective would be met.</p>
<p>Identify appropriate measures for black-tailed prairie dog population control and measures appropriate for encouraging population growth and expansion when needed.</p>	<p>The park would only use non-lethal controls and only to remove prairie dogs from developed areas and private lands. An encouragement of prairie dog expansion would only be a byproduct of other management activities.</p> <p>This object would not be fully met.</p>	<p>Park management would have all management tools available to them and also would have benchmarks to begin management activities for both reduction and encouragement of population growth and expansion.</p> <p>This objective would be met.</p>	<p>The park management would have all management tools available to them, but only in the Exclusion Zone, where available tools are primarily for reducing the population.</p> <p>The objective would not fully be met.</p>

Table 2.4: Summary of Effects by Impact Topic

Impact Topic	Alternative A – No Action Alternative	Alternative B – Management Zones (NPS Preferred)	Alternative C – Exclusion Zone
<i>Wildlife Resources</i>	<p>Impacts to prairie dogs and species that directly depend on prairie dogs are likely to be long-term, minor to moderate, and beneficial.</p> <p>A large decline in the prairie dog population would likely have long-term, moderate to major, and adverse impacts to wildlife resources on the park that depend on prairie dogs.</p> <p>Impacts to bison and other grazing ungulates as a result of forage resource competition are likely to be long-term, minor to moderate, and adverse.</p>	<p>Impacts to prairie dogs and species that depend on prairie dogs would be long-term, minor to moderate, and beneficial throughout the majority of the park. Removal of specific prairie dog towns in the Buffer Zone would likely result in long-term, minor to moderate, adverse impacts.</p> <p>Impacts to ungulate grazers are likely to be long-term, minor to moderate, and beneficial due to suitable habitat allocation thresholds.</p>	<p>Impacts to prairie dogs and species that depend on prairie dogs would be long-term, minor to moderate, and beneficial throughout the majority of the park. Removal of prairie dog towns throughout the entirety of the Exclusion Zone would likely result in long-term, moderate to major, and adverse impacts to prairie dogs and associated species within the Exclusion Zone.</p> <p>Impacts to bison and other grazing ungulates as a result of forage resource competition are likely to be long-term, minor to moderate, and adverse.</p>
<i>Endangered and Threatened Species</i>	<p>Impacts to endangered and threatened species are likely to be long-term, minor to moderate, and beneficial.</p>	<p>Impacts to endangered and threatened species are likely to be long-term, minor to moderate, and beneficial. Potential adverse impacts are possible in the Buffer Zone if a town that specific E&T species depend on is controlled.</p>	<p>Same as Alternative B.</p>
<i>Vegetation</i>	<p>Impacts to vegetation are likely to be long-term, minor to moderate, and beneficial.</p>	<p>Same as Alternative A throughout the majority of the park, but to a greater extent because of suitable habitat threshold allocations that would limit overgrazing in the Bison Management Zone.</p>	<p>Same as Alternative A, except for the Exclusion Zone, where completely removing prairie dogs would also remove plant diversity near the burrow sites, leading to adverse impacts.</p>
<i>Soils</i>	<p>Impacts to soils are likely to be long-term, moderate, and beneficial on a local scale; beneficial impacts are likely to be negligible to minor parkwide.</p>	<p>Same as Alternative A throughout the majority of the park.</p>	<p>Same as Alternatives A and B; removing prairie dogs from Exclusion Zone (and the associated soil mixing activities) may result in negligible to minor adverse impacts.</p>

Impact Topic	Alternative A – No Action Alternative	Alternative B – Management Zones (NPS Preferred)	Alternative C – Exclusion Zone
<i>Paleontological Resources</i>	Impacts to paleontological resources are likely to be negligible and adverse.	Same as Alternative A.	Same as Alternatives A and B.
<i>Wilderness Values</i>	Impacts to wilderness values are likely to be long-term, negligible to minor, and beneficial.	Same as Alternative A; any control activities performed in the wilderness area may result in potential short-term, minor, adverse impacts.	Same as Alternative B.
<i>Socioeconomics</i>	<p>Impacts to socioeconomics are likely to be long-term, negligible, and beneficial from visitors continuing to travel to Badlands to witness prairie dogs.</p> <p>Impacts to socioeconomics are likely to be long-term, minor to moderate, and adverse due to continued encroachment of prairie dogs onto adjacent private lands.</p>	<p>Long-term, negligible, beneficial impacts would result from visitors continuing to travel to the park to witness prairie dogs, as well as potential seasonal employment to focus on prairie dog management.</p> <p>Impacts to adjacent private landowners would be less adverse as compared to Alternative A due to control of prairie dogs in the ¼ mile buffer zone.</p>	Same as Alternative B; impacts to adjacent private landowners would be the least adverse under Alternative C due to the prairie dog ¼ mile prairie dog Exclusion Zone.
<i>Human Health and Safety</i>	Impacts to human health and safety are likely to be long-term, negligible, and both beneficial and adverse.	Overall impacts to human health and safety are likely to be long-term, minor, and beneficial.	Same as Alternative B.
<i>Visitor Use and Experience</i>	Impacts to visitor use and experience are likely to be long-term, minor, and beneficial.	Largely the same as Alternative A; visitors who witness prairie dog control activities and do not understand the context that the control is taking place may experience short-term, negligible to minor, and adverse impacts.	Same as Alternatives A and B.
<i>Park Operations</i>	Impacts to park operations are likely to be long-term, minor to moderate, and adverse.	Impacts to park operations are likely to be long-term, minor, and beneficial.	Same as Alternative B; however, time and effort spent maintaining the Exclusion Zone free of prairie dogs may potentially lead to a long-term, minor, adverse impact to park operations.

Impact Topic	Alternative A – No Action Alternative	Alternative B – Management Zones (NPS Preferred)	Alternative C – Exclusion Zone
<i>Ethnographic Resources</i>	Impacts to ethnographic resources are likely to be long-term, minor to moderate, and beneficial; impacts may be adverse if competition for forage resources results in adverse impacts to bison.	Impacts to ethnographic resources are likely to be long-term, minor to moderate, and beneficial.	Same as Alternative A; impacts in the Exclusion Zone are also likely to be adverse due to the complete removal of prairie dogs from this area of the park.
<i>Archaeological Resources</i>	Impacts to archaeological resources are likely to be negligible and adverse.	Same as Alternative A.	Same as Alternatives A and B.
<i>Water Resources</i>	Impacts to water resources are likely to be long-term, negligible, and beneficial, locally; there would likely be no impact on water resources parkwide or on a watershed scale.	Same as Alternative A.	Same as Alternatives A and B.
<i>Air Quality</i>	Impacts to air quality are likely to be short-term, minor, and adverse locally, and negligible parkwide.	Same as Alternative A.	Same as Alternatives A and B.

2.10 Mitigation Measures

Mitigation measures are designed to prevent and/or minimize adverse environmental impacts that may occur from prairie dog management activities. Mitigation measures are common to all alternatives and include but are not limited to the following:

- **Public Health and Safety**
 - Individuals who may be potentially affected by prairie dog management actions would be notified of such activities.
 - Temporary signage would be in place to notify the public in the event of control via rodenticide. All label directions with respect to the application of rodenticide would be followed accordingly by all NPS staff involved in application.
- **Cultural Resources**
 - National Park Service would verify the locations of known archaeological and cultural resources in the area of specific project locations.
 - If prairie dog control measures include fencing, proposed fencing areas may need to be first surveyed for paleontological and archaeological resources and then may require monitoring during fence installation.
 - Prairie dog management activities would be performed using non-sensitive travel routes to access the sites.
 - Park staff would be educated with regard to the sensitivity of cultural resources and the importance of such materials preservation.
- **Natural Resources**
 - Prairie dog control measures would be evaluated to select the control that would be effective for the specific control situation that has the least adverse impact to the park's prairie dog population as a whole among available control tools.
 - Prairie dog control measures would be evaluated to select the control that has the least adverse impact to species that depend on prairie dogs or the habitat they create and other non-target species among all available control tools.
 - NPS would use appropriate Integrated Pest Management procedures to evaluate appropriate courses of action in the event that control measures are employed.

Chapter 3 – Affected Environment and Environmental Consequences

3.1 Introduction

This chapter describes the affected environment, the impacts assessment methodology, and the environmental consequences of the alternatives for the Badlands National Park, North Unit Prairie Dog Management Plan. The chapter is organized in accordance with the impact topics identified in Chapter 1.

3.2 Methodology

For each impact, a synopsis of the affected environment is presented, followed by an evaluation of the effects that would likely result from implementing each of the three alternatives. Environmental consequences, including direct, indirect and cumulative effects are characterized by their context, intensity, duration, and whether the impact would be beneficial or adverse.

Context of Impact

The context of an impact is defined by the geographic extent of the setting in which the impact would take place, and in general varies from site-specific or local, to zone wide or park wide, to regional. Localized impacts are those that affect the resource only on the project site, or impacts that may affect resources that have an association with individual prairie dog colonies or their intermediate surroundings, and would not extend across all North Unit lands or to the larger region.

Intensity of Impact

Intensity is the degree to which a resource would be beneficially or adversely affected by an action. Impact intensities are characterized as negligible, minor, moderate, or major. Specific criteria are used to characterize the intensity of potential effects for each impact topic analyzed.

Duration of Impact

Duration is the time that a resource may be potentially affected by an action. Depending on the resource, impacts may last only as long as a particular management tool may be employed, or a single year, or longer. Impact duration is defined as short-term or long-term, and specific criteria that are used to rate the duration of potential effects is presented within the analysis section of each impact topic.

3.3 Direct, Indirect, and Cumulative Effects

For each impact topic, environmental effects are discussed in three subsections: direct and indirect effects, cumulative effects, and a conclusion. Direct effects are those caused by the specific actions that the National Park Service would undertake in implementing each alternative. Direct impacts would occur at the same time and place as the activity. Indirect effects are those that would be caused by implementing the alternative, but would occur at a later time or at some distance removed.

The Council on Environmental Quality (1978) regulations for implementing the National Environmental Policy Act requires an assessment of cumulative effects in the decision-making process for federal projects. Cumulative effects are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (CEQ, 1987). The description of cumulative effects includes a brief description of other plans or projects, and the degree to which implementation of each alternative may impact the resource topic being discussed. These projects and plans were identified in this document under "Related Projects, Plans, and Policies" in Chapter 1.

3.4 Impairment of Park Resources

NPS Management Policies 2006 (NPS, 2006e) provides guidance on addressing impairment of park resources. Impairment is an impact that, "in the professional judgment of the responsible National Park Service manager, would harm the integrity of park resources or values, including the opportunities that would otherwise be present for the enjoyment of those resources or values. Whether an impact meets this definition depends on the particular resources that would be affected, the severity, duration, and timing of the impact, the direct and indirect effects of the impact, and the cumulative effects of the impact in question and other impacts" (NPS, 2006e).

An impact may be more likely to result in impairment of park values if it affects a park resource whose conservation is necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park; key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or identified as a goal in the "North Unit General Management Plan 2007" or other relevant National Park Service planning documents. An impact would be less likely to result in impairment if it is an unavoidable result that cannot reasonably be mitigated or if it is necessary to preserve or restore the integrity of vital park resources (NPS, 2006e).

3.5 Wildlife Resources

3.5.1 Affected Environment

The mixed-grass prairie ecosystem and badlands topography characteristic of the North Unit supports a variety of wildlife species, including small mammals, ungulates, birds, reptiles, amphibians, and invertebrates. Some 56 mammalian species, 112 bird species, and 17 species of reptiles and amphibians are known to exist within the North Unit. Additionally, several fish species may exist in drainages such as Sage Creek and in stock ponds that are present throughout the North Unit. Numerous arthropod and insect species exist throughout the North Unit (NPS, 2007).

Black-Tailed Prairie Dog

As described previously, the black-tailed prairie dog is considered a keystone species of the mixed-grass prairie ecosystem. A keystone species is one whose ecological impacts are disproportionate to its abundance (Kotliar et al., 1999; Miller et al., 2000). Prairie dog activities substantially alter the prairie ecosystem that they inhabit. These impacts may be positive or negative depending on the species at question, but overall prairie dogs create a landscape pattern that promotes biodiversity on the mixed-grass prairie (Miller et al., 2000). The species maintains a close relationship with numerous other wildlife species in the mixed-grass prairie ecosystem. At least 9 species depend directly on prairie dog activities for their survival, and 137 others are associated at least opportunistically with prairie dogs (NPS, 2006a). Ungulates graze on the highly nutritious forage that prairie dogs continually clip, while many species of small mammals, reptiles, and burrowing mammals depend on prairie dog burrows for shelter. Prairie dogs are a direct food source for species such as ferruginous hawk and black-footed ferret, which is one of the rarest animals in the world and depends almost entirely on prairie dogs for their survival (NPS, 2006a).

Today, black-tailed prairie dogs inhabit approximately 1 to 2% of their original home range in North America. In its 12-month finding for a petition to list the black-tailed prairie dog as threatened, the U.S. Fish and Wildlife Service reported historical acreage estimates in South Dakota ranging from 33,000 acres to 1,750,000 acres (USFWS, 2000). An aerial survey conducted by the South Dakota Department of Fish, Game, and Parks and the U.S. Forest Service in 2002 and 2003 documented a total of 412,222 acres of prairie dog within South Dakota (SDGFP, 2004).

The primary causes of decline of the species in South Dakota are conversion of mixed-grass prairie ecosystem to farm and ranchland, poisoning, and the spread of sylvatic plague in a national context (USFWS, 2000). In 2004, sylvatic plague was discovered in an individual prairie dog in Custer County, western South Dakota; additional cases have been reported since 2005 on the Pine Ridge Reservation in Shannon County, South Dakota (SDAIB, 2004; USFWS, 2005). The vulnerability of the species to further decline depends upon many factors such as number, size, and spatial distribution of prairie dog colonies; barriers to colonization and expansion; and the nature of direct threats to prairie dog well-being (NPS, 2007).

The historic extent of black-tailed prairie dogs in Badlands National Park is not fully understood. From historic documentation, it is estimated that prairie dogs occupied 2,070 acres distributed among 55 individual towns in 1979. Current mapping activities from 2006 indicate that within the North Unit, prairie dogs occupy 6,363 acres distributed among 93 individual towns. These

towns are spread throughout the park with the majority of towns located within the Badlands Wilderness Area. Habitat suitability analysis conducted by Park Service personnel indicates that prairie dogs occupy approximately 11% of available suitable habitat in the North Unit.

Other Small Mammals

Other small mammalian species present in the North Unit include the least chipmunk (*Eutamias minimus*), eastern cottontail rabbit (*Sylvilagus floridus*), desert cottontail (*Sylvilagus audubonii*), and deer mouse (*Peromyscus maniculatus*). This list is of the most common species, but several other species are also present at varying times of the year.

Ungulates

Pronghorn (*Antilocapra americana*), mule deer (*Odocoileus hemionus*), and white-tailed deer (*Odocoileus virginianus*) are all ungulates that are present in the North Unit. White-tailed deer are generally restricted to riparian habitats and are not frequently seen in the park. Pronghorn and mule deer are more common throughout the North Unit and are frequently seen. Additionally, rocky mountain bighorn sheep (*Ovis canadensis canadensis*) were restored to the park in 1964 to fill the ecological niche previously occupied by the now extinct Audubon's bighorn sheep (*Ovis canadensis auduboni*). Currently, there are between 58 and 74 rocky mountain bighorn sheep in the park, which are found primarily in the Pinnacles and Cedar Pass areas of the North Unit. The long-term future of this species within the North Unit is uncertain due to a suspected epizootic disease that decimated the population between 1994 and 1996. Furthermore, this led to a distortion of the sex ratios in the Pinnacles subpopulation, which may lead to extirpation. However, in 2004 the population was supplanted with 23 ewes and lambs from New Mexico (NPS, 2007).

Bison (*Bison bison*) were restored to the park in 1963, with additional animals released in 1983. The herd has access to approximately 40,000 acres of North Unit land, primarily in the Sage Creek and Tyree Basins. Bison management requires that areas of the park that border private lands are fenced to prevent individual animals from wandering onto private or public grazing lands.

The bison management plan of the North Unit is being implemented to maintain the genetics and demographics of the herd. The North Unit's bison herd is currently managed for a target winter population of 500-600 head, while the carrying capacity for forage is approximately 1,500 head. The herd increases annually to approximately 900 head through reproduction and recruitment; with fall roundup and culling operations the target population of approximately 500-600 head is achieved.

The relationship between prairie dog and ungulate grazers such as bison is a complex issue, dependent on many factors such as environmental conditions, the scale of the prairie dog towns, and the age of the towns (Vermeire et al., 2004). Prairie dogs clip the grasses adjacent to their burrow sites to aid in predator detection. As a consequence, prairie dog colony sites contain much less lower-quality, mature, standing grasses and a greater abundance of forbs, half-shrubs, and annual grasses, which are typically higher in crude protein (Vermeire et al., 2004). Detling and Whicker (1987) and Coppock et al (1983) concluded that bison preferentially graze on the clipped grasses near prairie dog colonies.

Coppock et al (1983) concluded that the primary attraction of bison to prairie dog sites was the improved nutritional content of the clipped grasses in comparison to the grasses that are not

continually regenerated by prairie dog activities. However, as Vermeire et al (2004) points out, creation of unique patch environments is not a phenomenon that is exclusive to prairie dogs; in the absence of prairie dogs, ungulate grazers are likely to use selectively grazed patches that they have created themselves.

It has also been suggested that the improved nutritional content of the grasses clipped by prairie dogs may effectively nullify the reduction in quantity of forage resources as a result of competition, thus having little impact on the carrying capacity of large herbivores (see Vermeire et al., 2004 for a review of this literature). Bison are ruminant animals, meaning that after they initially eat grasses they regurgitate a semi-digested material called cud, which they chew again. This process aids in the digestion of tough plant material such as grass. Thus, the improved forage quality of grasses that are clipped by prairie dogs may aid somewhat in the digestive processes for bison. However, adult bison may require approximately 30 pounds of forage per day. Therefore, minimal increases in forage quality are not likely to entirely compensate for decreases in overall quantities of available forage resources (Vermeire et al., 2004).

Interactions between prairie dogs and large grazers such as bison are scale and time dependent. Small, young prairie dog colonies in a large geographic area are not likely to significantly affect the carrying capacity of large grazers (Vermeire et al., 2004). However, as prairie dog colonies age and expand on the landscape, carrying capacity is reduced due to increased forage utilization (Vermeire et al., 2004). This is particularly evident during periods of drought and within areas such as the North Unit, where herd movements and available forage resources are restricted by fencing. Because of the complex interaction between prairie dogs and ungulate grazers in the mixed-grass prairie ecosystem, researchers have suggested that prairie dog control is necessary to maintain the carrying capacity of ungulate grazers (Vermeire et al., 2004). Furthermore, because of the associative relationship between prairie dogs and bison, Krueger (1986) concluded that management decisions should be made with the understanding that actions affecting one population will also likely have an effect on the other.

Carnivores

Twelve species of carnivores are present in the North Unit, including coyote (*Canis latrans*), bobcat (*Felis rufus*), red fox (*Vulpes vulpes*), and American badger (*Taxidea taxus*). Coyote and bobcat are the only carnivore species that are common in the North Unit. The black-footed ferret and swift fox are addressed in the section concerning endangered and threatened species.

Amphibians and Reptiles

Common amphibians found within Badlands National Park include the Plains spadefoot toad (*Scaphiopus bombifrons*), Great Plains toad (*Cognatus bufonidae*), and the chorus frog (*Pseudacris triseriata*). Common reptiles found within the park include the red-sided garter snake (*Thamnophis sirtalis*), Western Plains garter (*Thamnophis radix*), western hognose snake (*Heterodon nasicus*), bullsnake (*Pituophis melanoleuc*), and prairie rattlesnake (*Crotalus viridis*) (NPS, 2004b).

Birds

Badlands National Park provides habitat for approximately 68 observed bird species including raptors, waterfowl, songbirds, shorebirds, herons, cranes, and woodpeckers. Most bird species observed within the park are summer residents or migratory species (NPS, 2007). Common

bird species found in the park include northern harrier (*Circus cyaneus*), red-tailed hawk (*Buteo jamaicensis*), prairie falcon (*Falco mexicanus*), sharp-tailed grouse (*Tympanuchus phasianellus*), killdeer (*Charadrius vociferus*), mourning dove (*Zenaida macroura*), red-headed woodpecker (*Melanerpes erythrocephalus*), yellow-shafted flicker (*Colaptes auratus*), eastern kingbird (*Tyrannus tyrannus*), Bell's vireo (*Vireo bellii*), warbling vireo (*Vireo gilvus*), black-billed magpie (*Pica pica*), American crow (*Corvus brachyrhynchos*), bank swallow (*Riparia riparia*), cliff swallow (*Hirundo pyrrhonota*), barn swallow (*Hirundo rustica*), mountain bluebird (*Sialia currucoides*), American robin (*Turdus migratorius*), field sparrow (*Spizella pusilla*), dickcissel (*Spiza americana*), and red-winged blackbird (*Agelaius phoeniceus*) (NPS, 2004b). Other birds of special interest that are summer or winter park residents include the long-eared owl (*Asio otus*), barn owl (*Tyto alba*), burrowing owl (*Speotyto cunicularia*), great horned owl, (*Bubo virginianus*), ferruginous hawk (*Buteo regalis*), Swainson's hawk (*Buteo swainsoni*), and wild turkey (*Meleagris gallopavo*) (NPS, 2007).

Burrowing owl (*Speotyto cunicularia*) are small owls that usually reside in treeless areas with short vegetation, primarily in association with prairie dogs. Burrowing owls have been found to nest on prairie dog colonies, both active and inactive, as long as the burrow system is intact (USFS, 2006). Because of their dependence on active prairie dog burrow colonies for breeding habitat, long-term persistence of well-connected, large, active prairie dog towns is important for the future of the burrowing owl (USFS, 2006). From 1994-1996, the burrowing owl was designated by the USFWS as a Category 2 species for consideration to be listed as a threatened or endangered species. In 1996, the Category 2 designation was discontinued. The species is currently listed by the USFWS as a National Bird of Conservation Concern. The burrowing owl is not listed as endangered or threatened by the state of South Dakota (Klute et al., 2003).

Insects

A variety of insect species are present within Badlands National Park. Common butterfly species include the eastern tiger swallowtail (*Pterourus glaucus*), checkered white (*Pontia protodice*), cabbage white (*Pieris rapae*), clouded sulphur (*Colias philodice*), striped hairstreak (*Satyrium liparops*), Melissa blue (*Lycaeides melissa*), regal fritillary (*Speyeria idalia*), Atlantis fritillary (*Speyeria atlantis*), variegated fritillary (*Euptoieta claudia*), pearl crescent (*Phyciodes tharos tharos*), Wiedemer's admiral (*Basilarchia weidemeyerii*), viceroy (*Basilarchia archippus*), mourning cloak (*Nymphalis antiopa*), red admiral (*Vanessa atalanta*), painted lady (*Vanessa cardui*), hackberry emperor (*Asterocampa celtis*), common wood nymph (*Cercyonis pegala*), common check skipper (*Pyrgus communis*), and the Delaware skipper (*Anatrytone logan*). Several species of grasshoppers and crickets (*Orthoptera*) along with elm leaf beetles (*Pyrrhalta luteola*) and elm bark beetles (*Scolytus multistriatus*) are also common within Badlands National Park (NPS, 2004b).

3.5.2 Methodology

This impact analysis focuses on wildlife and the associated habitat that are considered most likely to be affected by prairie dog management activities under each alternative. The impact analysis examines the potential change to wildlife, habitat, and use of the project area that may occur as a result of prairie dog management activities.

The intensity thresholds for an impact on wildlife are defined as follows:

Negligible: Wildlife and their habitats would not be affected, or the effects would be at or below the level of detection. Impacts would not be measurable or of perceptible consequence to wildlife populations.

Minor: Effects to wildlife and their associated habitat would be measurable but localized within a small area or in the vicinity of a particular prairie dog town. While the mortality of individual species may potentially occur, the viability of the wildlife populations would not be compromised and the community would recover if left alone. Impacts to wildlife populations, their habitat, and to natural processes sustaining them would be short-term and within the range of natural variability.

Moderate: Effects to wildlife and their associated habitats would occur over a substantial portion of the park. Effects to wildlife would be long-term and readily perceptible in terms of abundance, distribution, quantity, or quality of the wildlife population. Sufficient habitat would remain functional to maintain variability of wildlife species. Mitigation efforts would be necessary to offset adverse effects and would likely be successful.

Major: Effects to wildlife would be readily apparent, would be long-term, and would substantially change wildlife populations over a large area both within and outside of the park. Loss of habitat may affect the viability of some native species. Extensive mitigation measures would be required to offset adverse impacts and the success of such mitigation could not be assured.

The duration thresholds for impacts to wildlife are defined as follows:

Short-term: Recovery takes less than one year.

Long-term: Recovery takes longer than one year.

3.5.3 Effects of Alternative A – No Action Alternative

Direct and Indirect Effects

Under Alternative A, impacts to prairie dogs would likely be long-term, moderate, and beneficial. Prairie dog colonies would likely expand if current drought conditions persist. If annual precipitation increases, it is expected that prairie dog populations in the North Unit would stabilize. Under Alternative A, if conditions remain stable, the black-tailed prairie dog would continue to fill its ecological role as a keystone species of the mixed-grass prairie ecosystem characteristic of the North Unit. Prairie dogs would continue to provide habitat for burrowing animals and would continue to be a food source for predators. Impacts to species that directly depend on prairie dogs are likely to be long-term, minor to moderate, and beneficial. However, if prairie dog populations decline or the species is greatly impacted in the event of an outbreak of sylvatic plague, park management officials would have limited tools at their disposal to curb the impacts of such an event. Because of the vital role prairie dogs fill within the mixed-grass prairie ecosystem, such a decline in the species population would likely have long-term, moderate to major, adverse impacts to wildlife resources in the North Unit that are associated with prairie dogs for food and habitat.

If drought conditions persist and prairie dog colonies continue to expand, prairie dogs would continue to compete with ungulates for available forage resources, particularly the bison herd. During initial phases of drought, prairie dog colonies expand to a larger area on the landscape,

with a corresponding decrease in density per acre. Over time, densities increase and new areas are colonized. As drought conditions continue, the town continues to increase in size, possibly leading to increased populations within the town.

Because habitat suitable for bison is essentially the same habitat that is suitable for prairie dogs, expansion of prairie dogs in the bison management areas of the park may lead to a decrease in the amount of forage available for the bison herd. Because the bison herd's movements are restricted by fencing, the forage available to the herd is also restricted to the area that they can migrate. Although prairie dog expansion may reduce the available forage for ungulates such as bison, thereby possibly reducing the carrying capacity of the bison range (Vermeire et al., 2004), studies have shown that the clipped grasses around prairie dog towns have a higher nutritional content than grasses not grazed by prairie dogs (NPS, 2006a). However, if prairie dogs do expand rapidly in the bison management areas, park personnel would have limited tools to effectively manage competition for forage resources. Impacts to bison and other grazing ungulates are likely to be long-term, minor to moderate, and adverse under the No Action Alternative.

Cumulative Effects

Additional projects and plans in the North Unit that may have a cumulative effect on wildlife resources include the General Management Plan, Weed Management Plan, Fire Management Plan, and Bison Management Plan, the latter of which is currently under development. Cumulative effects on wildlife and their habitat from the General Management Plan would include increased habitat fragmentation and wildlife displacement, which would result in long-term, minor, and adverse effects. Increased education and interpretive improvements may lead to long-term, minor, and beneficial improvements. Actions taken under the Weed Management Plan would have potentially short-term, minor, and adverse impacts, due to intrusion of aircraft into wildlife habitat and non-target species exposure to herbicide. However, potentially long-term, major, and beneficial impacts are also likely by shifting the overall vegetation species composition of the current habitat to native species. Actions taken under the Fire Management Plan are likely to have long-term, major, and beneficial impacts on wildlife resources because of the fire dependent nature of the park's vegetation communities. Effects of the Bison Management Plan are also likely to have beneficial impacts on wildlife resources by ensuring that the species remains a viable component of the ecosystem while managing for the competition of forage resources. Regionally, other prairie dog management plans (such as the South Dakota state plan and the Nebraska National Forest plan) would likely have negligible impacts to wildlife species in the North Unit. As a result, implementing the No Action Alternative would have a long-term, minor to moderate, and beneficial cumulative impact to prairie dogs and species that depend on the habitat they provide. Cumulative effects as a result of implementing Alternative A would have long-term, minor to moderate, adverse impacts to ungulate grazers if competition for forage resources and persistent drought conditions lead to a substantial decrease in available forage.

Conclusion

Implementation of Alternative A would likely have long-term, minor to moderate, beneficial effects on prairie dogs and other wildlife species that are associated with or dependent upon habitat prairie dogs create. If prairie dog populations within the park declined dramatically, the black-tailed prairie dog would not maintain its keystone species role within the park. This would result in a long-term, moderate to major, adverse effect for wildlife species that are dependent upon them or their habitat. There would be long-term, minor to moderate, adverse effects as a

result of competition with ungulate grazers for forage resources. Alternative A would not result in the impairment of wildlife resources.

3.5.4 Effects of Alternative B – Management Zones (NPS Preferred)

Direct and Indirect Effects

Impacts to wildlife resources under Alternative B would be dependent on the management activities employed within specific zones. In the Buffer Zone, impacts to prairie dogs and wildlife resources that are associated with prairie dogs are likely to be long-term, minor to moderate, and adverse if a prairie dog colony encroaches onto adjacent private land, the landowner issues a complaint, and the colony is controlled. If a specific prairie dog colony within the Buffer Zone were removed, any species that directly depends on the controlled town would likely be adversely impacted as well. However, the degree of the impacts throughout the entirety of the zone would largely be dependent upon how many towns receive complaints and are subsequently controlled. Because the prairie dog population that currently exists within the Buffer Zone is a small portion of the North Unit's overall prairie dog population and because the suitable habitat within the Buffer Zone is also a small percentage of the overall suitable habitat in the North Unit, any control efforts employed in the Buffer Zone would likely not have a long-term, adverse impact to wildlife resources across the entirety of the North Unit.

Impacts to prairie dogs in the other three zones under Alternative B are likely to be long-term, minor to moderate, and beneficial. In the Free-Range Zone, prairie dogs would be allowed to fluctuate naturally in densities and acreages, which would result in long-term, moderate, beneficial impacts to prairie dogs. Because natural processes would continue largely uninterrupted, wildlife species that depend directly on prairie dog colonies within the Free-Range Zone would also experience long-term, moderate, beneficial impacts.

In the Control Zone, prairie dogs would be managed to inhabit 7 to 15% of available suitable habitat. As they currently inhabit 7% of suitable habitat within the Control Zone, there would be ample room for prairie dogs to fluctuate naturally before control would be initiated. This would likely result in a long-term, minor to moderate, beneficial impact to prairie dogs. Because natural processes would continue largely uninterrupted, wildlife species that depend directly on prairie dog colonies within the Control Zone would also experience long-term, moderate, beneficial impacts.

In the Bison Management Zone, prairie dogs would be allowed to fluctuate naturally to the point that the acreage of prairie dogs plus the acreage utilized by the bison herd exceeds roughly one-half, or 50 to 60% of available suitable habitat. Depending on the size of the bison herd, prairie dogs could potentially expand to approximately 4,800 acres. Currently, prairie dogs inhabit approximately 2,700 acres in the Bison Management Zone. Therefore, prairie dogs could potentially expand in the Bison Management Zone, which would result in a long-term, minor to moderate, beneficial impact to prairie dogs and associated wildlife resources. In the event that the habitat allocation threshold is exceeded, prairie dog control would take place on those colonies that have shown the largest and most recent expansions. Any such control would have long-term, moderate, adverse impacts on the colonies that are removed as well as any wildlife resources that utilize the specific town for food or shelter. However, the adoption of suitable habitat allocation thresholds within the Bison Management Zone would have long-term, minor to moderate, beneficial impacts for ungulate grazers by managing for the competition of forage resources between these grazers and prairie dogs.

All available means of control would be made available under Alternative B. The impacts of non-lethal controls, such as visual barriers, trapping, and relocation would be negligible to non-target species and would provide some benefit to specific prairie dog colonies by allowing them to live in a confined area but not exterminating them to prevent their expansion.

The use of rodenticide (zinc phosphide) as a prairie dog control measure has the potential to impact non-target species that may consume the bait or poisoned prairie dogs. The Animal and Plant Health Inspection Service found that zinc phosphide is highly toxic to most mammals and some birds directly. Thus, if non-target species directly consume spilled bait, they are at risk for illness or death. However, secondary risks from zinc phosphide are minimal, because the rodenticide does not bioaccumulate in the environment or within the muscle tissue of treated animals (APHIS, 2003; NPS, 2006a). Deaths to predatory species that may consume treated prairie dog carcasses that have not been removed may be possible if the animal consumes undigested bait in the cheeks or gastro-intestinal tracts. However, many predatory animals will not consume the gastro-intestinal tract and exhibit emetic (vomiting) responses to the consumption of zinc phosphide (APHIS, 2003). Because Alternative B allows for the use of rodenticide (zinc phosphide) as a control measure, non-target species have the potential to be adversely affected. However, the use of zinc phosphide as a control measure would likely be infrequent, and impacts may be mitigated by following specific label directions. Impacts to non-target species from zinc phosphide consumption are likely to be short-term, negligible to minor, and adverse.

Cumulative Effects

Other projects and plans that may have a cumulative effect on wildlife resources were discussed under Alternative A. The cumulative effects of Alternative B on wildlife would be long-term, minor to moderate, and beneficial. The majority of the prairie dog population would be largely unaffected by Alternative B. However, at the start of implementing Alternative B, there could be short to long-term, minor to moderate, adverse effects on the prairie dogs living in specific towns that may be controlled as well as the species that depend on them for food or shelter. In the long-term, if the prairie dogs continue to expand, there would be control measures in place to prevent or minimize impacts to bison as a result of forage resource competition. The rodenticide used in prairie dog control could have a short-term, negligible to minor, adverse effect on non-target species.

Conclusion

Implementation of Alternative B would likely have long-term, minor to moderate, beneficial impacts for prairie dogs and other wildlife species that are associated with or dependent on the habitat prairie dogs create. If prairie dog populations within the park declined dramatically due to epizootic disease or other cause beyond the National Park Service's control, park personnel would have protocols in place to ensure that the black-tailed prairie dog would maintain its keystone species role within the park. This would result in a long-term, moderate, and beneficial impact for wildlife species that are dependent upon them or their habitat. Additionally, habitat allocations in the Bison Management Zone would reduce pressures for forage resources in the event that the prairie dog population radically expands. This would lead to a long-term, minor, beneficial impact for ungulates. Adverse impacts to non-target species from rodenticide application would likely be negligible to minor. Alternative B would not result in the impairment of wildlife resources.

3.5.5 Effects of Alternative C – Exclusion Zone

Direct and Indirect Effects

Under Alternative C, there would be two prescribed prairie dog management areas: a Prairie Dog Exclusion Zone, which includes areas one-quarter ($\frac{1}{4}$) mile interior to the park adjacent to private lands. The other zone would include all other park lands, where prairie dogs would be allowed to fluctuate naturally. The Exclusion Zone represents approximately 9% of the North Unit, while the area allocated to natural fluctuation represents the remaining 91% of the North Unit.

Control in the Exclusion Zone would be managed to maintain the area free of prairie dogs. This would likely result in a long-term, moderate to major, adverse impact on prairie dogs and wildlife species that directly depend on prairie dogs in the Exclusion Zone. However, as prairie dogs would be free to fluctuate throughout much of their suitable habitat in the North Unit, impacts to prairie dogs in the remaining areas of the North Unit are likely to be long-term, minor to moderate, and beneficial. Because the area where prairie dogs will be allowed to fluctuate naturally represents the majority of the North Unit with respect to total land, suitable habitat, and existing prairie dog colonies, the overall impact of Alternative C to prairie dogs and wildlife species that depend on prairie dog colonies would likely be long-term, minor to moderate, and beneficial.

Under Alternative C, impacts to ungulate grazers in the bison range are likely to be long-term, minor to moderate, and adverse, if drought conditions persist and prairie dogs expand in these areas. Under Alternative C, NPS resource management officials would have few tools at their disposal to address issues of forage resource competition between prairie dogs and ungulate grazers in the bison range.

All available controls would be used and the impacts of their use would be the same as under Alternative B.

Cumulative Effects

Other projects and plans that may have a cumulative effect on wildlife resources were discussed under Alternative A. The overall cumulative effects of Alternative C on wildlife resources would be variable. Prairie dogs would experience long-term, minor to moderate, beneficial impacts from the large area where they would be allowed to fluctuate naturally as would all the species directly dependent on them. The impacts to local prairie dog towns in the Exclusion Zone and the wildlife species that depend on the specific towns would be adverse, but the impact on the parkwide populations would be negligible to minor. Cumulative impacts to ungulate species that compete with prairie dogs for forage resources would be long-term, minor to moderate, and adverse. Rodenticide utilized as a management tool could also have a short-term, negligible to minor, adverse effect on non-target species.

Conclusion

Implementation of Alternative C would likely have long-term, minor to moderate, beneficial impacts on prairie dog populations as a whole and other wildlife species that are associated with or dependent upon habitat prairie dogs create. If prairie dog populations within the park declined dramatically due to epizootic disease or other cause beyond the National Park

Service's control, park personnel would have protocols in place to ensure that the black-tailed prairie dog would maintain its keystone species role within the park. This would result in a long-term, minor to moderate, beneficial effect for wildlife species that are dependent upon them or their habitat. Alternative C would not result in the impairment of wildlife resources.

3.6 Endangered and Threatened Species

3.6.1 Affected Environment

Several state-listed and federally listed species have been identified within Badlands National Park and use the park for at least part of their lifecycle. A complete list of special status species in South Dakota can be viewed in Table 3.1. The U.S. Fish and Wildlife Service has determined that the black-footed ferret, bald eagle, whooping crane, and least tern can be found in the two counties that encompass the North Unit. However, no least tern habitat is found in the park. The other bird species are either transitory migrants or found in limited numbers in Badlands. Therefore, they are not discussed further.

The state of South Dakota also lists the peregrine falcon and Eskimo curlew as threatened or endangered species. Most of these species occupy the park in limited numbers or would not be affected by this plan. Therefore, they are not discussed further.

Black-Footed Ferrets are listed both federally and by the state of South Dakota as an endangered species. It is one of the most endangered mammals in North America. In 1987, only 18 individuals were known to exist in a wild population in Meeteetse, WY. They were all captured, and following a highly successful breeding and reintroduction program, they are starting to show signs of recovery. In 1998, more ferrets existed in the wild than in captivity for the first time since the captive breeding program started in 1987, which has produced approximately 2,600 ferrets as of 1998 (Black-Footed Ferret Recovery Program, No date). Surveys conducted in 2004/2005 indicated a minimum ferret population of 204 in the Conata Basin, located on the Buffalo Gap National Grassland just south of the North Unit (USFS, 2007b).

Black-footed ferrets are the only ferret species native to North America and have a particularly dependent relationship with prairie dogs. Black-footed ferrets prey almost exclusively on prairie dogs, which accounts for almost 90% of the ferrets' diet (Biggins and Godbey, No date). Prairie dog burrow sites also provide shelter for black-footed ferrets (Biggins and Godbey, No date). Ferrets seem to have a preference for larger prairie dog towns. Although smaller towns may be used for dispersal, large complexes of prairie dog towns are considered more appropriate for black-footed ferret usage (Biggins and Godbey, No date).

Historically, the black-footed ferret was present in South Dakota, but it is not believed to have been abundant. However, it is difficult to determine their population size because of their nocturnal nature and underground dwellings. The precipitous decline of the species is attributed to three primary causes: habitat conversion of prairie to agriculture; lethal prairie dog control measures; and sylvatic plague, which also killed large numbers of prairie dogs. Canine distemper may have also affected the survival of the black-footed ferret. An additional factor may be the absence of bears and wolves in Badlands National Park. This has allowed the coyote population to grow and coyotes are the primary predator of black-footed ferrets.

**Table 3.1: Special Status Species of South Dakota
(SDGFP, 2007)**

Common Name	Scientific Name	Federal Status	State Status
Invertebrates			
American burying beetle	<i>Nicrophorus americanus</i>	LE	
Scaleshell	<i>Leptodea leptodon</i>	LE	
Higgins Eye	<i>Lampsilis higginsii</i>	LE	
Dakota skipper	<i>Hesperia dacotae</i>	C	
Fish			
Banded killifish	<i>Fundulus diaphanus</i>		SE
Blacknose shiner	<i>Notropis heterolepis</i>		SE
Finescale dace	<i>Phoxinus neogaeus</i>		SE
Longnose sucker	<i>Catostomus catostomus</i>		ST
Northern redbelly dace	<i>Phoxinus eos</i>		ST
Pallid sturgeon	<i>Scaphirhynchus albus</i>	LE	SE
Pearl dace	<i>Margariscus margarita</i>		ST
Sicklefin chub	<i>Macrhybopsis meeki</i>		SE
Sturgeon chub	<i>Macrhybopsis gelida</i>		ST
Topeka shiner	<i>Notropis topeka</i>	LE	
Reptiles and Amphibians			
Eastern hognose snake	<i>Heterodon platirhinos</i>		ST
False map turtle	<i>Graptemys pseudogeographica</i>		ST
Lined snake	<i>Tropidoclonion lineatum</i>		SE
Birds			
American dipper	<i>Cinclus mexicanus</i>		ST
Bald eagle	<i>Haliaeetus leucocephalus</i>		ST
Eskimo curlew	<i>Numenius borealis</i>	LE	SE
Interior least tern	<i>Sterna antillarum athalassos</i>	LE	SE
Osprey	<i>Pandion haliaetus</i>		ST
Peregrine falcon	<i>Falco peregrinus</i>		SE
Piping plover	<i>Charadrius melodus</i>	LT	ST
Whooping crane	<i>Grus americana</i>	LE	SE
Mammals:			
Black bear	<i>Ursus americanus</i>		ST
Black-footed ferret	<i>Mustela nigripes</i>	LE	SE
Gray wolf	<i>Canis lupus</i>	LE	
River otter	<i>Lontra canadensis</i>		ST
Swift fox	<i>Vulpes velox</i>		ST
Plants:			
Western prairie fringed orchid	<i>Platanthera praeclara</i>	LT	

KEY TO CODES:

LE = Federal Endangered
LT = Federal Threatened
C = Federal Candidate
SE = State Endangered
ST = State Threatened

Prior to the aforementioned reintroduction, the last recorded sightings of individual black-footed ferrets in South Dakota were 1979 and 1983. In 1994, Badlands National Park became part of a designated reintroduction site for the ferret. Between 1994 and 1999, 217 captive born ferrets were released into the park. Predators took several of the new arrivals but not more than would have been expected of wild populations. Although many released ferrets lost their lives prior to breeding, wild born individuals have been detected annually (NPS, 2007).

The reintroductions ended in 1999, but with healthy breeding the wild populations have continued to grow at least in the larger population. The 2003 population within Badlands National Park was estimated at 8-12 individuals including a young litter. In terms of ongoing management, the ferret population is designated as a non-essential experimental population under the Endangered Species Act. That designation allows resource managers more flexibility in managing the population. Individual ferrets are still afforded all the protections of other endangered animals, including protection from trapping, shooting, and harassment (NPS, 2007).

The *Swift Fox* is listed on the state of South Dakota's Threatened Species List; it is not federally listed. Although since European settlement the numbers have been in decline, the historic range of the swift fox is believed to encompass the park. The northern range of this species was affected most by fur trapping and hunting; predator and rodent control programs; habitat loss; droughts; severe winters; and disease. As early as 1900, the swift fox was already quite rare on the northern plains (USFWS, 2006b).

In 2003 park staff initiated a three-year swift fox reintroduction effort in the North Unit. To date at least 114 individuals have been released into Badlands National Park. Some have died, but the surviving animals in many cases mated and successfully reproduced. They are now spending a considerable amount of time utilizing Badlands and adjacent grasslands (NPS, 2007).

3.6.2 Methodology

This impact analysis focuses on the endangered and threatened species that are considered most likely to be affected by prairie dog management activities under each alternative. Impacts to federally listed species are based on U.S. Fish and Wildlife Service Endangered Species Act Section 7 guidance and impact criteria. Impacts to state listed species and other species of special concern follow the intensity thresholds for wildlife species.

Negligible: (No effect) Impacts which may be perceptible although not necessarily easily measurable because the impacts would be low, transitory and within the range of natural variability would lead to a conclusion that the listed species or designated critical habitat would not be affected.

Minor: (May affect / Not likely to adversely affect) Effects on listed species or critical habitat would be discountable (i.e., adverse effects are unlikely to occur or could not be meaningfully measured, detected, or evaluated) or completely beneficial.

Moderate: (May affect / Likely to adversely affect) Adverse effects to a listed species or critical habitat might occur as a direct or indirect result of the proposed action and the effect would either not be discountable or completely beneficial. Moderate effects to listed species would

result in a local population decline due to reduced survivorship, declines in population, and/or a shift in the distribution.

Major: (Likely to jeopardize the continued existence of a species / adversely modify critical habitat) Effects could jeopardize the continued existence of a listed species or adversely modify designated critical habitat within and/or outside the park boundaries. Major effects would involve a disruption of habitat and breeding grounds of a protected species such that direct casualty or mortality would result in removal of individuals of a listed species from the population.

The duration thresholds for impacts to endangered and threatened species are defined as follows:

Short-term: Recovery takes less than one year.

Long-term: Recovery takes longer than one year.

3.6.3 Effects of Alternative A – No Action Alternative

Direct and Indirect Effects

Impacts under Alternative A are likely to be long-term and beneficial for the black-footed ferret and swift fox populations within the park. As prairie dogs would fluctuate naturally throughout the majority of the North Unit, natural processes and habitat created by prairie dogs would also continue to function. If drought conditions persist in the region, prairie dogs are likely to expand and occupy greater areas of available suitable habitat. This would be beneficial to the black-footed ferret, which is dependent on prairie dogs for meeting most of its basic needs. Although the black-footed ferret population in the park is small, larger acreage prairie dog towns would be better able to support and sustain a larger black-footed ferret population. For the time being, the introduction of new black-footed ferrets into the population has ceased so maintaining the existing population is of high importance. As for the swift fox recovery, the prairie dogs help to create suitable swift fox habitats both on a local and parkwide scale. For example, swift foxes may enlarge prairie dog dens for their own use and prairie dogs contribute to a heterogeneous landscape of short or mixed-grass vegetation cover that is suitable for swift foxes. Bald eagles can be found sporadically scavenging around prairie dog towns and would also experience a minor benefit from an expanding prairie dog population.

Cumulative Effects

Additional projects and plans in the North Unit that may have a cumulative effect on endangered and threatened species include the General Management Plan, Weed Management Plan, and Fire Management Plan. Any efforts taken under the General Management Plan would be done so with consultation with officials from the U.S. Fish and Wildlife Service in order to mitigate any potential impacts to endangered and threatened species. Additionally, proposed boundary adjustments would add potential black-footed ferret and swift fox habitat which would result in long-term, beneficial effects. Actions taken under the Weed Management Plan have the potential for short-term, moderate (may affect/likely to adversely affect), adverse effects if collisions with avian species occur while an aircraft is in flight. However, potentially beneficial impacts are also likely due to the removal of thistle that may limit prairie dog expansion, which would provide greater habitat areas for black-footed ferret populations. Actions taken under the Fire Management Plan would likely have potentially beneficial impacts gained through improved

habitat from wildland fire use. Other regional plans, such as the National Black-Footed Ferret Recovery Plan, would have long-term, beneficial impacts to endangered and threatened species. The South Dakota State Black-Tailed Prairie Dog Conservation Plan may likely have a long-term, minor (may affect/not likely to adversely affect) impact to black-footed ferret populations due to the use of rodenticide on private lands adjacent to public land boundaries. The 2005 Nebraska National Forest Black-Tailed Prairie Dog Conservation and Management Plan would likely have long-term, beneficial impacts to black-footed ferret population due to possible expansion of the prairie dog complex that exists in the Conata Basin. However, the 2005 plan is under the process of amendment, in which a variety of alternatives for prairie dog management is being considered. Thus, it is difficult to speculate on the cumulative impacts that may result from this amendment. Implementation of Alternative A would likely contribute to the long-term, beneficial impacts to endangered and threatened species if overall prairie dog colony acreage were to expand.

Conclusion

Impacts of Alternative A on endangered and threatened species would likely be long-term, minor to moderate, and beneficial. Black-footed ferrets in particular would benefit greatly from any expansion of prairie dog populations. The swift fox would also benefit. However, they are less dependent on prairie dogs, so the beneficial effect would be less tangible. Alternative A would not result in the impairment of endangered and threatened species.

3.6.4 Effects of Alternative B – Management Zones (NPS Preferred)

Direct and Indirect Effects

In the Buffer Zone, the effects of controlling prairie dogs on endangered and threatened species would be long-term, moderate (may affect/likely to adversely affect) and adverse, in the event that a specific town that is used by endangered and threatened species is controlled. If a black-footed ferret were to live in a prairie dog town within the Buffer Zone, the effect on the ferret would be potentially major if the prairie dogs were removed and the ferrets were not detected and subsequently relocated prior to control. No black-footed ferrets would be intentionally placed in a town within the Buffer Zone; however, ferrets have been known to migrate between towns and to linger in treated prairie dog towns for several weeks following the treatment. Swift foxes and bald eagles are less likely to be adversely impacted by the loss of an individual town, as they have other options for food and shelter.

In the Free-Range Zone, the effects on endangered and threatened species would be long-term, minor to moderate, and beneficial. Prairie dogs would largely be allowed to fluctuate naturally in densities and acreages, which potentially provide greater areas of habitat for black-footed ferrets. Although the black-footed ferret population in the North Unit is small, larger acreage of prairie dog towns would be better able to support and sustain a local black-footed ferret population. For the time being the introduction of new black-footed ferrets into the North Unit has ceased so maintaining the existing population is therefore of high importance. As for the swift fox recovery, the prairie dogs have a beneficial effect on swift foxes, as they help to create suitable swift fox habitats both on a local and parkwide scale. Bald eagles can be found scavenging around prairie dog towns and would also benefit from a larger prairie dog population.

In the Control Zone, prairie dogs would be managed to inhabit 7 to 15% of the suitable habitat. Currently they occupy approximately 7%. Therefore, there is ample room for prairie dogs to expand in the Control Zone, providing larger areas of habitat for black-footed ferrets and swift foxes. Impacts on species in the Control Zone will likely be similar to those in the Free-Range Zone; long-term, minor to moderate, and beneficial.

In the Bison Management Zone, potential impacts to endangered and threatened species would be dependent on whether the habitat allocation thresholds of forage resources in the zone for prairie dogs and bison are exceeded. Currently, there is potential for prairie dogs to expand, but this will depend on the size of the bison herd and other factors. Any prairie dog control in the zone would likely have long-term, minor to moderate (may affect/not likely to adversely affect or may affect/likely to adversely affect), adverse impacts on endangered and threatened species that depend directly on towns that may be controlled. However, if prairie dogs expand without exceeding the habitat allocation thresholds, then impacts are likely to be long-term and beneficial.

All available means of control would be made available under Alternative B. The impacts of non-lethal controls, such as visual barriers, trapping, and translocation would be negligible to non-target species and would provide some benefit to specific prairie dog colonies by allowing them to live in a confined area but not exterminating them to prevent their expansion.

The use of rodenticide (zinc phosphide) as a prairie dog control measure has the potential to impact non-target species that may consume the bait or poisoned prairie dogs. The Animal and Plant Health Inspection Service found that zinc phosphide is highly toxic to most mammals and some birds directly. Thus, if non-target species directly consume spilled bait, they are at risk for illness or death. However, secondary risks from zinc phosphide are minimal, because the rodenticide does not bioaccumulate in the environment or within the muscle tissue of treated animals (APHIS, 2003; NPS, 2006a). Deaths to predatory species that may consume poisoned prairie dog carcasses that have not been removed may be possible if the animal consumes undigested bait in the cheeks or gastro-intestinal tracts. However, many predatory animals will not consume the gastro-intestinal tract and exhibit emetic (vomiting) responses to the consumption of zinc phosphide (APHIS, 2003). Because Alternative B allows for the use of rodenticide (zinc phosphide) as a control measure, non-target species have the potential to be adversely affected. However, the use of zinc phosphide as a control measure would likely be infrequent, and impacts may be mitigated by following specific label directions. Impacts to non-target species from zinc phosphide consumption are likely to be short-term, negligible to minor (may affect/not likely to adversely affect), and adverse.

Cumulative Effects

Additional projects and plans relating to endangered and threatened species, both locally and regionally, were discussed under Alternative A. The cumulative effects under Alternative B on endangered and threatened species would be long-term, minor to moderate, and both beneficial and adverse, dependent on the specific management zone. In the Buffer Zone, impacts to local occurrences of black-footed ferrets are likely to be adverse if specific towns that the species depended on were controlled. However, as prairie dogs would be allowed to fluctuate naturally in areas where the park shares a boundary with the Buffalo Gap National Grassland, adverse impacts to the black-footed ferret population as a whole would likely be negligible to minor (may affect/not likely to adversely affect). The degree of the effect is largely dependent on the size of the existing prairie dog towns and their ability to support the black-footed ferret. The black-footed ferret numbers within the park are currently low; however, they could increase and in that

case any controls on prairie dogs would have an adverse effect on the ferrets. The swift fox is unlikely to be notably affected by any of the management zones.

Conclusion

Alternative B would likely contribute long-term, minor to moderate, beneficial impacts to endangered and threatened species throughout the majority of the North Unit. Potential adverse impacts may be experienced in the Buffer Zone. However, due to the fact that this area is a low percentage of the entire North Unit and that the percentage of the park's prairie dog population that currently exists in the Buffer Zone is also low, impacts to endangered and threatened species are likely to be negligible to minor (may affect/not likely to adversely affect). Alternative B would not result in the impairment of endangered and threatened species.

3.6.5 Effects of Alternative C – Exclusion Zone

Direct and Indirect Effects

Under Alternative C, the effects on endangered and threatened species outside of the Exclusion Zone would be long-term, minor to moderate, and beneficial throughout the majority of the North Unit. Prairie dogs would largely be allowed to fluctuate naturally in densities and acreages, which would potentially provide greater areas of habitat for black-footed ferrets. Although the black-footed ferret population in the park is small, larger acreages of prairie dog towns would be able to support and sustain a larger black-footed ferret population. For the time being the introduction of new black-footed ferrets into the population has been stopped, so maintaining the existing population is therefore of high importance. Larger acreages of prairie dog habitat would be beneficial for the swift fox recovery, as prairie dogs help to create suitable swift fox habitats both on a local and parkwide scale. Impacts to local populations of special status species that exist within the Exclusion Zone would likely be long-term, moderate (may affect/likely to adversely affect), and adverse, due to the complete removal of prairie dogs from this zone.

Impacts to endangered and threatened species from the application of rodenticide would be similar to those described under Alternative B.

Cumulative Effects

Additional projects and plans relating to endangered and threatened species, both locally and regionally, were discussed under Alternative A. The cumulative effect under Alternative C on endangered and threatened species would be a long-term, minor to moderate, and beneficial throughout the majority of the North Unit. The black-footed ferret benefits from large prairie dog towns, so having a large area where prairie dogs are free to fluctuate naturally would be beneficial for their recovery. The swift fox is not as dependent on prairie dogs and therefore is unlikely to be notably effected by this alternative. Impacts in the Exclusion Zone (which is the same spatially as the Buffer Zone under Alternative B) would be more adverse to endangered and threatened species, as control in the Alternative C Exclusion Zone would be mandatory. However, the Exclusion Zone is a small part of overall park lands, overall suitable habitat, and contains a small percentage of the North Unit's overall prairie dog population. Thus, adverse impacts to endangered and threatened species throughout the North Unit are likely to be negligible (no effect) to minor (may affect / not likely to adversely affect).

Conclusion

Impacts of Alternative C on endangered and threatened species would likely be long-term, minor to moderate, and beneficial throughout the majority of the North Unit. Black-footed ferrets in particular would benefit greatly from any expansion of prairie dog populations. The swift fox would also benefit. However, they are less dependent on prairie dogs, so the beneficial effect would be less tangible. Alternative C would not result in the impairment of endangered and threatened species.

3.7 Vegetation

3.7.1 Affected Environment

Badlands National Park is located in a transitional zone between western arid short-grass prairie and eastern moist tall-grass prairie. In conjunction with the adjacent Buffalo Gap National Grassland, it is the largest federally protected contiguous stand of native mixed grass prairie and is part of one of the largest remaining mixed-grass prairie ecosystems in the conterminous 48 states (NPS, 2007).

Nine major vegetative communities (excluding sparsely vegetated areas) were identified in a 1999 vegetation assessment. The major communities include dry mixed-grass prairie; mesic mixed-grass prairie; introduced grasslands; riparian/wet meadows; dry plains shrublands; mesic plains shrublands; riparian shrublands; dry coniferous forest and woodlands; and riparian deciduous forests and woodlands (NPS, 2006b). There are no federally listed plant species in the North Unit. However, several plants are listed as rare by South Dakota. Three species endemic to the region are found primarily in sparsely vegetated badlands areas: Barr's milkvetch, Dakota buckwheat, and sidesaddle bladderpod.

Non-native plants are found throughout the North Unit in areas that have experienced human disturbance. 71 species of non-native plants have been identified in the park. Current management activities are primarily targeted at Canadian thistle and include mowing, fire, biological controls, and inter-seeding of native grasses (NPS, 2006c; NPS, 2007).

In 1962, all livestock grazing was discontinued in the park. Over the next two years, the grasslands made a dramatic recovery thanks in part to an abundance of rain. Another factor that has contributed to the grasslands recovery has been active management and removal of non-native species. The grassland composition is now similar to pre-European settlement (NPS, 2006d).

Historically, fire served a vital role in maintaining the prairie ecosystem. However, for much of the twentieth century, fire was suppressed. Beginning in the 1980's, prescribed burning regimes of about 5,000 acres annually were applied in the North Unit. This routine burning helps to control fuel loads and to maintain the density and variety of traditional prairie vegetation (NPS, 2007).

Grasses are dominant throughout the park, covering approximately 54,000 acres or 49% of the North Unit. 41 native grass species have been recorded in the park. The most important of the grasses are buffalo grass, blue grama, western wheat grass, and needle-and-thread grass. Grasses are well-adapted to the climate of the North Unit; they are able to withstand high winds, extended periods of low rainfall, and frequent fires. Grasses provide valuable resources to the

larger ecosystem. They provide food and habitat for wildlife; nutrients are added to the soil as the grasses decay; and they help to prevent soil erosion (NPS, 2007).

The most common vegetative community is the western wheatgrass-mixed-grass prairie. Dry mixed-grass prairies dominated by western wheatgrass, blue grama, needle-and-thread, threadleaf sedge, little bluestem, side-oats grama, and buffalograss are found throughout the North Unit. Mesic mixed-grass prairie, dominated by western wheatgrass and green needlegrass, is typically found in wetter spots on hills, slopes, and buttes (NPS, 2007).

The remainder of the vegetated park land is comprised of a variety of vegetative communities. Wet meadows are found along the bottoms of drainage channels but cover only about 1% of the park. Woodlands are also uncommon and are generally found in floodplains, drainage bottoms, the toes of sand hills, draws associated with eroding buttes, and slumps on butte and cliff faces. Shrublands cover only 3% of the park, yet they represent one of the most spatially widespread communities in the park. They are found on sand deposits, mesic slopes, and draws and along river and creek floodplains (NPS, 2007).

Roughly 46% of the Badlands is only sparsely vegetated or essentially barren. The Badlands formations are not hospitable to most vegetation. There is limited moisture, which mostly is not readily absorbed but rather rolls off the steep slopes of the formations. Additionally, surface temperatures can get quite high for sustained periods throughout the growing season (NPS, 2007).

Prairie dog towns are highly variable in terms of vegetative composition. Several factors impact the vegetation of a prairie dog town including age of the town, soil type, population density, and grazing intensity. Vegetation type tends to vary from the outer edges of the town inward. The outer edges typically are dominated by western wheatgrass, blue grama, and/or buffalograss. Further into the towns, the vegetation is patchy and varies both in patch size and species composition. Another feature of prairie dog town vegetation is the drastically reduced canopy height relative to the surrounding areas. Prairie dogs typically clip all the vegetation within the colony to 5-10 cm to aid in predator detection, while the neighboring uncolonized area retains a 20-50 cm canopy height (USGS, 2006). Clipping the vegetation to short heights aids the prairie dog in predator detection.

Prairie dogs play a vital role in determining the vegetative composition of prairie ecosystems. Early stages of prairie dog towns tend to have a mixed-grass or shortgrass prairie type. As the town ages and with sustained grazing, the composition may shift to a mix of annual species and dwarf-shrubs. These latter stages have not been classified but are referred to as a complex. Species richness is highest under moderate levels of grazing. This is because grass species have not yet begun to disappear, but forb species have begun to increase (USGS, 2006). Over time, prairie dog towns exhibit reduced litter, an increase in the proportion of total live vegetation relative to standing dead, and increased nitrogen concentrations in the vegetation relative to uncolonized areas (Coppock et al., 1983).

3.7.2 Methodology

This impact analysis focuses on vegetative communities that are considered most likely to be affected by prairie dog management activities under each alternative. The impact analysis examines the potential change to vegetative communities that may occur as a result of prairie dog management activities.

The intensity thresholds for an impact on vegetative communities are defined as follows:

Negligible: Individual native plants or small groups of plants may be affected as a result of the alternative, but measurable changes in plant community size, integrity, or continuity would not likely occur. Effects would be short-term and on a small scale specific to individual prairie dog colonies that may be controlled.

Minor: Effects to native plants would be localized within a small area adjacent to any controlled prairie dog colonies. The viability of the vegetative community would not be affected and the community would recover if left alone. Effects would be short-term and not outside of the expected natural range of variability.

Moderate: Some individual plant species would be affected as well as a sizeable segment of the species' population in the long-term over a large geographic area within the North Unit. This change would be readily measurable in terms of abundance, distribution, quantity, and/or quality of the vegetative community. Mitigation efforts may be necessary to offset and/or minimize adverse impacts and would likely be successful.

Major: Effects to vegetative communities would be considerable and long-term over a large geographic area inside and outside of the North Unit. These effects would be readily measurable in terms of abundance, distribution, quality, and/or quantity of the vegetative communities. Extensive mitigation measures would be required to offset and/or minimize adverse impacts, and the success of such measures would not be guaranteed.

The duration thresholds for impacts to vegetation are defined as follows:

Short-term: Recovery takes less than three years.

Long-term: Recovery takes longer than three years.

3.7.3 Effects of Alternative A – No Action Alternative

Direct and Indirect Effects

Continuing current management could have a range of impacts depending on the rainfall conditions within the park. Under most circumstances, the existing towns would be expected to expand into the surrounding areas. In an average rainfall year, the expansion would be 2% or less per year. However, in years of reduced rainfall or high stocking density, towns could be expected to expand by as much as 25% in a single year (USFWS, 2006a). The effects on the vegetation would likewise be variable in terms of the affected area. Vegetation in and around existing towns would be reduced in height. The species composition in the core areas of the towns would exhibit the greatest changes relative to the uncolonized areas. Overall, the prairie dog's role in the mixed-grass prairie ecosystem of the North Unit of Badlands National Park would benefit the prairie ecosystem by helping to maintain a diverse plant community. Additionally, prairie dogs would cause a long-term, beneficial impact parkwide, by increasing the heterogeneity of the landscape. Under Alternative A, the impacts to vegetation would be long-term, minor to moderate, and beneficial, as prairie dogs play a vital role in maintaining the diversity of plants and plant communities in the prairie ecosystem within the park.

Cumulative Effects

Additional projects and plans in the North Unit that may have a cumulative effect on vegetation include the General Management Plan, Weed Management Plan, and Fire Management Plan. Cumulative effects from actions taken under the General Management Plan are likely to be long-term, minor to moderate, and beneficial. Most native vegetation would be protected and would continue to sustain itself. Native vegetation would benefit from improved trails and campsites; improved information and interpretive programs; and possible boundary adjustments. Adverse impacts in terms of loss of native vegetation may result from certain proposed developments and increased visitor use. Actions from the Weed Management Plan may cause short-term, negligible, adverse impacts to individual plants through trampling and non-target exposure to herbicide. However, based on a comprehensive approach to reduce noxious weed species, the potential benefits are likely to be long-term and major. Actions taken under the Fire Management Plan would potentially have long-term, major, beneficial effects on vegetation through the use of wildland fire, which allows the fire regime to more closely mirror that of pre-European times. The cumulative effects of Alternative A on the vegetation would be variable depending on rainfall. In an average rainfall year or period of several years, the effect on the vegetation would be a long-term, minor, and beneficial. The prairie dogs under average rainfall conditions promote species diversity locally and landscape heterogeneity parkwide. In years of less than average rainfall or drought, the prairie dogs may expand to the degree that they are competing for forage with other species to a degree that results in overuse. Overgrazing would have a long-term, moderate, adverse effect on the vegetation.

Conclusion

Impacts to vegetation under Alternative A would be long-term, minor to moderate, and beneficial from vegetation changes in and near prairie dog colonies that would increase the diversity of vegetative communities in the park. Effects of prairie dog expansion leading to an increase in exotic plants near the colony site would have long-term, negligible, and adverse effects on vegetation. Potential overgrazing as a result of limited forage resources during years of low precipitation would likely have long-term, minor to moderate, adverse effects on vegetation. Alternative A would not result in the impairment of vegetation resources.

3.7.4 Effects of Alternative B – Management Zones (NPS Preferred)

Direct and Indirect Effects

In the Buffer Zone, the effects of controlling prairie dogs on vegetation would be long-term, minor to moderate, and adverse depending on yearly precipitation and the number of prairie dog colonies that receive landowner complaints and are subsequently controlled. If a large percentage of the Buffer Zone prairie dog colonies are controlled, plant species diversity would be less than if prairie dogs were present and would trend towards fewer forbs and an increase in tall grasses. In areas dominated by human activities, there is a trend towards invasive non-native species, such as the Canadian thistle, which would require ongoing, long-term management. However, the percentage of the overall North Unit prairie dog population that currently inhabits the Buffer Zone is small. Therefore, impacts to the vegetative community of the entire North Unit would likely be small as a result of management activities occurring in the Buffer Zone.

In the Free-Range and Bison Management Zones, the effects on vegetation would be long-term, minor to moderate, and beneficial. Prairie dog towns would expand to varying extents

depending on conditions as discussed in Alternative A. Possible overgrazing would have a long-term, minor to moderate, adverse effect on vegetation. However, suitable habitat allocation thresholds established under Alternative B for the Bison Management Zone would provide for mitigation in the event that competition for forage resources between prairie dogs and other ungulates reaches such a level. If habitat allocation thresholds are exceeded in the Bison Management Zone, control would take place on those colonies that have shown the largest and most recent expansions. Any such control would have long-term, minor, and adverse impacts in areas specific to the removed prairie dog colonies by also removing the associated plant diversity present at the colony site.

In the Control Zone, the prairie dogs would be managed to inhabit 7 to 15% of the available suitable habitat. Currently, they occupy approximately 7% of available suitable habitat in the Control Zone. The effect on vegetative communities in this zone would likely be long-term, minor, and beneficial. The species diversity would be higher than the uncolonized areas and the vegetation would be maintained at a short stature.

Cumulative Effects

The cumulative effects of Alternative B in conjunction with other natural resource management plans in the North Unit would be long-term, minor to moderate, and beneficial to vegetation in terms of species diversity locally and landscape heterogeneity parkwide. There are protections against overgrazing in Alternative B in the Bison Management Zone, whereas under Alternatives A and C there are no such protections. The Buffer Zone is only a small part of the overall North Unit area and any adverse effects on the vegetation in this zone as a result of prairie dog removal would be negligible on a parkwide scale.

Conclusion

Impacts to vegetation under Alternative B would be long-term, minor to moderate, and largely beneficial from vegetation changes in and near prairie dog colonies that would increase the diversity of vegetative communities in the park. Benefits would also arise in the form of habitat threshold allocations in the Bison Management Zone that would provide protection from overgrazing. Alternative B would not result in the impairment of vegetation resources.

3.7.5 Effects of Alternative C – Exclusion Zone

Direct and Indirect Effects

Under Alternative C, the impacts on the vegetation would be similar to those seen under Alternative A with the exception of the Exclusion Zone. Impacts in the Exclusion Zone are likely to be long-term, minor to moderate, and adverse. Complete removal of the prairie dog from the Exclusion Zone would also remove the associated diversity of plant communities that prairie dogs establish adjacent to their burrow sites. However, the overall percentage of prairie dog colonies found in the Exclusion Zone compared to the North Unit overall is low. Thus, impacts to the vegetative communities of the entire North Unit from controlling prairie dogs in the Exclusion Zone would be minor. Additionally, there are few protections against overgrazing in the Bison Management Zone under Alternative C. Therefore, if drought conditions persist and prairie dog acreages expand to a level where forage resources become compromised, overgrazing may lead to a long-term, minor to moderate, adverse impact to vegetation in the bison pasture.

Cumulative Effects

The cumulative effects of Alternative C in conjunction with other natural resource management plans in the North Unit on vegetation would be long-term, minor to moderate, and largely beneficial. Similar to Alternative A, there are no protections against overgrazing, which could have a minor to moderate, adverse effect on the vegetation vigor and composition over time. The Exclusion Zone is only a small part of the overall park area and any adverse effects as a result of removing prairie dog colonies and associated plant diversity on the vegetation in this area would be small on a parkwide scale.

Conclusion

Impacts to vegetation under Alternative C would be long-term, minor to moderate, and largely beneficial. This is due to vegetation changes in and near prairie dog colonies that would increase the diversity of vegetative communities in the park. Effects of prairie dog expansion leading to an increase in exotic plants near the colony site would have long-term, negligible, and adverse effects on vegetation. Potential overgrazing as a result of limited forage resources during years of low precipitation would likely have long-term, minor to moderate, adverse effects on vegetation. Alternative A would not result in the impairment of vegetation resources.

3.8 Soils

3.8.1 Affected Environment

Soils in the North Unit consist primarily of altered sedimentary deposits of clay, silt, gravel, and ash. Due to the high rates of erosion present within the North Unit and the steep slopes consistent among the badlands features, the majority of the badlands formations lack soils. Depending on the sediment source, soils in the drainages of the North Unit have textures ranging from fine sandy loam to clay. Soils of the plateaus vary by age, parent material, and texture (NPS, 2007).

The Natural Resource Conservation Service has conducted soil surveys for the region covering the North Unit. Aside from the badland formations, dominant soil associations include:

- *Badlands-Interior-Cedarpass Association* – deep, well-drained, loamy and silty soils, occurring in uplands, fans, and floodplains;
- *Norrest-Cedarpass-Interior Association* – deep, well-drained, loamy and silty soils, occurring in uplands, fans, and floodplains;
- *Cedarpass-Interior-Denby Association* – deep, well-drained, clayey and loamy soils, occurring in alluvial fans and at the base of badland formations;
- *Orella-Fairburn-Badlands Association* – shallow, well-drained, clayey and loamy soils, occurring in proximity to badlands formations and in dissected plains; and
- *Orella-Histle-Whitewater Association* – shallow to moderately deep, well-drained, clayey and silty soils, occurring in plains.

Each soil association is a product of the cumulative processes of climate, organics, topography, parent material, time, and human impacts. As a consequence, each soil association provides some insight as to what kind of vegetation and wildlife may be supported at a particular site. All soils in the North Unit are subject to wind and water erosion and have been historically impacted by the development of park infrastructure. Additionally, soils in the North Unit have been exposed to compaction and alteration from foot traffic, off-road vehicle traffic, horseback traffic, and bison grazing. Regionally, soils have experienced alteration due to agriculture and grazing practices (NPS, 2007).

Prairie dogs seem to prefer soil that is flat or gently sloping, deep, clayey or loamy in texture, and well-drained with enough moisture capacity to support the burrow complex (NPS, 2006a). Prairie dogs may impact soil morphology through bioturbation, which is the process of mixing soils and sediments through burrowing activities. However, the degree to which prairie dogs impact soil morphology is in most cases site specific to the prairie dog burrow with impacts decreasing with distance away from the burrow site (Carlson and White, 1987). Prairie dog burrows are generally three to six feet below the surface and fifteen feet long. Mounds that indicate the entrance to a burrow are usually cone-shaped, one to three feet in height, and three to ten feet in diameter (City and County of Denver, No date). Carlson and White (1988) found that initially prairie dog colonies are comprised primarily of surface soil. Over time, subsurface soil is added to the colony site, leading to increases in the variation of soil texture. Additionally, mound soil is usually more alkaline because of the deposition of fecal matter, skeletal material, and less acidic subsoil.

Through bioturbation, prairie dogs can impact several aspects of soil morphology such as soil development, enhancement, or erosion. When prairie dogs create colonies or towns, they remove a substantial percent of the protective ground cover, leaving the soil exposed to erosion. However, prairie dog activities can also have beneficial impacts to soil resources near the colony site. Prairie dog burrowing activities bring heavier subsurface soils to the surface, which mixes the soil and positively affects the cycling of water and nutrients. Loosened soil adjacent to the burrow site allows for higher rates of water absorption. Additionally, prairie dogs commonly defecate and urinate aboveground, and thereby fertilize the topsoil in the areas adjacent to the burrow. Finally, prairie dog burrowing activities in areas that were previously compacted will likely reduce soil compaction by mixing the soil (Kerscher, No date; USFS, 2006).

3.8.2 Methodology

This impact analysis focuses on potential effects to soils as a result of prairie dog management activities under the different alternatives. Information on soils was based on NRCS soil surveys, consultation with North Unit staff, and previous projects in the same area.

The intensity thresholds for impacts on soils are defined as follows:

Negligible: Soils would not be affected or the effects would be below or at the lower levels of detection. Any overall effects to soils would be slight and would return to normal shortly after the completion of management activities.

Minor: The effects to soils would be detectable but effects to soil productivity, fertility, or area would be small and adjacent to the prairie dog colony site. Mitigation may be needed to offset adverse impacts, but such measures would be relatively simple to undertake and would likely be successful.

Moderate: The effects to soils would be readily apparent and result in a change to soil character over a large geographic area. Mitigation measures would be necessary to offset adverse impacts and would likely be successful.

Major: The effects to soils would be readily apparent and substantially change the character of soils inside and outside of the North Unit. Mitigation measures would be required to offset adverse impacts, and the success of any such measures could not be guaranteed.

The duration thresholds for impacts to soils are defined as follows:

Short-term: Recovery takes less than three years.

Long-term: Recovery takes longer than three years.

3.8.3 Effects of Alternative A – No Action Alternative

Direct and Indirect Effects

Under Alternative A, impacts to soil resources would be long-term, minor to moderate, and beneficial on a local scale, and negligible to minor on a parkwide scale. Prairie dogs would continue to impact soil near the colony sites by mixing soil, increasing rates of aeration and rainfall absorption, and increasing soil nutrient levels near the colony sites. Localized occurrences of erosion in proximity to prairie dog colonies may increase as a result of removed vegetation, particularly if drought conditions in the region persist and overall acreage of prairie dog colonies expand. However, erosion rates are likely to be negligibly impacted, because prairie dog burrowing activities bring heavier subsurface soil to the surface and increase rates of water absorption near the burrow site. Considering the high rates of erosion that exist under normal conditions at the North Unit of Badlands National Park, impacts of prairie dog activities on the erosion of soil resources is likely to be negligible.

Cumulative Effects

Additional projects and plans in the North Unit that may have a cumulative effect on soils include the General Management Plan, Weed Management Plan, Fire Management Plan, and Bison Management Plan, which is currently under development. Under the General Management Plan, most soil resources in the North Unit would not be affected. Long-term, minor to moderate, adverse impacts on soil from the General Management Plan include construction and use of new or improved trails. Additionally, the construction of a new road segment for the Badlands Loop Road in the Cedar Pass area would likely result in a moderate to major, adverse impact on soil resources specific to the project area. Long-term, minor to moderate, beneficial impacts to soils include restricting people to established trails and adding educational and interpretive signs to better inform visitors using the park. Implementation of the Bison Management Plan would have long-term, minor, and beneficial impacts to soils by providing management strategies for the bison herd and stabilizing soil resources that may be impacted by overgrazing and compaction. Impacts to soils from the Fire Management Plan and Weed Management Plan would be short-term, minor, and adverse in areas where prescribed fire use is employed or wildland fire occurs and short-term localized rates of erosion are increased. Alternative A would likely contribute to the long-term, minor, and beneficial impacts to soil resources near the prairie dog burrows. If drought conditions persist in the region and prairie dog colonies expand at a high rate, short-term cumulative impacts to soils may be

adverse as a result of removed vegetation. Additionally, under those conditions of drought and prairie dog expansion, long-term cumulative impacts to soils may be beneficial through greater rates of soil aeration, mixing, and increased nutrient levels of soils near the burrow site.

Conclusion

Overall, Alternative A would contribute long-term, minor to moderate, beneficial impacts on soils adjacent to prairie dog burrows and negligible to minor impacts parkwide, depending on climatic conditions. Alternative A would not result in the impairment of soil resources.

3.8.4 Effects of Alternative B – Management Zones (NPS Preferred)

Direct and Indirect Effects

Under Alternative B, impacts to soil resources would be long-term, minor to moderate, and beneficial on a local scale, and negligible to minor on a parkwide scale. Prairie dogs would continue to impact soil near the colony sites by mixing soil, increasing rates of aeration and rainfall absorption, and increasing soil nutrient levels near the colony sites. Localized occurrences of erosion in proximity to prairie dog colonies may increase as a result of removed vegetation, particularly if drought conditions in the region persist and overall acreage of prairie dog colonies expand. However, erosion rates are likely to be negligibly impacted, because prairie dog burrowing activities bring heavier subsurface soil to the surface and increase rates of water absorption near the burrow site. Considering the high rates of erosion that exist under normal conditions at the North Unit of Badlands National Park, impacts of prairie dog activities on the erosion of soil resources is likely to be negligible. Additionally, habitat allocation thresholds in the Bison Management Zone would likely protect any minor, adverse impacts to soil resources as a result of grazing pressures.

Depending on the number of prairie dog colonies controlled because of received complaints, impacts to soil resources in the Buffer Zone are likely to be long-term, negligible to minor, and adverse. The removal of these colonies would also remove the beneficial soil mixing activities that prairie dogs provide in and around their burrow sites. However, because these prairie dog towns are a small percentage of the overall population in North Unit, effects to the soil resources of the entire North Unit would be minimal and confined to the area immediately adjacent to the controlled towns.

There may be a short-term, negligible, and adverse consequence to local soil resources as a result of application of rodenticide (zinc phosphide) as a control measure. However, the U.S. Environmental Protection Agency has determined that zinc phosphide degrades quickly into zinc and phosphide ions, which adhere to soil faces and are relatively immobile. Zinc phosphide also maintains minimal persistence in the environment if applied according to label directions (USEPA, 1998).

Cumulative Effects

As discussed in Alternative A, soil resources may be adversely impacted due to any proposed development or construction activities associated with the General Management Plan. Adverse impacts would be largely short-term and not expected to exist beyond the length of any proposed project. Other natural resource management plans would likely contribute long-term, negligible to minor, and beneficial impacts to soils by effectively managing vegetation and wildlife resources. Cumulative impacts to soil resources from Alternative B are likely to be long-

term, minor, and beneficial. Prairie dogs would continue their beneficial impacts to soils throughout the majority of the North Unit, and prescription of specific management zones would protect against overexposure of soil resources from grazing competition.

Conclusion

Overall, Alternative B would contribute long-term, minor to moderate, beneficial impacts on soils adjacent to prairie dog burrows and negligible to minor impacts parkwide. Short-term, adverse effects from the use of zinc phosphide would be negligible. Alternative B would not result in the impairment of soil resources.

3.8.5 Effects of Alternative C – Exclusion Zone

Direct and Indirect Effects

Impacts to soil resources under Alternative C would be similar to those in Alternative A throughout the majority of the North Unit; long-term, minor to moderate, and beneficial in areas immediately adjacent to the prairie dog burrow, and negligible to minor parkwide. Prairie dogs would continue to impact soil near the colony sites by mixing soil, increasing rates of aeration, and increasing soil nutrient levels near the colony site. Localized occurrences of water erosion may decrease as a result of greater rates of rainfall infiltration near the burrow sites. If drought conditions in the region persist and overall acreage of prairie dog colonies expand, rates of wind erosion may increase because of a greater amount of removed vegetation and exposed soil. However, overall erosion rates may be negligibly impacted considering the high rates of erosion that exist under normal conditions at the North Unit of Badlands National Park.

Impacts to soil resources in the Exclusion Zone are likely to be long-term, negligible to minor, and adverse, due to the removal of prairie dogs from the entirety of the Exclusion Zone. The removal of these colonies would also remove the beneficial soil mixing activities that prairie dogs provide in and around their burrow sites. However, because these prairie dog towns are a small percentage of the overall North Unit, effects to the soil resources of the entire North Unit would be minimal and confined to the area immediately adjacent to the controlled towns.

Additionally, there may be a short-term, negligible, adverse consequence as a result of application of rodenticide (zinc phosphide) as a control measure. However, the U.S. Environmental Protection Agency has determined that zinc phosphide degrades quickly to zinc and phosphide ions, which adhere to soil faces and are relatively immobile. Zinc phosphide also maintains minimal persistence in the environment if applied according to label directions (USEPA, 1998).

Cumulative Effects

As discussed in Alternatives A and B, soil resources may be adversely impacted due to any proposed development or construction activities associated with the General Management Plan. Adverse impacts largely would be short-term and not expected to exist beyond the length of any proposed project. Other natural resource management plans would likely contribute long-term, negligible to minor, beneficial impacts to soils by effectively managing vegetation and wildlife resources. Cumulative impacts to soil resources from Alternative C throughout the North Unit would likely contribute to the long-term, minor, beneficial impacts to soil resources. If drought conditions persist in the region and prairie dog colonies expand at a high rate, short-term

cumulative impacts to soils may be adverse as a result of removed vegetation. Additionally, under those conditions of drought and prairie dog expansion, long-term cumulative impacts to soils may be beneficial through greater rates of soil aeration, mixing, and increased nutrient levels of soils near the burrow site.

Conclusion

Alternative C would contribute long-term, minor to moderate, beneficial impacts on soils adjacent to prairie dog burrows and negligible to minor impacts parkwide. Impacts from removing prairie dogs from the Exclusion Zone would likely be negligible to minor due to the fact that these prairie dogs are a small percentage of the overall North Unit prairie dog population. Additionally, prairie dogs currently inhabit only a small percentage of the suitable habitat in the Exclusion Zone, which thereby limits any adverse effect to soils in the entire zone as a result of removing these prairie dog colonies. Alternative C would not result in the impairment of soil resources.

3.9 Paleontological Resources

3.9.1 Affected Environment

Badlands National Park has served as a major center of North American paleontological research since 1846. The quality of the paleontological resources present at Badlands was one of the primary reasons the area was established as a National Monument in 1939 and a National Park in 1978 (NPS, 2007).

The White River Badlands region (which includes the North Unit) contains the largest known concentration of late Eocene and Oligocene mammalian fossils in North America. These fossil resources, dating between 25 million and 37 million years ago, include remains of mammals that once lived in the area, such as camels, three-toed horses, saber-toothed cat, and rhinoceroses (NPS, 2004b). Additionally, marine fossils have been found in the deposits of an ancient seabed that existed in the region between 68 million and 75 million years ago (NPS, 2007).

Although a large portion of the North Unit has the potential to contain fossil resources, only a small percentage of the area has actually been surveyed. Six years of intensive paleontological surveys funded by the National Park Service Natural Resource Preservation Program have produced 220 paleontological sites in both the North and South Units (NPS, 2007). Additionally, a pre-construction survey was conducted along the Badlands Loop Road between 1996 and 1998 (NPS, 2007).

In 1993, the Big Pig Dig site was discovered in the vicinity of Conata Basin Road. More than 5,000 fossils have been collected from the site, which is unique because of the density of resources found at the site and because the fossils have maintained a high degree of preservation (NPS, 2007).

3.9.2 Methodology

This impact analysis focuses on potential effects to paleontological resources as a result of prairie dog management activities under the different alternatives.

The intensity thresholds for impacts on paleontological resources are defined as follows:

Negligible: Paleontological resources would not be affected, or effects would be below levels of detection, consisting of extremely small amounts of exposed paleontological material immediately adjacent to an individual prairie dog colony.

Minor: There would be a low probability of exposure of paleontological resources as a result of ground disturbing activities on a small scale, which would not exceed the area immediately adjacent to an individual prairie dog colony. The loss of paleontological resources and associated contextual information would be minimal.

Moderate: There would be a moderate probability of exposure of paleontological resources as a result of ground disturbing activities throughout a particular prairie dog management zone. Most of the paleontological material that could potentially be uncovered would likely be found as a result of monitoring, but some material and the associated information may be lost.

Major: There would be a high probability of exposure of paleontological resources as a result of ground disturbing activities throughout the entire North Unit. Even if sites were monitored, a great deal of paleontological material and associated information would likely be lost.

There is no duration threshold for impacts to paleontological resources, as once paleontological material is destroyed, it cannot be recovered.

3.9.3 Effects of Alternative A – No Action Alternative

Direct and Indirect Effects

Under Alternative A, impacts to paleontological resources are likely to be negligible and adverse. Prairie dog burrowing activities may lead to local occurrences of fossil resource exposure. However, these incidences would be minimal, if they occur at all, given the high rates of erosion and exposure of underlying resources that occur under normal conditions in Badlands National Park. Additionally, prairie dog activities do not take place in the poorly vegetated bedrock where most fossil resources are found.

Cumulative Effects

Additional projects and plans in the North Unit that may have a cumulative effect on paleontological resources include the General Management Plan, Weed Management Plan, and Fire Management Plan. The General Management Plan would improve visitor access to certain parts of the park, leading to a possible increase in the occurrence of illegal fossil collecting. Additionally, construction of a new road segment in the Cedar Pass area may have potential adverse impacts on fossil resources. However, increased staffing and educational improvements would benefit paleontological resources. The Fire Management Plan may cause minor, adverse impacts to paleontological resources due to the potential disturbance of exposed fossils on the surface. However, most fires would not reach exposed fossils in the poorly

vegetated bedrock where most fossils are found. The Weed Management Plan may lead to negligible to minor, adverse impacts to paleontological resources from ATV, foot, or horse travel. However, fossils generally are not exposed in the vegetated areas where weed management is necessary. Overall, implementation of Alternative A would cause negligible, adverse impacts to paleontological resources of the North Unit.

Conclusion

Implementation of Alternative A would likely lead to a negligible, adverse impact to paleontological resources due to possible disturbance of fossil resources from prairie dog burrowing activities. However, these impacts would be minimal, if they occur at all, given that most fossil resources occur in underlying bedrock, which is not impacted by prairie dog activities. Alternative A would not result in the impairment of fossil resources.

3.9.4 Effects of Alternative B – Management Zones (NPS Preferred)

Direct and Indirect Effects

Similar to Alternative A, impacts to paleontological resources under Alternative B are likely to be negligible and adverse. Prairie dog burrowing activities may lead to local occurrences of fossil resource exposure, but these incidences would be minimal, if they occur at all, given the high rates of erosion and exposure of underlying resources that occur under normal conditions in Badlands National Park. As stated earlier, prairie dog activities, and any associated management activities, would not likely take place in the bedrock where most paleontological resources are found. If prairie dog control measures include fencing, proposed fencing areas would need to be surveyed for paleontological resources and then monitored during the fencing installation process. Any impacts to fossil resources from management activities (such as foot traffic or motorized traffic to access prairie dog towns) can be mitigated through appropriate procedures and staying on established trails or roads.

Cumulative Effects

Cumulative effects under Alternative B are similar to those under Alternative A. Implementation of Alternative B may cause negligible, adverse cumulative impacts to paleontological resources. However, as fossil resources are generally not found in the prairie portions of the park where the bedrock has not been exposed, these impacts would not likely lead to the impairment of the North Unit's paleontological resources.

Conclusion

Implementation of Alternative B would likely lead to a negligible, adverse impact to paleontological resources due to possible disturbance of fossil resources from prairie dog burrowing activities and possible fencing activities. However, these impacts would be minimal, if they occur at all, given that most fossil resources occur in underlying bedrock, which is not impacted by prairie dog activities. Alternative B would not result in the impairment of paleontological resources.

3.9.5 Effects of Alternative C – Exclusion Zone

Direct and Indirect Effects

As in Alternatives A and B, impacts to paleontological resources are likely to be negligible and adverse. Prairie dog burrowing activities may lead to local occurrences of fossil resource exposure, but these incidences would be minimal, if they occur at all, given the high rates of erosion and exposure of underlying resources that occur under normal conditions in Badlands National Park. Any impacts to fossil resources from management activities (such as foot traffic or motorized traffic to access prairie dog towns) can be mitigated through appropriate procedures and staying on established trails or roads.

Cumulative Effects

Cumulative effects under Alternative C are similar to those under Alternatives A and B. Implementation of Alternative C may result in negligible, adverse cumulative impacts to paleontological resources. However, as fossil resources are generally not found in the prairie portions of the park where the bedrock has not been exposed, these impacts would not likely lead to the impairment of the park's paleontological resources.

Conclusion

Implementation of Alternative C would likely lead to a negligible, adverse impact to paleontological resources due to possible disturbance of fossil resources from prairie dog burrowing activities. However, these impacts would be minimal, if they occur at all, given that most fossil resources occur in underlying bedrock, which is not impacted by prairie dog activities. Alternative C would not result in the impairment of paleontological resources.

3.10 Wilderness Values

3.10.1 Affected Environment

Wilderness was legally designated in the North Unit of Badlands National Park in 1976 under Public Law (PL) 94-567 (NPS, 2004b). The 64,000-acre Badlands Wilderness Area is comprised of two separate units, which are the 54,000-acre Sage Creek Unit and the 10,000-acre Conata Unit. Figure 3.1 depicts the boundaries of the Badlands Wilderness Area.

The Badlands Wilderness Area can be viewed as a composite of the features that make Badlands National Park a unique place due to the size of the wilderness and the fact that it contains both badlands and mixed-grass prairie features. Because permits are not required for backcountry use in the wilderness, the park does not have substantial data for wilderness visitation. However, backcountry wilderness use of the two units is estimated to be low, primarily due to high summer temperatures, limited water sources, and biting insects. For those who do enter the Sage Creek Unit for backcountry use, the Sage Creek Primitive Campground is the primary access point. Additionally, no trails or developed facilities exist in either wilderness unit. However, because of the high degrees of visibility in the mixed-grass prairie portions of the wilderness, development structures such as buildings or towers that are located outside of the wilderness can be seen from certain points. Vehicles traveling on park roads can also be seen. Fencing that is used to keep bison in the wilderness and cattle out of the wilderness can also be seen along the boundary of the wilderness area (NPS, 2004b).

Wilderness values and attributes, such as solitude, natural soundscapes, and natural landscapes, can be considered intact and preserved in the Badlands Wilderness Area. Human presence in the wilderness area is minimal with limited human visitation and park management activities occurring as needed to support other park objectives (NPS, 2004b).

3.10.2 Methodology

This impact analysis focuses on potential effects to wilderness values as a result of prairie dog management activities under the different alternatives.

The intensity thresholds for impacts on wilderness values are defined as follows:

Negligible: A change in the wilderness character may potentially occur, but the change would be so small and isolated geographically that it would not be of any measurable or perceptible consequence.

Minor: A change in the wilderness character and associated values would occur, but the change would be small and, if measurable, highly localized.

Moderate: A change the wilderness character and associated values would occur. It would be measurable and detectable, but localized.

Major: A dramatic change in the wilderness character and associated values would occur. The change would be measurable and readily apparent throughout the entire wilderness area and would have a substantial or permanent consequence to wilderness values.

The duration thresholds for impacts to wilderness values are defined as follows:

Short-term: Recovery takes less than one year.

Long-term: Recovery takes longer than one year.

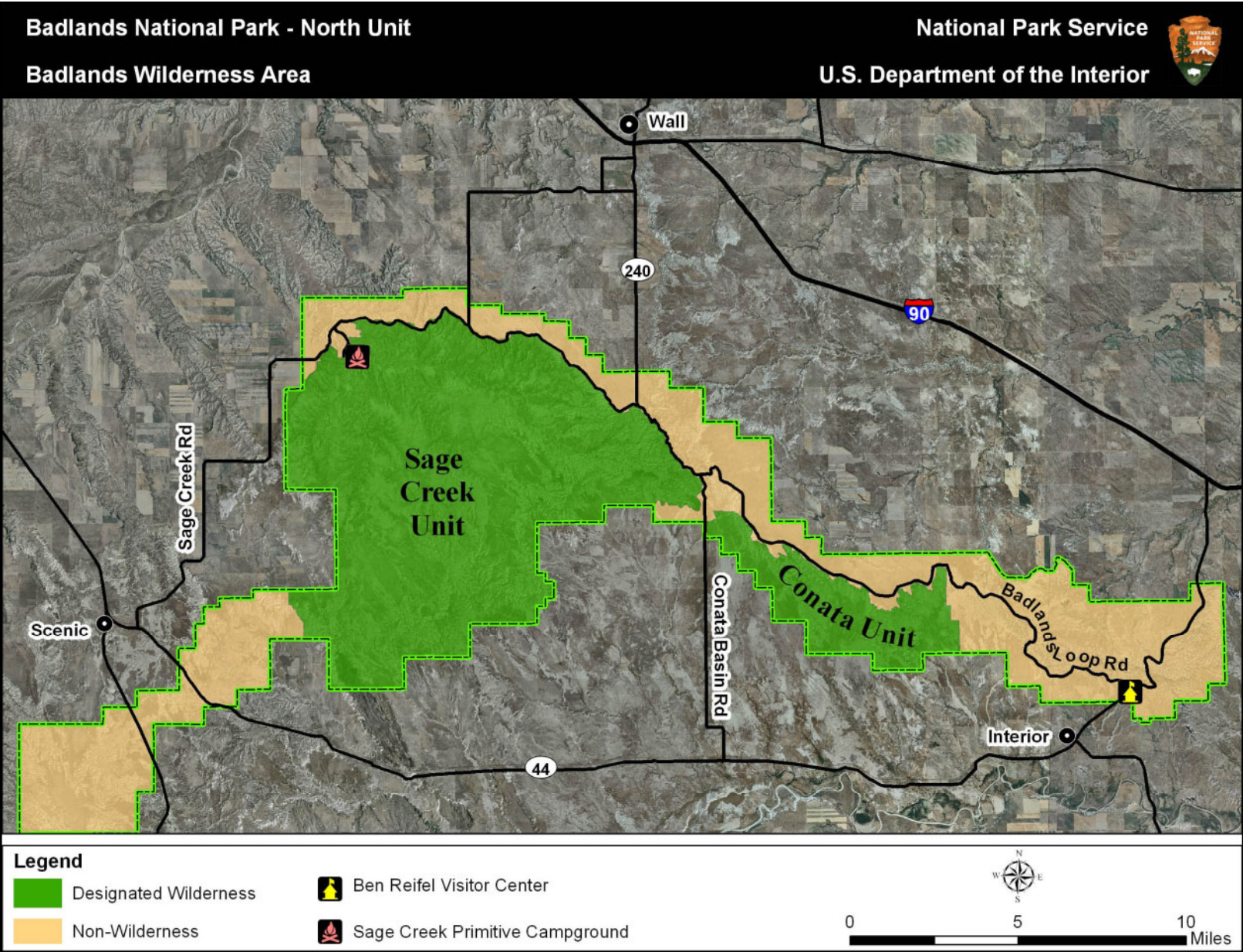


Figure 3.1: Badlands Wilderness Area, North Unit, Badlands National Park

3.10.3 Effects of Alternative A – No Action Alternative

Direct and Indirect Effects

Under Alternative A, impacts to wilderness values are likely to be long-term, negligible to minor, and beneficial due to the continued presence of the prairie dog as a native species of the mixed-grass prairie ecosystem. Intrusions from management activities would be minimal, and primarily consist of annual mapping activities of prairie dog towns that are located within the wilderness area boundaries. Any individuals visiting the wilderness for the expressed purpose of experiencing wilderness values may encounter short-term, minor, and adverse impacts from witnessing management activities.

Cumulative Effects

Additional projects and plans in the North Unit that may have a cumulative effect on wilderness values include the Weed Management Plan, Fire Management Plan, and Bison Management Plan, which is currently under development. The Weed Management Plan would have short-term, moderate, adverse impacts to wilderness due to closures during chemical application and intrusion from aerial equipment. However, this plan may also have long-term, moderate, beneficial impacts to wilderness due to the presence of fire and its effects on the naturalness of wilderness areas. The Fire Management Plan may have short-term, minor, adverse impacts to wilderness users due to reduced visibility from smoke and restricted access during times of fire. However, the Fire Management Plan may have potential long-term, moderate to major, beneficial impacts to wilderness values because fires would continue their natural processes in the ecosystem and mechanized equipment used in fire suppression activities would only be used in extreme circumstances. The Bison Management Plan would have potential long-term, minor, beneficial impacts on wilderness due to the continued presence of the bison, which is native to the wilderness. Overall, cumulative effects that may result from implementation of Alternative A are likely to be long-term, negligible to minor, and beneficial.

Conclusion

Implementation of Alternative A would likely lead to a long-term, negligible to minor, beneficial impact to wilderness values due to the continued presence of the prairie dog in the mixed-grass prairie ecosystem. Alternative A would not result in the impairment of wilderness values.

3.10.4 Effects of Alternative B – Management Zones (NPS Preferred)

Direct and Indirect Effects

Under Alternative B, impacts to wilderness values are likely to be short to long-term, negligible to minor, and both beneficial and adverse. Wilderness values may be adversely impacted in the short-term by management activities to remove prairie dogs that expand into the Sage Creek Primitive Campground. However, wilderness values may be beneficially impacted by maintaining the quality of the site for backcountry users. Additionally, if prairie dogs reach the point at which control may be initiated in the Bison Management Zone (located in the Sage Creek Wilderness Unit), wilderness values may be adversely impacted if some control is needed to bring the population below the threshold level. Other intrusions from management activities would be minimal and primarily consist of annual mapping activities of prairie dog

towns that are located within the wilderness boundaries. Any individuals visiting the wilderness for the expressed purpose of experiencing wilderness values may encounter short-term, minor, adverse impacts from witnessing management activities.

Cumulative Effects

Cumulative effects under Alternative B are similar to those under Alternative A, in that management activities under the various other park plans and projects may cause short-term, negligible to minor, adverse impacts to wilderness values. However, these plans are likely to have long-term, moderate, beneficial impacts to wilderness values by maintaining natural ecosystem processes. Alternative B may contribute to the short-term, negligible to minor, adverse cumulative impacts on wilderness values due to increased personnel during annual mapping activities and any control activities that may be necessary. However, the continued presence of the prairie dog as a native species of the wilderness area may lead to long-term, negligible to minor, beneficial impacts to wilderness values.

Conclusion

Implementation of Alternative B would likely lead to a long-term, negligible to minor, beneficial impact to wilderness values by ensuring that bison and prairie dogs effectively coexist within the Badlands Wilderness Area. Any control activities that may take place on prairie dogs in the Bison Management Zone (which is located in the wilderness area) may result in short-term, minor, adverse impacts. Alternative B would not result in the impairment of wilderness values.

3.10.5 Effects of Alternative C – Exclusion Zone

Direct and Indirect Effects

Similar to Alternative A, impacts to wilderness values under Alternative C are likely to be long-term, negligible to minor, and beneficial. Intrusions from management activities would be minimal and primarily consist of annual mapping activities of prairie dog towns that are located within the wilderness boundaries. Any individuals visiting the wilderness for the expressed purpose of experiencing wilderness values may encounter short-term, minor, adverse impacts from witnessing management activities.

Cumulative Effects

Cumulative effects under Alternative C are similar to those under Alternative A in that management activities under the various other park plans and projects may cause short-term, negligible to minor, adverse impacts to wilderness values. However, these plans are likely to have long-term, moderate, beneficial impacts to wilderness values by maintaining natural ecosystem processes. Alternative C may contribute to the short-term, negligible to minor, adverse cumulative impacts on wilderness values due to increased personnel during annual mapping activities and any control activities that may be necessary. However, the continued presence of the prairie dog as a native species of the wilderness area may lead to long-term, negligible to minor, beneficial impacts to wilderness values.

Conclusion

Implementation of Alternative C would likely lead to a long-term, negligible to minor, beneficial impact to wilderness values. Alternative C would not result in the impairment of wilderness values.

3.11 Socioeconomics

3.11.1 Affected Environment

The North Unit of Badlands National Park is located within southeastern Pennington County and western Jackson County and is bordered to the south by Shannon County. Generally, the counties that encompass the North Unit are sparsely populated with low population densities and high populations of Native Americans. This is especially true of Shannon and Jackson Counties, which have a high Native American population due to the presence of the Pine Ridge Reservation. The reservation encompasses all of Shannon County and the southern portion of Jackson County. The major exception to the rural characteristics of the surrounding counties is the presence of Rapid City in Pennington County, which is located approximately 35 miles northwest of the park's western boundary. Approximately 70% of Pennington County's population lives in Rapid City, which serves as the region's economic center and is the primary origin for travelers heading to Badlands National Park. Other towns in proximity to the North Unit include Scenic, Interior, and Wall.

Agricultural activities as a whole are the most predominant industries in areas surrounding the North Unit of Badlands National Park. In 2002, there were a total 1,204 farms and ranches in Pennington, Jackson, and Shannon Counties. The total land in farms for the three counties totaled approximately 4.3 million acres. 741 of the 1,204 total farms raise and sell cattle, and approximately 180,000 acres of farmland were used for raising forage crops such as hay (NASS, 2002).

During the scoping process, many private landowners expressed a concern regarding the expansion of prairie dogs onto private lands used for cattle grazing and foraging activities. The opinion was expressed that the expansion of prairie dogs onto private lands adjacent along the park boundary directly impacted the economic well-being of the individuals who owned the farms/ranches, primarily through loss of available grazing land and forage capacity. Prairie dogs compete indirectly with cattle by clipping vegetation in order to enhance the visual detection of predators in the vicinity of their burrows. Additionally, the region has experienced drought conditions over the past several years. The drought has further stressed available forage on private lands and impacted the local agricultural economy.

The issue of competition for forage resources is complex, and one that can be debated from a variety of different perspectives and supported by various studies conducted in the past. As Vermeire et al. (2004) concluded, relationships between prairie dogs and herbivores such as cattle are scale and time dependent and are driven by a variety of forces such as environmental conditions (largely drought), the size of the town, the age of the town, and the intensity of grazing on the pasture. When analyzing the issue of level of competition between livestock and prairie dogs, an important consideration to keep in mind is scale (USFS, 2006). For example, a single prairie dog colony occupying less than 5% of a pasture would not likely have a large impact on forage resources available to cattle. However, at a local scale where prairie dogs may

occupy a high percentage of a pasture, competition for limited forage resources is a concern, particularly during drought conditions (USFWS, 2006).

Prairie dogs compete with livestock for forage resources in two ways: by consuming the vegetation and by clipping the vegetation. The latter involves the process of the prairie dogs maintaining the vegetation at a short height to aid in visual predator detection. Changes in the composition of vegetation communities also occurs on prairie dog burrows. As grasses are continuously clipped, they are replaced by forbs and dwarf shrubs. Thus, the forage quality of vegetation adjacent to prairie dog burrows may increase as a result of increased protein content and digestibility. However, an increase in forage quality may not necessarily compensate for an overall decrease in forage quantity, making livestock grazing largely unsuitable on older prairie dog colonies where there is little remaining vegetation (USFS, 2006).

Past field studies analyzing the impact on livestock weight gains as a result of prairie dog expansion have resulted in mixed conclusions. O’Meilia et al. (1982) concluded that summer weight gains of yearling steers did not differ significantly on pastures with and without prairie dogs. However, in a six-year study which analyzed the relationship between livestock weight gains and prairie dog expansion, Derner et al. (2006) found that livestock weight gains did decrease in pastures colonized by prairie dogs. However, this decrease was at a rate slower than the rate of prairie dog colony expansion. Compared to livestock weight gains on pastures with no prairie dog colonies, livestock weight gains decreased by 5.5% on pastures that were 20% colonized by prairie dogs, whereas livestock weight gains decreased by 13.9% on pastures that were 60% colonized by prairie dogs (Derner et al., 2006). Researchers attributed these variations to the high grazing resistance of the dominant grasses blue gramma and buffalograss (Derner et al., 2006). Overall, the reduction of the livestock weight gains led to an estimated economic loss of \$14.95 per steer on the pastures with 20% prairie dog colonization and \$37.91 per steer on the pastures with 60% colonization (Derner et al., 2006). Because of the highly controversial nature of the subject, and the limited and conflicting results of much of the research, large-scale field studies in a variety of different environmental conditions are necessary to clarify the effects of prairie dog and livestock forage competition (USFS, 2006).

3.11.2 Methodology

This impact analysis focuses on potential effects to the socioeconomic environment as a result of prairie dog management activities under the different alternatives.

The intensity thresholds for impacts to the socioeconomic environment are defined as follows:

Negligible: No effects would occur or the effects to the socioeconomic environment would be below or at the level of detection.

Minor: Effects to the socioeconomic environment would be small, take place in areas immediately adjacent to specific controlled prairie dog towns, and would be detectable. Mitigation measures may be necessary to offset potential adverse impacts, and any such measures would be relatively simple and would likely be successful.

Moderate: Effects to the socioeconomic environment would be readily apparent and take place on local scales within and immediately adjacent to the North Unit. Mitigation measures may be necessary to offset potential adverse impacts, and any such measures may be extensive but likely successful.

Major: Effects to the socioeconomic environment would be apparent and would cause substantial regional changes. Extensive mitigation would be necessary to offset any adverse impacts, and the success of which could not be guaranteed.

The duration thresholds for impacts the socioeconomic environment are defined as follows:

Short-term: Effects of management activities persist less than one year.

Long-term: Effects of management activities persist longer than one year.

3.11.3 Effects of Alternative A – No Action Alternative

Direct and Indirect Effects

Under Alternative A, North Unit personnel would continue to consult with adjacent private landowners on a case-by-case basis as complaints arise. However, the limited control measures allowed under Alternative A would handicap North Unit personnel in the manner with which they could respond to such complaints. With no actual management strategy for dealing with prairie dog encroachment onto adjacent private lands, local ranchers would continue to experience adverse economic impacts from prairie dog expansion through the loss of available forage land, particularly if drought conditions in the area persist. Impacts to local landowners are likely to be long-term, minor to moderate, and adverse on a local scale.

Visitors to the park would continue to travel to the park for the opportunity to view prairie dogs in their natural habitat. These visitors would continue to provide revenue to the local tourism economy. Impacts to the tourism economy of the park are likely to be long-term, negligible, and beneficial.

No new park personnel would be hired to focus on prairie dog management activities. Impacts to employment in the region would be long-term, negligible, and adverse.

Cumulative Effects

The South Dakota Department of Game, Fish, and Parks and the Department of Agriculture's Black-Tailed Prairie Dog Conservation and Management Plan provide guidance for the implementation of prairie dog management activities on public and private lands. The South Dakota state plan states that private landowners directly adjacent to public lands would be assisted in controlling prairie dogs when it has been documented that encroachment of prairie dogs onto private lands has come from public lands. The South Dakota Department of Fish, Game, and Parks provide annual prairie dog control on private lands using rodenticide at no cost to private landowners. The state plan would remove the financial burden of prairie dog control on private lands. In the event that prairie dogs were to encroach on private lands beyond those adjacent to the park boundary, those landowners technically would not be eligible for prairie dog control assistance.

The cumulative effect on socioeconomics of implementing Alternative A would be long-term, negligible to minor, and beneficial due to the continued generation of tourism income from visitors who visit the park to view prairie dogs. However, cumulative effects may also likely be long-term, minor to moderate, and adverse, if drought conditions in the region persist and prairie dogs expand at an increased rate onto adjacent lands.

Conclusion

Implementation of Alternative A would lead to long-term, minor to moderate, adverse impacts to adjacent private landowners as a result of continued prairie dog encroachment. Impacts would also likely be long-term, negligible, and beneficial due to continued tourism revenue from visitors visiting the North Unit to witness prairie dogs.

3.11.4 Effects of Alternative B – Management Zones (NPS Preferred)

Direct and Indirect Effects

Under Alternative B, North Unit personnel would continue to consult with adjacent private landowners on a case-by-case basis as complaints arise. Park personnel would be better equipped to deal with such complaints because of the variety of control measures allowed under this alternative and the creation of the prairie dog buffer zone. Park staff would remove prairie dogs that encroach onto private lands at the landowner's request. Overall, impacts of prairie dog encroachment on adjacent private landowners would be less adverse than Alternative A.

Visitors to the park would continue to travel to the park for the opportunity to view prairie dogs in their natural habitat. These visitors would continue to provide revenue to the local tourism economy. Any impacts due to control measures would be negligible. Any control at the Roberts prairie dog town, which is the primary colony site for visitors to witness prairie dogs, would likely occur on the portion of the town that expands onto private land and not the portion that resides within the park boundary. Impacts to the tourism economy of the park are likely to be long-term, negligible, and beneficial.

Under Alternative B, additional park personnel may be hired to focus on prairie dog management activities. Impacts to local employment would be long-term, negligible, and beneficial.

Cumulative Effects

As in Alternative A, the South Dakota Department of Game, Fish, and Parks and the Department of Agriculture's Black-Tailed Prairie Dog Conservation and Management Plan would provide assistance to private landowners directly adjacent to public lands in dealing with prairie dog encroachment. However, as the park's management strategy is designed to keep prairie dogs outside of these areas where private lands and the North Unit shares a common boundary, prairie dog encroachment from the North Unit is expected to be minimal. As there should be little effect to the North Unit's prairie dog population as whole, visitors would continue to travel to the North Unit to view prairie dogs in their natural habitat, which provides tourism revenue to the local economy. Additionally, there is the possibility for a minimal increase in employment opportunities to focus on prairie dog management activities. Overall, the cumulative effects of Alternative B are likely to be long-term, minor, and beneficial.

Conclusion

Impacts to adjacent private landowners would be less adverse under Alternative B, due to control of prairie dogs within the ¼ mile Buffer Zone. The continued presence of the prairie dog within the North Unit would maintain wildlife viewing opportunities for park visitors, creating a long-term, negligible, benefit to socioeconomics.

3.11.5 Effects of Alternative C – Exclusion Zone

Direct and Indirect Effects

Under Alternative C, North Unit personnel would continue to consult with adjacent private landowners on a case-by-case basis as complaints arise. Park personnel would be better equipped to deal with such complaints because of the variety of control measures allowed under this alternative. Impacts to private landowners adjacent to the park border would be the least adverse under Alternative C, due to the presence of the one-quarter (1/4) mile Exclusion Zone, which would be maintained free of prairie dogs.

Visitors to the North Unit would continue to travel to the park for the opportunity to view prairie dogs in their natural habitat. These visitors would continue to provide revenue to the local tourism economy. Impacts to the tourism economy of the park are likely to be long-term, negligible, and beneficial.

Additional North Unit personnel may be hired to focus on prairie dog management activities. Impacts to local employment would be long-term, negligible to minor, and beneficial.

Cumulative Effects

Cumulative effects of Alternative C would be similar to those under Alternative B. Assistance to private landowners adjacent to the park boundary under the South Dakota state plan, in conjunction with the Prairie Dog Exclusion Zone, would largely limit the impacts of prairie dog expansion on adjacent private landowners.

Conclusion

Impacts to adjacent private landowners would be the least adverse under Alternative C, due to control of prairie dogs within the entirety of the ¼ mile Exclusion Zone. The continued presence of the prairie dog within the North Unit would maintain wildlife viewing opportunities for park visitors, creating a long-term, negligible, benefit to socioeconomics.

3.12 Human Health and Safety

3.12.1 Affected Environment

A primary goal for the park is to provide for a safe and enjoyable visitor experience. Components of this goal include maintaining adequate conditions to buildings and infrastructure, signs warning visitors of anticipated hazards, law enforcement, and wildlife management.

Prairie dogs as a species present a very limited number of risks to human populations. In some cases, prairie dogs may bite humans if they get too close or if the animal feels threatened, but these risks may be mitigated by the park through appropriate signs and informational pamphlets.

A source of much concern recently among the general public is the relationship between prairie dogs and sylvatic plague. Sylvatic plague is a disease caused by a bacterium (*Yersinia pestis*), which occurs primarily in rodents. It was inadvertently introduced to the North American Prairie from Asia around 1900 and has been identified in at least 76 species of mammals (City and County of Denver, No date). Transmission from animals to humans is primarily from infected

flea bites or direct contact with the infected animal (SDGFP, 2005; City and County of Denver, No date). The most common human form is bubonic plague, which is characterized by swollen lymph glands and high fever. The disease can be treated with antibiotics but can be potentially fatal if left untreated.

Although sylvatic plague has not been identified in prairie dog populations within the North Unit, in 2004 sylvatic plague was discovered in a single prairie dog in Custer County, South Dakota. Since 2005, additional cases have been reported on the Pine Ridge Reservation in Shannon County, South Dakota, located south of the North Unit (SDAIB, 2004; USFWS, 2005). Most public health officials believe that the chance of humans contracting plague from prairie dogs or the fleas that are hosts of the virus is very low (City and County of Denver, No date). Close to 100% of prairie dogs in a colony infected with sylvatic plague will die in a short period of time, and fleas that may transmit the disease seem to prefer to bite other animals instead of humans (City and County of Denver, No date). According to the Centers for Disease Control, an average of 13 people in the United States were infected with plague annually between 1970 and 1995 (CDC, 1996). South Dakota Health Department records, which date to 1923, indicate that no human in South Dakota has been infected with plague (SDGFP, 2005).

Control measures utilized in prairie dog management activities could also potentially pose a very limited risk to public safety. Zinc phosphide, a common rodenticide used as a lethal control measure can pose a minor risk to public health, but this risk may be mitigated by following appropriate label instructions (USEPA, 1998).

3.12.2 Methodology

Existing and potential threats to human health and safety within the North Unit were identified and evaluated in the impacts analysis section.

The intensity thresholds for impacts to the human health and safety environment are defined as follows:

Negligible: Human health and safety would not be affected, or effects would be at the lowest levels of detection and would not have an appreciable effect on human health and safety.

Minor: The effects would be detectable but would not have an appreciable effect on human health and safety. If mitigation were necessary, such measures would be relatively simple and would likely be successful.

Moderate: Effects would be readily apparent and result in substantial effects to public health and safety on a local scale. Changes in the rates of injuries, accidents, and/or illnesses would be measurable. Mitigation measures would probably be needed and would likely be successful.

Major: Effects would be apparent and result in substantial, noticeable effects to public health and safety throughout the region. Changes in the rates of mortality may result. Extensive mitigation measures may be necessary, and the success of such measures could not be assured.

The duration thresholds for impacts to human health and safety are defined as follows:

Short-term: Effects persist less than one year.

Long-term: Effects persist longer than one year.

3.12.3 Effects of Alternative A – No Action Alternative

Direct and Indirect Effects

Impacts to human health and safety under Alternative A are likely to be long-term, negligible, and both beneficial and adverse. Park staff would continue to relocate and live-trap prairie dogs that pose a risk to public safety. Because there would be no lethal control measures to react to problem prairie dogs, management activities would pose no risk to public safety. However, in the event that sylvatic plague does appear at the North Unit in the future, public safety could be negligibly and adversely impacted due to the limited control measures allowed under this Alternative.

Any risks to park personnel involved in field work activities would be long-term, negligible, and adverse, dependent upon field conditions.

Cumulative Effects

Additional projects and plans in the North Unit that may have a cumulative effect on human health include the General Management Plan, Weed Management Plan, and Fire Management Plan. Improved educational programs and infrastructure development under the General Management Plan may lead to long-term, minor, beneficial impacts to human health. Safety precautions undertaken during implementation of weed management strategies would not likely affect human health and safety. Because wildland fire use is a component of the Fire Management Plan, there is potential for dispersed smoke from naturally-ignited fires to periodically settle near towns, settlements, or roads. This could potentially lead to short-term, minor, adverse impacts. Overall, the various projects and plans that exist or are proposed in the North Unit may have short-term, minor, and adverse impacts to human health. However, improved infrastructure and resource management strategies associated with these plans would likely have long-term, moderate, beneficial impacts to human health. Any impacts associated with Alternative A would cause negligible cumulative impacts to human health and safety.

Conclusion

Alternative A would continue to have long-term, negligible, beneficial effects and long-term, negligible, adverse effects on public health and safety. Beneficial effects would occur from continuing to relocate prairie dogs away from areas where they may pose health and safety risks. Adverse effects would result from the continued potential for injuries from park staff working in outdoor field conditions while implementing prairie dog management activities and the limited measures to respond to an outbreak of sylvatic plague among North Unit prairie dog populations.

3.12.4 Effects of Alternative B – Management Zones (NPS Preferred)

Direct and Indirect Effects

Impacts to public safety under Alternative B are likely to be long-term, minor, and beneficial due to the adoption of specific management zones. Because prairie dogs would be controlled in administrative areas of the park with the highest concentration of visitors, health risks

associated with prairie dogs would be minimized. Additionally, the park would be better equipped to deal with any occurrence of sylvatic plague as there are a variety of control measures allowed under this alternative. Risks associated with any particular management strategy can be negated and mitigated by strict application protocols.

Any risks to North Unit personnel involved in fieldwork activities would be long-term, negligible, and adverse dependent upon field conditions. Additionally, as zinc phosphide would be allowed as a lethal control measure, NPS staff involved in application would need to ensure that all label directions are carefully adhered to in order to minimize any potential adverse impacts to their own health and safety. The EPA recognizes zinc phosphide as a category I toxicant for oral and inhalation exposure (the highest of four categories), category III for dermal exposure, and category IV for eye irritation (EPA, 1998). The EPA states that by following the product's label instructions and wearing proper personal protective equipment, adequate worker protection is provided.

Cumulative Effects

Cumulative effects of the various existing and proposed projects and their impacts on human health and safety are similar to Alternative A. Overall, the various projects and plans that exist or are proposed in the North Unit may have short-term, minor, adverse impacts to human health. However, improved infrastructure and resource management associated with these plans would likely have long-term, moderate, and beneficial impacts to human health. Effects of Alternative B would contribute long-term, minor, benefits to human health and safety. Adoption of specific management zones and an increase in the options for control would provide park staff with more efficient methods for prairie dog control. Human health impacts relating to the use of zinc phosphide as a prairie dog control measure are likely to be negligible given the infrequency of use and the inability of the substance to persist in the environment. Any other risks associated with prairie dog control measures may be mitigated through proper planning and implementation.

Conclusion

Alternative B would continue to have long-term, minor, beneficial effects and long-term, negligible, adverse effects on human health and safety. Beneficial effects would occur from continuing to relocate prairie dogs away from areas where they may pose health and safety risks. Adverse effects would result from the continued potential for injuries from park staff working in outdoor field conditions while implementing prairie dog management activities. Any risks associated with the use of rodenticide (zinc phosphide) would be negligible due to the low bioaccumulation rate of the substance in the environment. Impacts of exposure of NPS staff to zinc phosphide involved in its application can be minimized by following label directions and wearing appropriate safety equipment.

3.12.5 Effects of Alternative C – Exclusion Zone

Direct and Indirect Effects

Impacts to human health and safety under Alternative C would be similar to those under Alternative B: long-term, minor, and beneficial. As with Alternative B, the park would be better equipped to deal with any occurrence of sylvatic plague, as there are a variety of control

measures allowed under this alternative, of which the impacts would be the same as under Alternative B.

Cumulative Effects

Cumulative effects of the various existing and proposed projects and their impacts on human health and safety are similar to Alternative B. Overall, the various projects and plans that exist or are proposed in the North Unit may have short-term, minor impacts to human health. However, improved infrastructure and resources management associated with these plans would likely have long-term, moderate, beneficial impacts to human health. Effects of Alternative C would contribute long-term, minor benefits to public health and safety. Adoption of a specific management zone and an increase in the options for control would provide park staff with more efficient methods of prairie dog control. Human health impacts relating to the use of zinc phosphide as a prairie dog control measure are likely to be negligible, given the infrequency of use and the inability of the substance to persist in the environment. Any other risks associated with prairie dog control measures may be mitigated through proper planning and implementation.

Conclusion

Alternative C would continue to have long-term, minor, beneficial effects and long-term, negligible, adverse effects on human health and safety. Beneficial effects would occur from continuing to relocate prairie dogs away from areas where they may pose health and safety risks. Adverse effects would result from the continued potential for injuries from park staff working in outdoor field conditions while implementing prairie dog management activities. Any risks associated with the use of rodenticide (zinc phosphide) would be negligible due to the low bioaccumulation rate of the substance in the environment.

3.13 Visitor Use and Experience

3.13.1 Affected Environment

As a National Park Service unit, Badlands National Park provides a variety of opportunities for recreation, enjoyment, education, and inspiration in the context of the natural features that compose the North Unit. Thus, a significant management goal of the park is to provide these opportunities to the public with a high degree of enjoyment and accessibility.

Regionally, Badlands National Park is often the first stop on a longer trip westward into the Black Hills along Interstate 90, a trip which also includes Mount Rushmore, Jewel Cave, Wind Cave, Custer State Park, and the Black Hills National Forest. On average, approximately one million people visit Badlands National Park annually, with the highest visitation periods being in the summer months of June, July, and August (NPS, 2007).

Badlands National Park offers a variety of ways for visitors to experience the park. Hikers can explore the park via maintained trails such as the Castle, Door, Window, and Notch Trails. Backpackers can make extended stays in the Sage Creek Wilderness Area. Motorists can experience the stunning scenery of the North Unit by driving the Badlands Loop Road, which offers numerous scenic overlooks and wayside exhibits, of which most are wheelchair accessible. Additionally, the park maintains a large campground at the Cedar Pass Complex and the Sage Creek primitive campground.

The Ben Reifel Visitor Center, which is also located in the Cedar Pass Complex, offers a variety of visitor services for individuals stopping in Badlands. In the summer, nightly interpretive programs are held at the Badlands Amphitheatre. Additionally, interpretive walks are led by park rangers to help visitors learn more about the history, geology, fossil resources, and wildlife of the park. Wildlife resources of the park are a critical aspect of the visitor experience; visitors can often see bison, pronghorn, bighorn sheep, numerous bird and reptile species, and prairie dogs.

Prairie dogs are an important part of the overall visitor experience to the North Unit. As a keystone species of the mixed-grass prairie ecosystem, the prairie dog is an important educational resource of the park. A survey conducted for the year 2000 indicated that the Roberts prairie dog town was one of the most visited park sites in the North Unit due to its size and close proximity to Rim Road (NPS, 2007). An information board is located at the Roberts town that provides information to visitors regarding prairie dogs and associated species. Because of the important educational and interpretative values associated with the Roberts town, any likely control on the town would be to prevent further encroachment onto private lands and would not entail control on the entire town.

3.13.2 Methodology

This impact analysis estimates the potential effects on visitor use and experience of the North Unit that may result from prairie dog management activities,

The intensity thresholds for impacts to visitor use and experience are defined as follows:

Negligible: Changes in visitor use and experience would be below or at the level of detection. Visitors would not be aware of the effects associated with the alternative.

Minor: Changes in visitor use and experience would be detectable, although the changes would be slight. The visitor would be aware of the effects associated with the alternative, but the effects would be slight.

Moderate: Changes in visitor use and experience would be readily apparent. The visitor would be aware of the effects associated with the alternative and would likely wish to express his or her opinion about the changes.

Major: Changes in visitor use and experience would be apparent and would be severely adverse or exceptionally beneficial. The visitor would be aware of the effects associated with the alternative and would likely express a strong opinion about the changes.

The duration thresholds for impacts to visitor use and experience are defined as follows:

Short-term: Effects occur during management or treatment activities.

Long-term: Effects extend beyond management or treatment activities.

3.13.3 Effects of Alternative A – No Action Alternative

Direct and Indirect Effects

Under Alternative A, the park would continue on a limited basis to live-trap and relocate prairie dogs that conflict with other resource management activities in developed areas. Prairie dog control in areas designed for other visitor use objectives may potentially be difficult given the limited control measures allowed. However, the ability of visitors to experience prairie dogs in areas of the park currently inhabited by prairie dogs would remain relatively easy, particularly at the Roberts town. Impacts to visitor experience under Alternative A would be long-term, minor, and beneficial.

Cumulative Effects

Other park plans, projects and developments, such as those proposed under the General Management Plan, would likely cause long-term, moderate, beneficial impacts to visitor experience through improvements in park infrastructure and increases in recreational and interpretive opportunities for visitors. Under Alternative A, visitors would have relatively easy opportunities to observe prairie dogs in their native habitat. Control of prairie dogs that conflict with other visitor use objectives may potentially be difficult due to the limited control measures allowed. Cumulative effects would likely be long-term, minor, and beneficial.

Conclusion

Alternative A would have long-term, minor, and beneficial effects on visitor use and experience. The fact that visitors would continue to have easy access to view prairie dog activities would be beneficial.

3.13.4 Effects of Alternative B – Management Zones (NPS Preferred)

Direct and Indirect Effects

Prairie dogs would be managed to not expand into administrative areas, such as campgrounds and the Cedar Pass Complex, and would not conflict with other park management activities that focus on providing visitor services. However, the possibility remains that visitors may actively witness ongoing prairie dog control activities, which may negatively impact certain visitor's experience if they do not understand the context under which the management activities are being implemented. However, most prairie dog management activities would take place during low visitation periods. Thus, the overall impacts to visitor experience under Alternative B may be short to long-term, negligible to minor, and beneficial, with the exception of a negligible to minor negative experience that may accompany witnessing control activities without understanding the larger context or prairie dog management goals.

Cumulative Effects

Other park plans, projects, and developments (such as those proposed under the General Management Plan) would likely cause long-term, moderate, beneficial impacts to visitor use and experience through improvements in park infrastructure and increases in recreational and interpretive opportunities for visitors. Under Alternative B, visitors would have relatively easy opportunities to observe prairie dogs in their native habitat. Visitors may experience short-term,

adverse impacts if they witness ongoing prairie dog management actions and do not understand the context under which they are being implemented. However, appropriate prairie dog management in areas designed for other visitor uses would potentially beneficially impact visitor experience. Any potential adverse impact may be lessened through appropriate mitigation procedures. Cumulative effects under Alternative B are likely to be short to long-term, negligible to minor, and beneficial.

Conclusion

Alternative B would have long-term, minor, beneficial effects, as well as short-term, negligible to minor, adverse effects on visitor use and experience. The fact that visitors would continue to have easy access to view prairie dogs in their native habitat and that prairie dog activity would be controlled in areas designed for other visitor services would be beneficial. Any instance in which a visitor witnesses prairie dog control and does not understand the context of any such actions may lead to an adverse effect. To mitigate this type of adverse effect the park management would avoid performing baiting or setting traps in public areas and if they do, signs would be placed explaining what is happening. This is the same protocol used by the park when controlling exotic plants.

3.13.5 Effects of Alternative C – Exclusion Zone

Direct and Indirect Effects

The effects of Alternative C would be similar to Alternative A. Because the majority of the prairie dog towns in the North Unit do not fall within the quarter-mile exclusion zone and would be allowed to fluctuate naturally, adverse impacts to visitor experience as a result of witnessing management activities would be highly unlikely. Furthermore, as there are no prairie dog towns that currently exist in the exclusion zone near the Cedar Pass Complex, impacts to other visitor services are likely to not be impacted. The ability to experience prairie dogs in areas of the park currently inhabited by prairie dogs would remain relatively easy, particularly at the Roberts town. Impacts to visitor experience under Alternative C would be short to long-term, negligible to minor, and beneficial. The park would maintain the ability to control prairie dogs in administrative areas of the park where expansion conflicts with other park management goals and objectives.

Cumulative Effects

Other park plans, projects and developments, such as those proposed under the General Management Plan, would likely result in long-term, moderate, beneficial impacts to park operations through improvements in park infrastructure and increases in recreational and interpretive opportunities for visitors. Under Alternative C, visitors would have relatively easy opportunities to observe prairie dogs in their native habitat. Visitors may experience short-term, adverse impacts if they witness ongoing prairie dog management actions and do not understand the context under which they are being implemented.

Conclusion

Alternative C would have long-term, minor, beneficial effects, as well as short-term, negligible to minor, adverse effects on visitor use and experience. The fact that visitors would continue to have easy access to view prairie dogs in their native habitat and that prairie dog activity would

be controlled in areas designed for other visitor services would be beneficial. Any instance in which a visitor witnesses prairie dog control and does not understand the context of any such actions may lead to an adverse effect.

3.14 Park Operations

3.14.1 Affected Environment

For the purpose of this EA, park operations refer to any park infrastructure (such as campgrounds) that may be affected by any of the alternatives, as well as any additional costs that may arise from implementation of any of the proposed alternatives.

Facilities administered by the NPS in the North Unit include the Ben Reifel Visitor Center, the Cedar Pass Campground, the Sage Creek Campground, and the Pinnacles Ranger station. Additionally, the park maintains a horse pasture (located near the Pinnacles Ranger Station) and bison holding pens in the north of the park used during the annual bison roundup.

Alternatives B and C would lead to an increase in costs incurred by the park to pay for implementation of the alternatives. Because there is no active prairie dog management plan, there are no funds to allow for implementation of any action alternative under the current administration. Specific costs for implementation of any action alternatives would be relative to the specific alternative, the measure of control used, and the number of adjacent private landowner complaints received by the park. Current estimates for costs directly related to prairie dog management include \$18,000 for each new seasonal employee hired; \$12 per acre for pre-bait and treated bait as a control measure; and \$8 per acre for live-trapping. Additional costs would include materials used for fencing and creation of visual barriers, native grass seed used for restoration of controlled towns, and fuel used for planting equipment.

3.14.2 Methodology

This impact analysis section evaluates any changes that may occur to park operations as a result of implementing any of the alternatives.

The intensity thresholds for impacts to park operations are defined as follows:

Negligible: Park operations would not be affected or the effects would be below or at the level of detection and would not have an appreciable effect on park operations.

Minor: Impacts to park operations would be detectable but would not be of a magnitude that would appreciably change the park. Any mitigation required to offset adverse impacts would be relatively simple to implement and would likely be successful.

Moderate: Impacts to park operations would be readily apparent to park staff and the general public and would lead to a substantial change to park operations. Mitigation measures required to offset any adverse impacts would likely be successful.

Major: Impacts to park operations would be apparent and result in noticeable changes to park operations that would be noticed by park staff and the general public. The impacts would be substantially different as compared to current park operations. Mitigation efforts would be

required to offset adverse impacts, and the success of any such efforts could not be guaranteed.

The duration thresholds for impacts to park operations are defined as follows:

Short-term: Effects occur during the duration of the project.

Long-term: Effects extend beyond the duration of the project.

3.14.3 Effects of Alternative A – No Action Alternative

Direct and Indirect Effects

Impacts to park infrastructure in proximity to prairie dogs (primarily the Pinnacles horse pasture, bison holding pens, and the Sage Creek Campground) would be long-term, minor to moderate, and adverse. Because of the limited control measures allowed under the No Action Alternative, other park objectives in these areas where prairie dog colonization has occurred would continue to be compromised. Park personnel commented during the internal scoping process that prairie dog colonization has led to conflicts with other park goals. This is particularly the case with prairie dogs grazing in ungulate holding pens and associated grazing areas. The park would maintain the ability to live-trap and relocate prairie dogs that have expanded into administrative areas where they conflict with other park management goals and objectives. However, without methods that are more efficient, considerable and increasing amounts of park staff time would need to be spent to continue to live-trap the prairie dogs as the population increases. As the population increases, there may be more instances of prairie dog encroachment onto neighboring, private landowner land. This would also require increasing amounts time to deal with as the prairie dog population increases, especially with the limited control methods available under this alternative.

Costs would primarily include the estimated \$8 per acre for live-trapping in areas where prairie dog colonies have expanded onto adjacent private land. Additionally, park personnel assigned with the task of dealing with boundary complaints from adjacent private landowners would incur additional time to their schedules.

Cumulative Effects

Other park plans, projects, and developments (such as those proposed under the General Management Plan) would likely result in long-term, moderate, beneficial impacts to park operations. Cumulative impacts to park operations as a result of Alternative A would be long-term, minor to moderate, and adverse. Park personnel would continue to incur additional time to respond to boundary complaints relating to encroachment on adjacent private lands. Prairie dogs would continue to conflict in areas where colonies interact with other park management objectives with few resources to respond to problem prairie dog populations. Additional costs associated with prairie dog management would likely be minor.

Conclusion

Prairie dog activities that conflict with other park operations and time responding to landowner concerns about prairie dogs as a result of continuing current management would result in a long-term, minor to moderate, adverse impact on park operations.

3.14.4 Effects of Alternative B – Management Zones (NPS Preferred)

Direct and Indirect Effects

Under Alternative B, environmental consequences to park infrastructure in proximity to prairie dogs would be long-term, minor, and beneficial. Impacts to other park management objectives in administrative areas would be limited, as the park would maintain the ability to control prairie dogs that have expanded into administrative areas that conflict with other park goals and objectives. Additionally, with objectives for different zones and with methods that are more efficient, park staff would be better able to control prairie dog populations without continuously having to live-trap. This would result in less time needed to perform live-trapping, but time would have to be spent managing the zones. However, the zone management would allow for better management of the prairie dog population.

Costs associated with implementation of Alternative B would be dependent and relative to the control measure used.

Cumulative Effects

Other park plans, projects, and developments (such as those proposed under the General Management Plan) would likely cause long-term, moderate, and beneficial impacts to park operations. Cumulative impacts to park operations from Alternative B would be long-term, minor, and beneficial. Prairie dog conflicts with other park operation objectives would be limited because of administrative control of prairie dogs in some of these areas. Additional costs associated with prairie dog management would be dependent and relative to the control measure employed.

Conclusion

Prairie dog activities that conflict with other park operations and time responding to landowner concerns about prairie dogs would be minimized under Alternative B. Consequently, Alternative B would have long-term, minor, and beneficial impacts to park operations.

3.14.5 Effects of Alternative C – Exclusion Zone

Direct and Indirect Effects

Impacts to park infrastructure in proximity to prairie dogs (primarily the Pinnacles horse pasture, bison holding pens, and the Sage Creek Campground) would be long-term, minor, and beneficial. Park personnel commented during the internal scoping process that prairie dog colonization has led to conflicts with other park goals in areas such as the bison holding pens where prairie dogs are grazing possibly at the expense of the bison. However, administrative control of prairie dogs in these areas would likely lessen the adverse impact of prairie dogs in these areas.

Although the Exclusion Zone would effectively limit park staff time needed to respond to encroachment complaints from adjacent private landowners, the time required to ensure that the Exclusion Zone was maintained free of prairie dogs would likely lead to a long-term, minor, adverse impact to park operations.

Costs associated with implementation of Alternative C would be dependent and relative to the control measure used in the Exclusion Zone adjacent to private lands.

Cumulative Effects

Other park plans, projects, and developments (such as those proposed under the General Management Plan) would likely cause long-term, moderate, beneficial impacts to park operations. Cumulative impacts to park operations from Alternative C would be long-term, minor to moderate, and both beneficial and adverse. Park personnel would continue to incur additional time to respond to boundary complaints relating to encroachment on adjacent private lands. However, this additional time would be minimal due to the presence of the prairie dog Exclusion Zone. Conversely, additional time and resources would be required to actively maintain the Exclusion Zone free of prairie dogs. Additional costs associated with prairie dog management would be dependent on and relative to the control measure employed.

Conclusion

Under Alternative C, administrative control of prairie dogs in areas where expansion conflicts with other park objectives would likely lead to a beneficial impact to park operations. Park staff time spent maintaining the Exclusion Zone free of prairie dogs would likely result in long-term, minor, adverse impact to park operations.

3.15 Ethnographic Resources

3.15.1 Affected Environment

Ethnographic resources are defined by the National Park Service as “any site, structure, object, landscape, or natural resource feature assigned traditional, legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it” (NPS, 2007). Ethnographic resources exist in the North Unit of Badlands National Park, which is an acknowledged part of the historical territory of the Oglala Sioux people. Local tribes have continually utilized lands within the park boundary for more than eleven thousand years, and several areas in Badlands National Park hold special significance in Native American cultural traditions (NPS, 2007).

The prairie dog maintains a long history with the Native Americans who inhabit the prairie landscape. Prairie dogs were historically used as food source in Native American diets, and their bones were used for the manufacture of tools. Additionally, prairie dog burrowing activities have special spiritual properties in Native American Folklore. Excavated soils from prairie dog colonies are linked to the subterranean world and are believed to have spiritual, religious, and medicinal purposes. Furthermore, animal and plant species that have an associative relationship with the prairie dog (such as bison, black-footed ferret, or plants that have herbal uses) have additional cultural properties for Native Americans, as they are part of the natural landscape (NPS, 2006a).

3.15.2 Methodology

This impact analysis section evaluates any effects that may occur to ethnographic resources as a result of implementing any of the alternatives.

The intensity thresholds for impacts to ethnographic resources are defined as follows:

Negligible: Effects would be barely perceptible and would not alter resource conditions or the relationship between the resource and the affiliated group's traditional beliefs and/or practices.

Minor: (Adverse) – Effects would be slight but noticeable and would not appreciably alter resource conditions or the relationship between the resource and the affiliated group's traditional beliefs and/or practices.

(Beneficial) – Traditional access, practices, and/or beliefs would be accommodated by the conditions at North Unit.

Moderate: (Adverse) – Effects would be apparent and would alter resource conditions or the relationship between the resource and the affiliated group's traditional beliefs and/or practices.

(Beneficial) – Traditional access, practices, and/or beliefs would be facilitated by the conditions at North Unit.

Major: (Adverse) – Effects would be highly apparent and would alter resource conditions or the relationship between the resource and the affiliated group's traditional beliefs and/or practices to the extent that the survival of the group's beliefs and/or practices would be jeopardized.

(Beneficial) – Traditional access, practices, and/or beliefs would be encouraged by the conditions at North Unit.

The duration thresholds for impacts to ethnographic are defined as follows:

Short-term: Recovery takes less than one year.

Long-term: Recovery takes longer than one year.

3.15.3 Effects of Alternative A – No Action Alternative

Direct and Indirect Effects

Impacts of Alternative A would be long-term, minor to moderate, and both adverse and beneficial to ethnographic resources. Large expansions of prairie dogs within the bison range could potentially have adverse impacts on ungulate grazers through competition for forage resources. However, the continued presence of the prairie dog as a native species of the mixed-grass prairie ecosystem would have a long-term, minor to moderate, beneficial impact on ethnographic resources. The same impact would occur from the continued presence of any associated natural landscape features, such as prairie dog burrows or species which depend on prairie dogs, as a result of prairie dog activities that are valued by traditional groups.

Cumulative Effects

Because of the dramatic changes which have occurred in the Western United States landscape over the past few centuries, ethnographic resources have been adversely impacted. The decimation of species valued by Native Americans (such as bison and prairie dogs) and the conversion of vast areas of land to agriculture and industrial developments have had irreversible impacts on the Native American landscape. Thus, projects and plans implemented by the National Park Service seek to maintain those ethnographic resources that remain.

Implementation of the General Management Plan may lead to long-term, minor, adverse impacts to ethnographic resources. Until inventories of ethnographic resources within the North Unit can be completed, site-specific surveys and consultations with Native American groups would be performed as appropriate. Impacts of the Weed Management Plan would be long-term, minor to moderate, and beneficial, because actions under the plan would restore the lands to their pre-European landscape. Additionally, none of the plant species used for traditional purposes would be adversely impacted under the plan.

Losses in prairie dog habitat and populations outside of the North Unit are likely to continue. As risk to the overall population increases, losses of prairie dog habitat and populations outside the North Unit are likely to increase. Alternative A would have a long-term, minor to moderate, beneficial cumulative effect on resources within the park valued by Native Americans, such as prairie dogs and associated species. However, when combined with long-term, moderate, and adverse effects of actions outside of the North Unit upon resources valued by Native Americans, the resulting beneficial impact would likely be negligible.

Conclusion

Alternative A would likely contribute to the both beneficial and adverse impacts to ethnographic resources. Effects to ungulate grazers valued by Native American Traditions would be adverse if prairie dogs expand at a rapid rate and begin to compete for forage resources. However, effects would also likely be beneficial if the prairie dog populations expand, because the prairie dog is a species that has a long relationship with Native American culture. Alternative A would not result in the impairment of ethnographic resources.

3.15.4 Effects of Alternative B – Management Zones (NPS Preferred)

Direct and Indirect Effects

Impacts of Alternative B would likely be long-term, minor to moderate, and beneficial. Because prairie dogs compete for forage area with other species valued by Native American Tradition, consequences may be adverse. This consequence may be effectively minimized through habitat allocations in the Bison Management Zone. Additionally, the continued presence of prairie dogs on the North Unit landscape and traditional landscape features associated with prairie dogs would likely lead to long-term, minor to moderate, beneficial impacts to ethnographic resources.

Cumulative Effects

Past cumulative effects for this alternative would be the same as described for Alternative A. However, because there would be specific management zones (most notably the Bison Management Zone), cumulative adverse impacts would be negligible and minimized through proper management of the habitat that is shared by bison and prairie dogs.

Conclusion

Alternative B would have long-term, minor to moderate, beneficial impacts to ethnographic resources of the North Unit, particularly in the Bison Management Zone. As competition for forage resources between prairie dogs and other species valued by Native Americans would be more effectively managed, adverse impacts would be minimized while the beneficial impacts to

ethnographic resources as a result of prairie dog activities would continue. Alternative B would not result in the impairment of ethnographic resources.

3.15.5 Effects of Alternative C – Exclusion Zone

Direct and Indirect Effects

Impacts of Alternative C would be long-term, minor to moderate, and both adverse and beneficial to ethnographic resources. Because prairie dogs compete for forage area with other species valued by Native American tradition, consequences may be adverse. Adverse impacts may also be experienced in the ¼ mile Exclusion Zone where prairie dogs would not be allowed. However, the continued presence and likely expansion of prairie dogs, as well as species associated with prairie dogs, on the majority of the North Unit landscape would likely result in a long-term, minor to moderate, beneficial impact.

Cumulative Effects

Past cumulative effects for this alternative would be the same as described for Alternative A. Because prairie dogs would be allowed to fluctuate naturally throughout the majority of the study area, they would continue to compete with other species valued by Native Americans for forage resources. Any cumulative benefit to ethnographic resources as a result of Alternative C would likely be negligible given the adverse impacts that have occurred to ethnographic resources from sources outside of the North Unit over the past.

Conclusion

Alternative C would likely contribute to the long-term, minor to moderate, beneficial impacts to ethnographic resources. Effects to ungulate grazers valued by Native American Traditions would be adverse if prairie dogs expand at a rapid rate and begin to compete for forage resources. However, effects would also likely be beneficial if the prairie dog populations expand, because the prairie dog is a species that has a long relationship with Native American culture. Alternative B would not result in the impairment of ethnographic resources. Effects in the Exclusion Zone where prairie dogs would not be allowed are likely to be adverse.

3.16 Archaeological Resources

3.16.1 Affected Environment

Badlands National Park is located within an area referred to as the Plains Culture Area, which is defined by archaeologists on the basis of the character of material remains from prehistoric sites (NPS, 2000). Sequential changes in the character of those remains and material dating techniques have allowed archaeologists to assign a general time frame to four separate periods and/or cultural affiliations of the Plains Culture Area. The four periods are the Paleo-Indian (11,500 to 8,000 BP), the Plains Archaic Tradition (8,000 to 1,500 BP), the Late Prehistoric Period (1,500 BP to 1700s), and the Protohistoric/Historic Period (1675 to 1920s) (NPS, 2000).

The first formal archaeological survey conducted in Badlands National Park was in 1953 by Paul Beaubien (NPS, 2002). Beaubien recorded thirty sites, which primarily consisted of scatters of lithic debris and animal bones in vicinity of the Badlands Wall (NPS, 2002). Over the next forty years, intermittent, small-scale archaeological investigations were conducted in the North Unit,

which documented the continual Native American use of the North Unit for the past 11,000 years.

In 1997, the National Park Service Midwest Archaeological Center initiated a systematic, multi-year archaeological inventory program for Badlands National Park, which continued through 2000. The results of these programs led to the identification of approximately 200 previously unrecorded sites (NPS, 2002).

3.16.2 Methodology

This impact analysis section evaluates any effects that may occur to archaeological resources as a result of implementing any of the alternatives.

The intensity thresholds for impacts to archaeological resources are defined as follows:

Negligible: Archaeological resources would not be affected, or effects would be at the lowest levels of detection.

Minor: Impacts would affect small, localized areas with modest site potential and no significant ties to a traditional group's cultural identity.

Moderate: Impacts would affect moderate areas with high site potential and no significant ties to a traditional group's cultural identity.

Major: Impacts would affect large areas with exceptional site potential and that has significant ties to a traditional group's cultural identity.

There is no duration threshold for impacts to archaeological resources, as once archaeological material is destroyed, it cannot be recovered.

3.16.3 Effects of Alternative A – No Action Alternative

Direct and Indirect Effects

Impacts of prairie dog management activities under Alternative A are likely to be negligible and adverse, because most prairie dog management activities would not take place beneath the surface soil where most unidentified archaeological material is located. Any impact to archaeological resources from prairie dog management activities would be highly unlikely given the limited number of control options under the No Action Alternative. Additionally, any motorized travel used to access prairie dogs that may potentially impact exposed archaeological materials may be mitigated by staying on established roads and trails.

Cumulative Effects

Other projects and plans in the North Unit are likely to cause negligible to minor, beneficial and adverse impacts to archaeological resources in the North Unit of Badlands National Park. The General Management Plan would likely lead to beneficial impacts through enhanced visitor education programs regarding the nature of the archaeological resources found within the North Unit. Any projects focusing on infrastructure development would be performed in accordance with cultural resource guidelines to minimize impacts to unknown archaeological sites.

Additionally, impacts to archaeological resources from management activities under the Weed Management Plan and Fire Management Plan would likely be minor to moderate and adverse due to the potential for exposed archaeological materials to be impacted by prescribed burning. Alternative A would likely contribute negligible, adverse effects to the overall cumulative impacts of other plans to archaeological resources.

Conclusion

Overall, Alternative A would likely result in negligible, adverse impacts to archaeological resources. Alternative A would not result in the impairment of archaeological resources.

3.16.4 Effects of Alternative B – Management Zones (NPS Preferred)

Direct and Indirect Effects

Impacts of prairie dog management activities under Alternative B are likely to be very similar to as those under Alternative A. Impacts are likely to be negligible and adverse due to the fact that most prairie dog management activities would not take place beneath the surface soil where most unidentified archaeological material is located. If prairie dog management activities included the installation of fencing materials, proposed fencing areas would need to be surveyed for archaeological resources and then monitored during the installation process.

Cumulative Effects

Additional plans and projects in the North Unit that may potentially impact archaeological resources in the North Unit were described under Alternative A and would be similar under Alternative B. However, if prairie dog management activities under Alternative B included the installation of fencing materials, proposed fencing areas would need to be surveyed for archaeological resources and then monitored during the installation process. Cumulative effects as a result of implementing Alternative B are likely to be negligible and adverse.

Conclusion

Alternative B would likely result in negligible, adverse impacts to archaeological resources. Alternative B would not result in the impairment of archaeological resources.

3.16.5 Effects of Alternative C – Exclusion Zone

Direct and Indirect Effects

Impacts of prairie dog management activities under Alternative C are likely to be very similar to as those under Alternatives A and B. Impacts are likely to be negligible and adverse because most prairie dog management activities would not take place beneath the surface soil where most unidentified archaeological material is located. If prairie dog management activities included the installation of fencing materials, proposed fencing areas would need to be surveyed for archaeological resources and then monitored during the installation process.

Cumulative Effects

Additional plans and projects in the North Unit that may potentially impact archaeological resources in the North Unit were described under Alternative A and would be similar under Alternative C. However, if prairie dog management activities under Alternative C included the installation of fencing materials, proposed fencing areas would need to be surveyed for archaeological resources and then monitored during the installation process. Cumulative effects as a result of implementing Alternative C are likely to be negligible and adverse.

Conclusion

Alternative C would likely result in negligible, adverse impacts to archaeological resources. Alternative C would not result in the impairment of archaeological resources.

3.17 Water Resources

3.17.1 Affected Environment

The North Unit of Badlands National Park is located within the Missouri River watershed and is comprised of five lesser watersheds: the Bad, the Middle Cheyenne-Elk, the Middle Cheyenne-Spring, the Middle White, and the Upper White. The Badlands Wall divides drainage of the North Unit. Tributaries northwest of the wall flow into the Cheyenne River; tributaries northeast of the wall flow into the Bad River; and tributaries southeast of the wall flow into the White River. The largest volume of eroded sediment originating from the Badlands Wall flows southeast into the White River (NPS, 2003).

A large amount of the precipitation experienced in the North Unit of Badlands National Park comes in the form of summer thunderstorms. Since 1960, annual precipitation has averaged approximately seventeen inches annually based on precipitation totals from the Interior rain gauge station (SDSU, No date). Figure 3.2 graphically depicts this information. However, drought conditions, which have been characteristic over the past several years, have led to below average precipitation amounts. Since 2002, annual precipitation totals have averaged approximately 14 inches (SDSU, No date)(See Figure 3.2). The majority of the rainfall flows overland and does not penetrate the soil due to the soil's low permeability and low moisture capacity (NPS, 2003). Northern areas of the North Unit are largely protected from water erosion by a bed of short to medium grasses. Areas south of the Badlands Loop Road support little vegetation and have high rates of erosion, which lead to the classic badlands formations of highly dissected gullies.

Surface water features (Figure 3.3) are limited in the North Unit. The majority of the streams are intermittent, in which flow is initiated by rainfall events. Water for park facilities is derived from a rural water distribution system known as the West River Lyman/Jones Mni Wiconi Water Project. Additionally, the park maintains a number of artificial stock ponds, which are utilized primarily for bison that inhabit the Badlands Wilderness Area (NPS, 2003).

Information on water quality for the North Unit is extremely limited with only a single water quality observation station in the far eastern portion of the park. Water quality for the North Unit is thought to vary seasonally and between streams, and specific causes or contributors to adverse water quality are mostly unknown (NPS, 2007).

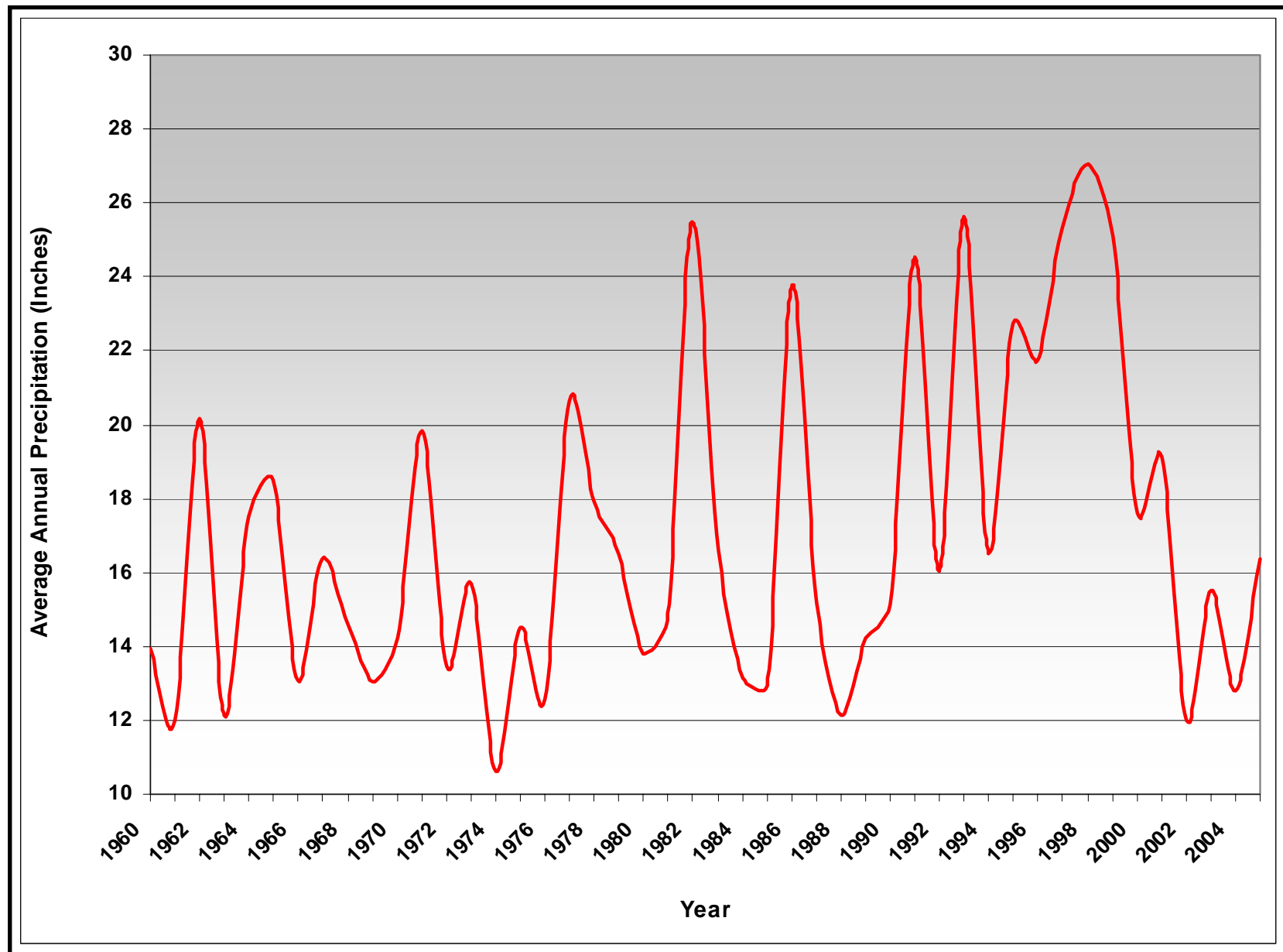


Figure 3.2: Average Annual Rainfall, 1960-2005, Interior, South Dakota

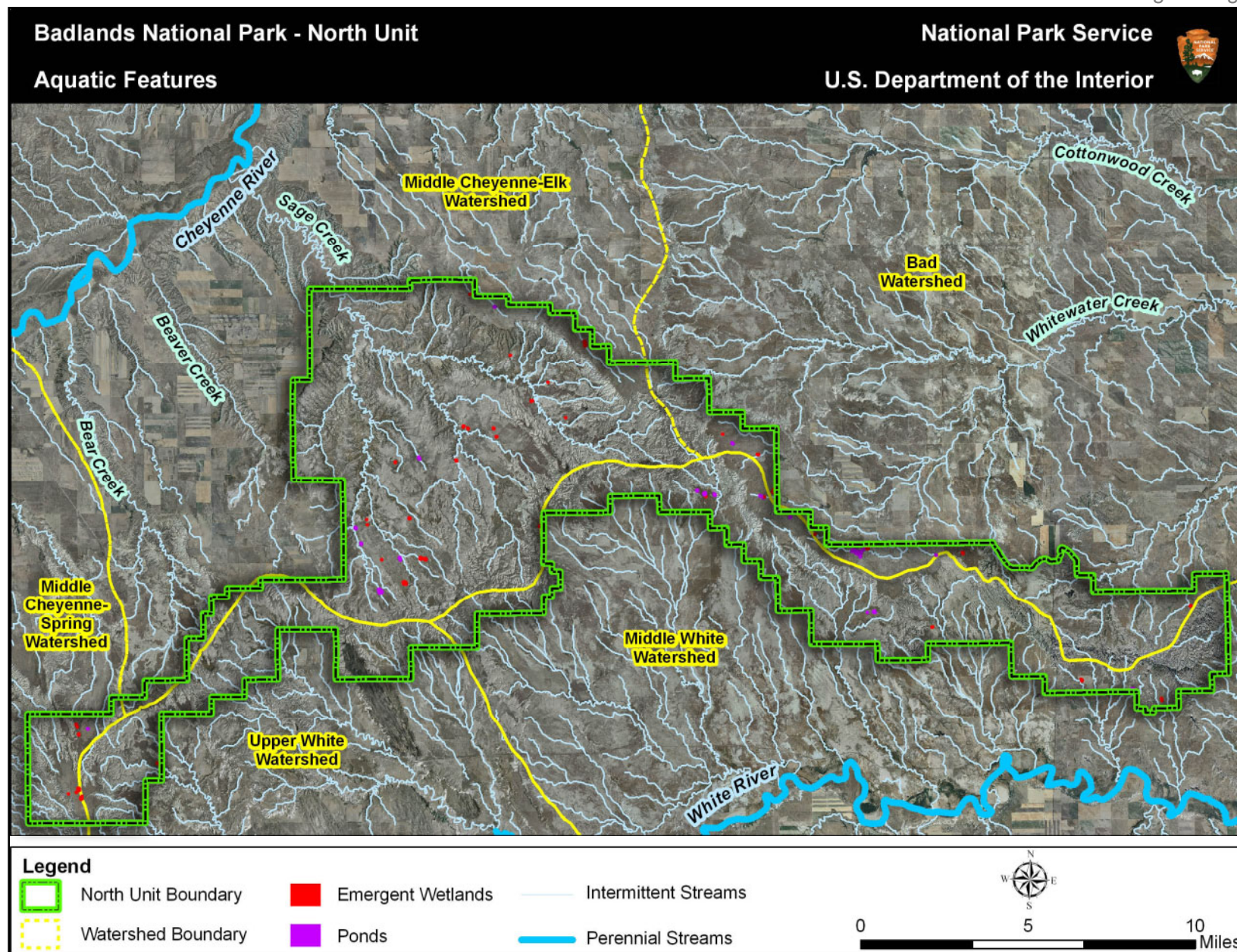


Figure 3.3: Aquatic Features, North Unit, Badlands National Park

3.17.2 Methodology

This impact analysis section evaluates any changes that may occur to water resources as a result of implementing any of the alternatives.

The intensity thresholds for impacts to water resources are defined as follows:

Negligible: Effects would not be detectable, and water quality parameters would be well below all water quality standards for the designated use of the water. No vegetation or wildlife effects associated with altered water quality would be evident.

Minor: Effects to water resources would be detectable, but water quality parameters would be well below all water quality standards for the designated use of the water. Water quality would be within the range of historical conditions.

Moderate: Effects to water quality would be measurable, but water quality parameters would be within all water quality standards for the designated use of the water. Changes in vegetation, wildlife use, and health associated with water quality would be measurable and readily apparent. Mitigation efforts would be necessary to offset adverse effects and would likely be successful.

Major: Effects to water quality would be readily measurable, and some water quality parameters may be periodically exceeded. Changes in vegetation, wildlife use, and health associated with water quality would be measurable and apparent. Extensive mitigation measures would be required to offset adverse impacts, the success of which could not be assured.

The duration thresholds for impacts to water resources are defined as follows:

Short-term: Recovery takes less than one year following project implementation.

Long-term: Recovery takes longer than one year following project implementation.

3.17.3 Effects of Alternative A – No Action Alternative

Direct and Indirect Effects

Short-term, localized occurrences of water erosion may occur in areas colonized by prairie dog towns. Water erosion may potentially lead to increased rates of sedimentation in intermittent streams in proximity to prairie dog towns where vegetation cover has been removed. However, research also suggests that burrowing activities of prairie dogs leads to decreased erosion rates due to the fact that prairie dog burrows allow for more rapid absorption rates during rainfall events (NPS, 2006a). The more rapid absorption rates lead to decreases in the amount of sediment transported to intermittent streams during rainfall events (NPS, 2006a; Kerscher, No date). Additionally, the small amounts of sediments that may occur due to prairie dog towns would be minor due to the high rates of erosion and sedimentation experienced in the topography of Badlands National Park. Environmental consequences would be long-term, negligible, and beneficial, and no impact would likely be experienced on a watershed scale.

Cumulative Effects

Other projects and plans in the North Unit are likely to cause short-term, negligible to moderate, adverse impacts to water quality resources in the North Unit of Badlands National Park. Construction and development activities taken under the General Management Plan may lead to localized increases of erosion, which would result in an increase in sediment loads in nearby tributaries. Actions taken under the Weed Management Plan may lead to short-term, moderate, adverse impacts to water resources due to aerial application of herbicides and any associated drift that may impact surface waters. Any erosion associated with actions under the Fire Management Plan would be negligible to minor due to the naturally high rates of erosion and sediment loading that occurs in the North Unit. Additionally, the time period between burns and vegetation regeneration is generally short. This allows new vegetation to restabilize the soil, which reduces any erosion that may result from the burn. Alternative A would likely contribute negligibly to these local, adverse impacts. The potential exists for areas in proximity to prairie dogs where vegetation has been removed to experience brief periods of erosion during intense rainfall events, which may lead to increased sediment loads in local streams. However, as prairie dog burrows allow for greater absorption rates during rainfall events, water erosion may also be decreased. Thus, if increased absorption rates in proximity to prairie dog towns lead to decreased water erosion, there may be long-term, negligible, and beneficial effects.

Conclusion

Alternative A would have long-term, negligible, and beneficial impacts to water resources of the North Unit. Loss of vegetation in proximity to prairie dog towns may lead to negligibly increased water erosion rates. However, the greater rates of rainfall infiltration in proximity to prairie dog burrows may decrease water erosion rates. Alternative A would not result in the impairment of water resources.

3.17.4 Effects of Alternative B – Management Zones (NPS Preferred)

Direct and Indirect Effects

Short-term, localized occurrences of water erosion may occur in areas colonized by prairie dog towns. Water erosion may potentially lead to increased rates of sedimentation in intermittent streams in proximity to prairie dog towns where vegetation cover has been removed. However, research also suggests that burrowing activities of prairie dogs leads to decreased erosion rates due to the fact that prairie dog burrows allow for more rapid absorption rates during rainfall events (NPS, 2006a). The more rapid absorption rates may lead to decreases in the amount of sediment transported to intermittent streams during rainfall events (NPS, 2006a; Kerscher, No date). Additionally, the small amounts of sediments that may occur due to prairie dog towns would be minor due to the high rates of erosion and sedimentation experienced in the topography of Badlands National Park. Environmental consequences would be long-term, negligible, and beneficial, and no impact would likely be experienced on a watershed scale.

The potential degradation of water quality due to rodenticide (zinc phosphide) application as a control measure would cause short-term, negligible, and adverse impacts. Zinc phosphide and any associated residues are largely immobile and readily absorb into the soil. Furthermore, because zinc phosphide is non-persistent under most environmental conditions, opportunities for transport into any nearby tributaries would be limited given the generally low precipitation amounts experienced in the North Unit. Zinc phosphide and any associated byproducts are

regarded by the USEPA as having a low potential for contamination to groundwater or surface water features (USEPA, 1998).

Cumulative Effects

Other North Unit projects and plans which may potentially impact water resources were discussed under Alternative A. Alternative B would likely contribute negligibly to these local, adverse impacts. The potential exists for areas in proximity to prairie dogs where vegetation has been removed to experience brief periods of erosion during intense rainfall events. The erosion may potentially lead to increased sediment loads in local streams. However, as prairie dog burrows allow for greater absorption rates during rainfall events, water erosion may also be decreased. Thus, if increased absorption rates in proximity to prairie dog towns lead to decreased water erosion, there may be long-term, negligible, and beneficial effects.

Conclusion

Alternative B would have long-term, negligible, and beneficial impacts to water resources of the North Unit. Loss of vegetation in proximity to prairie dog towns may lead to increased water erosion rates. However, the greater rates of rainfall infiltration in proximity to prairie dog burrows may decrease water erosion rates. Additionally, impacts to water quality due to zinc phosphide application would likely be negligible, because byproducts readily absorb into the soil, are immobile, and do not persist in the environment. Alternative B would not result in the impairment of water resources.

3.17.5 Effects of Alternative C – Exclusion Zone

Direct and Indirect Effects

Similar to Alternatives A and B, short-term, localized occurrences of water erosion may occur in areas colonized by prairie dog towns. This may lead to increased rates of sedimentation in intermittent streams in proximity to prairie dog towns where vegetation cover has been removed. However, research also suggests that burrowing activities of prairie dogs leads to decreased erosion rates due to the fact that prairie dog burrows allow for more rapid absorption rates during rainfall events (NPS, 2006a). The more rapid absorption rates may potentially lead to decreases in the amount of sediment transported to intermittent streams during rainfall events (NPS, 2006a; Kerscher, No date). Additionally, the small amounts of sediments that may occur due to prairie dog towns would be minor due to the high rates of erosion and sedimentation experienced in the topography of Badlands National Park. Environmental consequences would be long-term, negligible, and beneficial, and no impact would likely be experienced on a watershed scale.

The potential degradation of water quality due to rodenticide (zinc phosphide) application as a control measure would cause short-term, negligible, and adverse impacts. Zinc phosphide and any associated residues are largely immobile and readily absorb into the soil. Furthermore, because zinc phosphide is non-persistent under most environmental conditions, opportunities for transport into any nearby tributaries would be limited given the generally low precipitation amounts experienced in the North Unit. Zinc phosphide and any associated byproducts are regarded by the USEPA as having a low potential for contamination to groundwater or surface water features (USEPA, 1998).

Cumulative Effects

Other projects and plans in the North Unit that may potentially impact water resources were discussed under Alternative A. Alternative C would likely contribute negligibly to these local adverse impacts. The potential exists for areas in proximity to prairie dogs where vegetation has been removed to experience brief periods of erosion during intense rainfall events. This may lead to increased sediment loads in local streams. However, as prairie dog burrows allow for greater absorption rates during rainfall events, water erosion may also be decreased. Thus, if increased absorption rates in proximity to prairie dog towns lead to decreased water erosion, there may be long-term, negligible, and beneficial effects.

Conclusion

Alternative C would likely have long -term, negligible, and beneficial impacts to water resources of the North Unit. Loss of vegetation in proximity to prairie dog towns may lead to increased water erosion rates. However, the greater rates of rainfall infiltration in proximity to prairie dog burrows may decrease water erosion rates. Additionally, impacts to water quality due to zinc phosphide application would likely be negligible, because byproducts readily absorb into the soil, are immobile, and do not persist in the environment. Alternative C would not result in the impairment of water resources.

3.18 Air Quality

3.18.1 Affected Environment

The 64,000 acre Badlands Wilderness Area present in the North Unit is defined as a Class 1 air quality area as defined by the Clean Air Act of 1977. Under this classification, minimal deterioration is allowed to air quality in the wilderness area.

Air quality in the North Unit is generally good. Minor sources of air pollution immediately adjacent to the North Unit include emissions from vehicles in the summer; natural and agricultural dust; and smoke from fires (either from prescribed burns in the park or on adjacent USFS land, as well as from burning of agricultural waste on private lands). Additionally, small quantities of emissions that originate from industrial facilities located in Rapid City, from the Black Hills of western South Dakota, and from eastern Wyoming occasionally reach the North Unit. Historically, the park has experienced short-term air pollution from blowing dust, low-level smoke from fires, and occasional pollution from the external sources described above (NPS, 2007). Although the air quality of the North Unit is generally good, several proposed industrial facilities (such as coal-fired power plants) in the region could potentially lead to a deterioration of the air quality in the North Unit of Badlands National Park.

A short-term, localized impact associated with prairie dog burrowing activities is the exposure of excavated soil to wind erosion, which may result in blowing soil and atmospheric dust. Quantitative data in regards to specific amounts of blowing soil associated with prairie dog towns is limited. However, localized dust as a result of prairie dog town burrowing activities is a commonly observed phenomenon experienced by private landowners and park personnel during periods of prolonged drought.

3.18.2 Methodology

This impact analysis section evaluates impacts that may occur to air quality as a result of implementing any of the alternatives.

The intensity thresholds for impacts to air quality are defined as follows:

Negligible: Effects to air quality would not be measurable or detectable.

Minor: Effects to air quality would be detectable but slight and on a small scale adjacent to individual prairie dog colonies. Effects would consist of very brief periods of blowing dust.

Moderate: Effects to air quality would be clearly detectable. Prolonged periods of blowing dust would occur and result in a distinct change to air quality and visibility on a local level. Mitigation measures may be necessary to offset any adverse impacts, and any such measures would likely be successful.

Major: Effects to air quality would be substantial and readily detectable. Prolonged periods of blowing dust would occur and result in a distinct change to air quality and visibility throughout the North Unit as well as areas outside of the park. Mitigation measures would be necessary to offset any adverse impacts, and any such measures may not be entirely successful.

The duration thresholds for impacts to air quality are defined as follows:

Short-term: Recovery takes less than seven days.

Long-term: Recovery takes longer than seven days.

3.18.3 Effects of Alternative A – No Action Alternative

Direct and Indirect Effects

Short-term, localized occurrences of blowing soil may occur in areas colonized by prairie dogs. This could possibly lead to brief periods of reduced visibility and buildup of airborne dust on park features in proximity to the prairie dog towns. However, research also suggests that prairie dog burrowing activities bring heavier soils to the surface. These heavier soils reduce the capability for these soils to become airborne from wind (NPS, 2006a). Environmental consequences as a result of prairie dog expansion would likely be short-term, minor, and adverse.

Cumulative Effects

Other projects and plans in the North Unit are likely to cause short to long-term, negligible to minor, adverse impacts to air quality. Construction and development actions associated with the General Management Plan may cause local occurrences of increased amounts of dust. Activities associated with the Weed Management Plan and the Fire Management Plan may cause short-term, minor, adverse impacts to air quality as a result of increased smoke from prescribed burns or wildland fire use. Alternative A would contribute negligibly to localized occurrences of air quality degradation due to blowing soil in proximity to prairie dog towns. However, as research also suggests that prairie dog colonies bring heavier soil to the surface and decrease the propensity for exposed soil to become airborne, it is difficult to predict whether prairie dog activities would be beneficial or adverse in regards to air quality. Nonetheless, given

that the majority of the North Unit's air pollution is derived from sources external to the park, it is likely that any cumulative impact prairie dog activity causes would be negligible.

Conclusion

Alternative A would have short-term, negligible to minor, adverse impacts to air quality resources of the North Unit. Higher incidences of localized airborne dust in proximity to prairie dog towns may arise. However, because prairie dog burrowing activities bring heavier soil to the surface that does not readily become airborne, this impact most likely would be negligible to minor locally, and negligible North Unit wide. Alternative A would not result in the impairment of air quality resources.

3.18.4 Effects of Alternative B – Management Zones (NPS Preferred)

Direct and Indirect Effects

Similar to Alternative A, short-term, localized occurrences of blowing soil may occur in areas colonized by prairie dogs. This could possibly lead to brief periods of reduced visibility and buildup of airborne dust on park features in proximity to prairie dog towns. However, research also suggests that prairie dog burrowing activities bring heavier soils to the surface, which reduces the capability for these soils to become airborne from wind (NPS, 2006a). Environmental consequences are likely to be short-term, minor, and adverse.

Cumulative Effects

Similar to Alternative A, other projects and plans in the North Unit are likely to cause short to long-term, negligible to minor, adverse impacts to air quality. Construction and development actions associated with the General Management Plan may result in local occurrences of increased amounts of dust. Activities associated with the Weed Management Plan and the Fire Management Plan may result in short-term, minor, adverse impacts to air quality as a result of increased smoke from prescribed burns or wildland fire use. Alternative B would contribute negligibly to localized occurrences of air quality degradation due to blowing soil in proximity to prairie dog towns. However, as research also suggests that prairie dog colonies bring heavier soil to the surface and decrease the propensity for exposed soil to become airborne, it is difficult to predict whether prairie dog activities would be beneficial or adverse in regards to air quality. Nonetheless, given that the majority of the North Unit's air pollution is derived from sources external to the park, it is likely that any cumulative impact that results from prairie dog management and/or prairie dog activities would be negligible.

Conclusion

Similar to Alternative A, Alternative B would have short-term, negligible to minor, adverse impacts to air quality resources of the North Unit. Higher incidences of localized airborne dust in proximity to prairie dog towns may arise. However, because prairie dog burrowing activities bring heavier soil to the surface that does not readily become airborne, this impact most likely would be negligible to minor locally, and negligible North Unit wide. Alternative B would not result in the impairment of air quality resources.

3.18.5 Effects of Alternative C – Exclusion Zone

Direct and Indirect Effects

As with Alternatives A and B, short-term, localized occurrences of blowing soil may occur in areas colonized by prairie dogs. This could possibly lead to brief periods of reduced visibility and buildup of airborne dust on park features in proximity to the prairie dog towns. However, research also suggests that prairie dog burrowing activities bring heavier soils to the surface, minimizing the capability for these soils to become airborne from wind (NPS, 2006a). Any potential adverse impacts to air quality as a result of prairie dog activity would be minimized in the Prairie Dog Exclusion Zone. Overall, environmental consequences as a result from prairie dog management would likely be short-term, minor, and adverse.

Cumulative Effects

Other projects and plans in the North Unit which may impact air quality in the North Unit were discussed under Alternatives A and B. Alternative C would contribute negligibly to localized occurrences of air quality degradation due to blowing soil in proximity to prairie dog towns. However, as research also suggests that prairie dog colonies bring heavier soil to the surface and decrease the propensity for exposed soil to become airborne, it is difficult to predict whether prairie dog activities would be beneficial or adverse in regards to air quality. Nonetheless, given that the majority of the North Unit's air pollution is derived from sources external to the park, it is likely that any cumulative impact that results from prairie dog management and/or prairie dog activities would be negligible.

Conclusion

Similar to Alternatives A and B, Alternative C would have short-term, negligible to minor, adverse impacts to air quality resources locally, and negligible impacts North Unit wide. Higher incidences of localized airborne dust in proximity to prairie dog towns is a possibility. However, because prairie dog burrowing activities bring heavier soil to the surface that does not readily become airborne, this impact most likely would be negligible to minor. Alternative C would not result in the impairment of air quality resources.

3.19 Short-Term Use and Long-Term Productivity of the Environment

CEQ regulations for implementing the National Environmental Policy Act require consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). This includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).]

All alternatives of the North Unit's proposed Prairie Dog Management Plan provide measures for park personnel to control prairie dog encroachment into administrative areas of the park that are designed for short-term human uses, such as campgrounds and park facilities. Under the No Action Alternative (Alternative A), control would be limited to live-trapping. Under Alternatives B and C, control in administrative areas of the park that conflict with prairie dog

encroachment would potentially be more effective through the use of a variety of control measures, such as live-trapping, fencing, vegetative barriers, and lethal control.

With regards to long-term productivity and sustainability of the North Unit's environmental resources, the Preferred Alternative (Alternative B: Management Zones) provides the most effective means of ensuring the viability of not only the black-tailed prairie dog but also the wildlife, prairie vegetation, and other components of the prairie ecosystem. All three alternatives give park management officials the ability to continue to sustain a population of black-tailed prairie dogs in the park. This ensures that the prairie dog maintains its keystone role in the mixed-grass prairie ecosystem. However, the unregulated nature of the No Action Alternative (Alternative A) and the Exclusion Zone Alternative (Alternative C), which allows for natural prairie dog fluctuations throughout the majority of the park, may not effectively address conflicts between any future major prairie dog colony expansion and other natural resources that NPS needs to conserve, particularly other ungulate grazers such as bison. If drought conditions in the region persist and prairie dog colonies continue to expand as they have for the last several years, competition for forage resources would increase. Park management officials would have no effective management strategies to deal with the competition for the North Unit's limited forage resources. This could potentially place a strain on the vegetation and other grazers that share the mixed-grass prairie ecosystem with the black-tailed prairie dog.

The Preferred Alternative (Alternative B: Management Zones) gives NPS the best option for sustaining the productivity of the mixed-grass prairie ecosystem in the long-term. Habitat allocation thresholds in the Bison Management Zone would more effectively deal with competition for forage resources between prairie dogs and other ungulate grazers, particularly if regional drought conditions persist. The provision for prairie dog populations to fluctuate naturally in the Free-Range Zone would be beneficial not only to prairie dogs but also the black-footed ferret reintroduction program in the Conata Basin. Prairie dog acreage thresholds in the Control Zone will ensure the viability of native mixed-grass prairie vegetation while allowing the prairie dog room to expand and continue their natural processes on the landscape. Any future control undertaken in the Buffer Zone between the park boundary and adjacent private lands will likely not have an adverse impact on the North Unit's overall prairie dog population. This is because this zone is a low percentage of the North Unit and the percentage of the North Unit's existing prairie dog population that currently inhabits the Buffer Zone is also low.

3.20 Conflicts with Adjacent Land Uses and Policies

Council on Environmental Quality regulations for implementing the National Environmental Policy Act at 40 CFR 1502.16 require Federal agencies evaluating the environmental impacts of their projects, plans, or programs to ... "include discussions of...(c) Possible conflicts between the proposed action and the objectives of Federal, regional, State, and local (and in the case of a reservation, Indian tribe) land use plans, policies and controls for the area concerned." CEQ regulations at 40 CFR 1506.2 (d) requires the Federal agency to: "discuss any inconsistency of a proposed action with any approved State or local plan or laws (whether or not federally sanctioned). Where an inconsistency exists, the statement should describe the extent to which the agency would reconcile its proposed action with the plan or law."

The North Unit of Badlands National Park is bordered by several parcels of private land used primarily for agricultural land practices, including livestock production and crop production. Additionally, the North Unit shares contiguous borders with the USFS Buffalo Gap National

Grassland as well as the South Unit of Badlands National Park. The South Unit is managed as part of the park, through a memorandum of understanding with the Oglala Sioux Tribe.

Adjacent private landowners who raise livestock must adjust the size of their herds to the amount of available forage. Forage resources are dependent upon several factors. These are principally climatic conditions, but also consumption by grazing wildlife. During the scoping process for this document, several adjacent landowners commented that they had experienced a loss of forage for their livestock due to prairie dog encroachment from the park.

3.21 Conflicts with Private and State Plans and Policies on Adjacent Lands

Private landowners are eligible for prairie dog control assistance from the South Dakota Department of Game, Fish, and Parks (SDGFP), under the South Dakota Black-Tailed Prairie Dog Conservation and Management Plan. Appendix 7 of the South Dakota Black-Tailed Prairie Dog Conservation and Management Plan outlines the steps the State will take to deal with prairie dog encroachment from public lands onto private lands as follows:

1. Landowner contacts SDGFP about prairie dog encroachment off public land onto their private land.
2. SDGFP representative visits landowner and determines if control is warranted and what control options will be used.
 - A. First, the SDGFP representative will determine if the prairie dog colony originated from public or private lands. If the colony originated on the private land, no control option will be offered.
 - B. If it is determined that the prairie dogs are encroaching from the public lands, the SDGFP representative will then decide if a non-lethal option exists to alleviate the situation and if the non-lethal option is practical, effective, and efficient. The non-lethal option will be utilized if such an option exists and will solve the complaint if practical, effective, and efficient.
 - C. If it is determined that non-lethal controls cannot be used, SDGFP staff will then use lethal (usually zinc phosphide) and decide if SDGFP will provide control or if a commercial applicator will be employed to alleviate the complaint.

The State of South Dakota does not have the authority to conduct prairie dog management on Federal lands or tribal lands.

Under the prairie dog management plan alternatives described in this environmental assessment, private landowners with land adjacent to the North Unit of Badlands National Park would be protected from prairie dog encroachment originating in the North Unit as well as from encroachment originating in adjacent State lands under the South Dakota State plan.

Under the No Action Alternative (Alternative A), NPS would continue to consult with private landowners who register a complaint regarding prairie dog encroachment and would control the prairie dog towns by live-trapping. Under the Management Zones Alternative (Alternative B), NPS would consult with private landowners who register a complaint regarding encroachment and control the prairie dog towns in the one-quarter (1/4) mile buffer zone. NPS would utilize any and all available lethal and non-lethal control tools. Under the Exclusion Zone Alternative (Alternative C), NPS would actively exclude prairie dog colonies within the one-quarter (1/4) mile Exclusion Zone utilizing any and all available control tools. Although private landowners

would be protected from encroachment under all the alternatives, management strategies for addressing encroachment onto private lands would be more effective under the Action Alternatives (B and C) because of the greater array of control techniques available. Therefore, NPS actions under the North Unit plan would be consistent with plans enacted by the State of South Dakota in regards to the principal goal of protecting private landowners from prairie dog encroachment.

3.22 Conflicts with Federal Plans and Policies on Adjacent Lands

One of the primary goals of the Black-Tailed Prairie Dog Conservation and Management Plan for the Nebraska National Forest (which manages the Buffalo Gap National Grassland adjacent to the North Unit of Badlands National Park) is to maintain the prairie dog complex in the Conata Basin black-footed ferret reintroduction area. Management activities under the North Unit Prairie Dog Management Plan would not conflict with this goal. Under all of the NPS alternatives, prairie dog colonies located on the boundary of the North Unit and the Buffalo Gap National Grassland would be allowed to fluctuate naturally, which would continue to provide vital habitat for the black-footed ferret reintroduction program.

Chapter 4 – Consultation and Coordination

Summary of Public Involvement

In September of 2006, a press release announced the initiation of the Badlands National Park Prairie Dog Management Plan and Environmental Assessment. Interested parties were encouraged to submit comments via phone, mail, or email on the upcoming projects. Development of this plan has been a discussion topic at numerous meetings at Badlands National Park and during several other public scoping meetings held in Wall and Rapid City, SD on October 5, 2006. Several informal comments and suggestions were received from attendees, park neighbors, and other state and federal land managers at these various meetings during the scoping period. Many were incorporated into the alternatives of this plan. Additional opportunities for comment will be afforded to the general public as well as many regulatory organizations during the public review period. The release of the public review document will be announced widely through the Planning, Environment and Public Comment (PEPC) website (<http://parkplanning.nps.gov/>), press releases, e-mail, and during two public open house meetings. These public open house meetings are to be arranged during the public comment period in Wall and Rapid City to discuss the plan with interested members of the public. The document will undergo a 30-day public review period and all substantive comments will be addressed. If no substantive comments or new information are received during the public review period, a finding of no significant impact will be issued and the plan will be implemented as written.

Oglala Sioux Tribe

The appropriate level of Tribal government will be consulted during development of this plan and environmental assessment by the Park Superintendent. Additional opportunities for comment will be afforded to the Oglala Sioux Tribe during the public review period.

US Forest Service, Buffalo Gap National Grasslands

Opportunities for comment will be afforded to Buffalo Gap National Grasslands during the public review period.

US Fish and Wildlife Service

In accordance with the Endangered Species Act of 1973, Section 7 consultation with the U.S. Fish and Wildlife Service concerning impacts to endangered and threatened species will be initiated during the initial drafting of this Badlands National Park Prairie Dog Management Plan and Environmental Assessment. Additional opportunities for comment and formal documentation will be completed by US Fish and Wildlife Service during public review, according to their agency policies.

State Historic Preservation Office

With several park planning projects underway, recent consultation with South Dakota State Historic Preservation Office has already identified all known National Register properties within the park. Eddie Childers informally notified the South Dakota State Historic Preservation Office that we would be developing a Prairie Dog Management Plan in 2007 during consultation for the

Badlands Loop Road Phases III and IV Environmental Assessment in September 2006. A scoping letter was also submitted to the SHPO during the early drafting stages of this document stating that pursuant to 36 CFR part 800.8, Badlands National Park would use this plan/EA to fulfill our compliance with National Historic Preservation Act Section 106 compliance and consultation and will forward a copy for their review when completed. Another letter will be submitted to the South Dakota State Historic Preservation Office to officially notify them that the Badlands National Park Prairie Dog Management Plan and Environmental Assessment will be available for their review and comment during the public review period.

South Dakota Game, Fish, and Parks

Art Smith, Wildlife Biologist for the South Dakota Game, Fish and Parks, was consulted for information used in the Badlands National Park Prairie Dog Management Plan. Opportunities for comment will be afforded to South Dakota Game, Fish, and Parks during the public review period.

South Dakota Department of Agriculture

Opportunities for comment will be afforded to South Dakota Department of Agriculture during the public review period.

Chapter 5 - List of Preparers

NPS Planning Team Participants

Paige Baker, Ph.D.	Superintendent	Badlands National Park
Brian Kenner	Chief of Resource Management	Badlands National Park
Doug Albertson	Wildlife Biologist	Badlands National Park
Eddie Childers	Wildlife Biologist	Badlands National Park
Greg Schroeder	Wildlife Biologist	Badlands National Park

Contractor – Mangi Environmental

Phil Sczerzenie	Project Manager, Wildlife Biologist
Mark Blevins	Environmental Professional
Karla Hillstrom	Environmental Professional
Meghan Morse	Environmental Professional

Chapter 6 - List of Recipients

Federal Agencies and Government

Department of Agriculture
 U.S. Forest Service
 Natural Resources Conservation Service
Department of the Interior
 Wind Cave National Park
 Mount Rushmore National Monument
 Scotts Bluff National Monument
 Midwest Archeological Center
 Midwest Regional Office
 U.S. Fish and Wildlife Service
U.S. Congressional Representatives from South Dakota

State and Local Agencies, Governments and Private Organizations

South Dakota Governor Mike Rounds' Office
State Historic Preservation Office
South Dakota Department of Agriculture
South Dakota Department of Transportation
South Dakota Department of Environmental and Natural Resources
South Dakota Stock Grower's Association
South Dakota State Historic Preservation Officer
South Dakota Game, Fish, and Parks
Pennington County Commissioners
Jackson County Commissioners
Wall Mayor, Wall SD
Rick Hustead, Chairman, Wall Drug
Natural Resources Conservation Service
Sierra Club of Western SD
Defenders of Wildlife
Keystone Conservation
Prairie Wildlife Research
SD Grasslands Coalition
Prairie Hills Audubon Society

Native American Tribes and Councils

Oglala Sioux Tribal Council
Oglala Sioux Tribal President
Oglala Sioux Parks and Recreational Authority
Crow Creek Sioux Tribal Council
Cheyenne River Sioux Tribe
Santee Sioux Tribe of Nebraska
Sisseton-Wahpeton Sioux Tribe
Spirit Lake Nation

Standing Rock Nation
Flandreau Santee Sioux Tribe
Three Affiliated Tribes
Lower Brule Sioux Tribe
Turtle Mountain Tribe
Winnebago Tribe
Omaha Tribe
Yankton Sioux Tribe
Rosebud Sioux Tribe
Ponca Tribe

Private Individuals

Danny Dougen, Scenic, SD
Marvin Jobgen, Scenic, SD
Duane Jobgen, Scenic, SD
Sonny Kudrna, Scenic, SD
Charles Kruse, Interior, SD
Philip Kruse, Interior, SD
James Kjerstad, Wall, SD
Nancy Hilding, Rapid City, SD
Cynthia Wolf, Cody, WY
Kirby Keyser, Wall, SD
Wayne Huether, Interior, SD

Public Media Outlets (e-mail contacts)

argusnews@argusleader.com
charles.ray@state.sd.us
kmcguire@denverpost.com
news@owh.com
danderson@startribune.com
artgroup@homeandawaymagazine.com
editorial@homeandawaymagazine.com
chetland@mpr.org
bruce@codyenterprise.com
cbrokaw@ap.org
kcsr@chadrad.com
keloTV@keloland.com
kotanews@rapidnet.com
jeben@newscenter1.com
news@kevn.com
kevin.woster@rapidcityjournal.com
jwickersham@newscenter1.com
kolson@keloland.com
booster@gwtc.net
news@bhpioneer.com
register@brookings.net
custerchronicle@gwtc.net
badrcd@gwtc.net
info@bbonline.com
kim@smatterings.com
kurt.buer@sd.usda.gov
brad.block@state.sd.us
cgeigle@fs.fed.us
bosster@rapidnet.com
david_barna@nps.gov
sdcoa@camnsd.org

dan.daly@rapidcityjournal.com
bill.harlan@rapidcityjournal.com
hsstar@gwtc.net
press@kadokatelco.com
mcnews@gwtc.net
centennial@countrymedia.net
mcoyote@gwtc.net
nupost@gwtc.net
courant@gwtc.net
news@rapidcityjournal.com
tournesd@dailypost.com
blcpl@gwtc.net
info@sdgreatlakes.org
bill@blackhillsbadlands.com
sdinfo@state.sd.us
prnews@gwtc.net
gbc@gwtc.net
news@sdpb.org
aharvey@keloland.com
news@kevn.com
cindym@kevn.com
news@haugobroadcasting.com
keegan@newscenter1.com
kotaradionews@rapidnet.com
kotaradio@rapidnet.com
kcow@bbc.net
aberdeenproduction@clearchannel.com
kslt@kslt.com
kotanews@rapidnet.com
pd@katradio.com

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Chapter 8 - Glossary

Badlands - A semi-arid environment where deep gullies and ravines have been formed by water and wind erosion.

Bioaccumulation - the accumulation of a substance in a living organism such as in its muscle tissue as a result of its intake both in the food and also from the environment.

Bioturbation - The stirring or mixing of sediment or soil by organisms, especially by burrowing or boring.

Ecosystem – A dynamic and interrelating complex of plant and animal communities and their associated non-living environment.

Encroachment – Expansion into an area not previously occupied.

Eocene - The second epoch of the Tertiary period, lasting from about 54 million to 38 million years ago.

Epizootic - An outbreak (epidemic) of disease in an animal population.

Extirpation - The elimination of a species or subspecies from a particular area, but not from its entire range.

Exotic - A species not historically present in an area also known as non-native species.

Forage - Grasses, small shrubs and other plant material that can be used as food sources for grazing animals and livestock.

Geographic Information System - A computer system designed to allow users to collect, manage, and analyze large volumes of spatially referenced information and associated attribute data.

Global Positioning System – A series of satellites and receivers used to calculate positions on the Earth's surface.

Habitat – Suite of existing environmental conditions required by an organism for survival and reproduction. The place where an organism typically lives.

Keystone Species - An organism that has a greater role in maintaining ecosystem function than would be predicted based on its abundance. Without this species, the ecosystem would likely collapse or greatly diminish in quality (such as number of species).

Mesic – Moderate or temperate climate.

Mitigation - Actions taken to improve site conditions by limiting, reducing or controlling adverse impacts to the environment.

Mixed-Grass Prairie Ecosystem – An ecosystem characterized by the mixture of both short grass and tall grass prairie ecosystems.

Native – A species that historically occurs in an area or one that was not introduced (brought) from another area.

Oligocene – The Third epoch of the Tertiary period, lasting from about 34 and 23 million years ago.

Prairie Ecosystem – An ecosystem where predominate vegetation is grasses and small shrubs, land is predominately flat, and the climate is temperate (mesic).

Prescribed Fire – Fire intentionally ignited by park fire personnel for natural resource management under strict guidelines to meet specific objectives.

Rodenticide – A chemical agent applied to eliminate rodents.

Stochastic – A random environmental or genetic occurrence that may have an impact on the population of a species, such as sylvatic plague.

Sustainable population – A population that will exist without undue risk of extirpation.

Sylvatic Plague – An infectious disease that is caused by the bacterium *Yersinia* (syn. *Pasturella*) *pestis*, is transmitted primarily by the bite of a rodent flea, and occurs in bubonic, pneumonic, and septicemic forms in humans.

Symbiotic - A close prolonged association between two or more different organisms of different species that may, but does not necessarily, benefit each member.

Ungulate – A hoofed mammal, such as bison.

Viable – capable of living successfully, able to develop normally.

Chapter 9 - Acronyms and Abbreviations

APHIS – Animal and Plant Health Inspection Service

BP – Before Present (years)

CA&S – Conservation Assessment and Strategy

CDC – Centers for Disease Control

CEQ – Council on Environmental Quality

CFR – Code of Federal Regulations

DOA – Department of Agriculture

EA – Environmental Assessment

EIS – Environmental Impact Statement

ESA – Endangered Species Act

FONSI – Finding of No Significant Impact

GMP – General Management Plan

GIS – Geographic Information System

GPS – Global Positioning System

MSCP – Multi-State Conservation Plan

NASS – National Agricultural Statistics Service

NFS – National Forest Service

NPS – National Park Service

NEPA – National Environmental Policy Act

PL – Public Law

ROD – Record of Decision

SD – South Dakota

SDGFP – South Dakota Game, Fish, and Parks

SDAIB – South Dakota Animal Industry Board

SDSU – South Dakota State University

T&E – Threatened and Endangered

USDA – United States Department of Agriculture

USEPA – United States Environmental Protection Agency

USFS – United States Forest Service

USFWS – United States Fish and Wildlife Service

USGS – United States Geologic Service