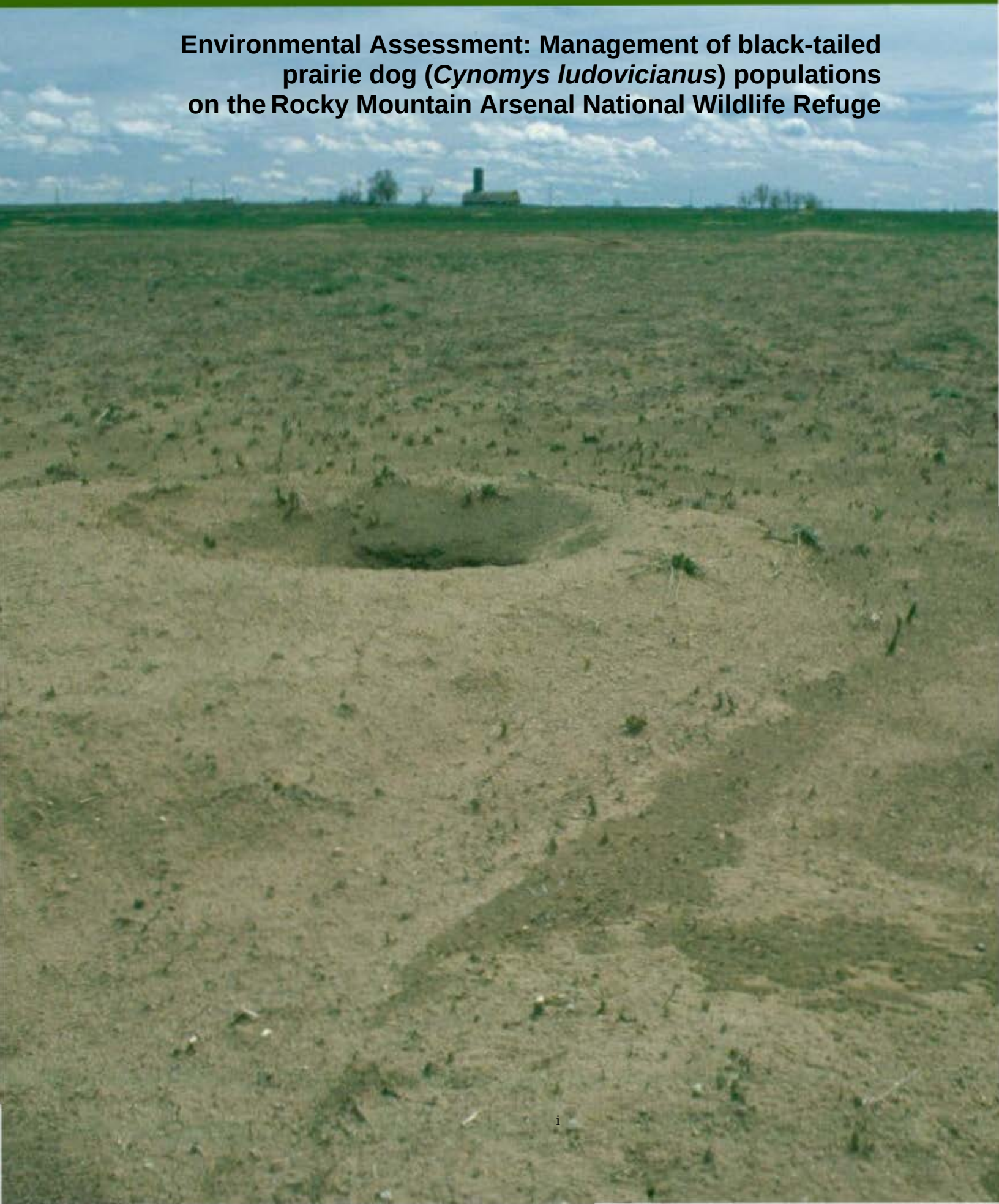
U.S. Fish & Wildlife Service

Environmental Assessment: Management of black-tailed prairie dog (*Cynomys ludovicianus*) populations on the Rocky Mountain Arsenal National Wildlife Refuge



The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people.

The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations.

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1.0 Introduction

This environmental assessment (EA) documents the issues, alternatives, and analysis associated with management of black-tailed prairie dog (*Cynomys ludovicianus*) populations on the Rocky Mountain Arsenal National Wildlife Refuge (RMANWR). In accordance with federal regulations (50 CFR § 1501.3(b)), the Service may prepare an EA on any action, at any time, in order to assist agency planning and decision-making.

The industrial activities and subsequent cleanup that has occurred on the RMANWR significantly altered the landscape. Over the past 25 years, black-tailed prairie dog populations have fluctuated dramatically. At their highest in 1988, prairie dogs were active on 4,573 acres of the Refuge. At their lowest, prairie dogs were only active on 22 acres of the Refuge in 1996. As of 2010, data indicate the area occupied by prairie dog colonies is approximately 3,800 acres, which is approximately 1,215 acres above the maximum proposed (U.S. Fish and Wildlife Service 2013).

This EA outlines a long-term management strategy, in support of the goals and objectives outlined in the RMANWR draft habitat management plan (U.S. Fish and Wildlife Service 2013), and provides a comparison of two management alternatives: (1) no change in current management of prairie dogs on the RMANWR (no action) and (2) implementation of adaptive combination of lethal and non-lethal control measures to actively manage prairie dog populations on the RMANWR (proposed action). The Service considered a full range of alternatives and the potential effects on resources protected and associated cultural, socioeconomic, and aesthetic resources that may be affected.

1.1 Rocky Mountain Arsenal National Wildlife Refuge

Located approximately ten miles from downtown Denver, the RMANWR encompasses 15,998 contiguous acres. Due to contamination from the production of chemical munitions and pesticides, significant portions of this site underwent environmental cleanup as stipulated in the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) administered by the Environmental Protection Agency (EPA). With the exception of about 1,084 acres that will be retained by the U.S. Army, the balance of land within the boundary was transferred to U.S. Fish and Wildlife Service (Service) jurisdiction following completion of remediation activities. Although most environmental cleanup was completed by the fall of 2011, native plant restoration activities continue on most lands.

As the nation's premier urban national wildlife refuge, the RMANWR is host to a robust environmental education program and a various forms of wildlife-dependent outdoor recreation. The Refuge provides catch-and-release recreational fee fishing, nearly ten miles of trails, a nine mile Wildlife Drive auto tour, wildlife viewing opportunities and site tours for the public.

1.2 Background

The Rocky Mountain Arsenal National Wildlife Refuge Act of 1992 (Public Law 102-402), specified eight purposes for which Rocky Mountain Arsenal National Wildlife Refuge (RMANWR) was established:

1. To conserve and enhance populations of fish, wildlife, and plants within the refuge, including populations of waterfowl, raptors, passerines and marsh and water birds.

2. To conserve species listed as threatened and endangered under the Endangered Species Act (ESA) and species that are candidates for such listing.

3. To provide maximum fish and wildlife orientated public uses at levels compatible with the conservation and enhancement of wildlife and wildlife habitat.

4. To provide opportunities for compatible scientific research.

5. To provide opportunities for compatible environmental and land use education.

6. To conserve and enhance the land and water of the refuge in a manner that will conserve and enhance the natural diversity of fish, wildlife, plants and their habitats.

7. To protect and enhance the quality of aquatic habitat within the refuge.

8. To fulfill international treaty obligations of the United States with respect to fish and wildlife and their habitats.

Brief history of RMANWR

By the start of World War II, several hundred agricultural families occupied the present-day Refuge area (Hoffecker 2001). Most of the original shortgrass steppe habitat had already been converted to farmland by this time and was intensively cultivated for production of crops such as milo, corn, millet, oats, and alfalfa. Areas that were too rocky to plow, too windblown due to sandy soils, or had no access to irrigation water remained unplowed and were grazed or dryland farmed. Today, these grazed areas exist as small unique remnant vegetative communities in Sections 4, 19, 8, and 35 of the Refuge.

Shortly after the start of World War II, the U.S. Army selected 19,883 acres as the site of the Rocky Mountain Arsenal. The purpose of this facility was to manufacture chemical weapons and incendiary ordnance for the war effort. All families living within the area were required to relocate and crops planted in the spring of 1942 were simply abandoned. Construction of chemical munitions facilities and other military infrastructure started in June 1942, just six months after the Pearl Harbor attack; construction was finished in record time (Helms and Fowler 1994). The use by the U.S. Army as a chemical weapons production facility from the 1940's to 1970's, and use by Shell Oil Company to manufacture pesticides from the 1970's to 1982 have significantly altered the structure and function of these lands. Examples include the construction of irrigation structures (e.g., lakes, canals), roads, and permanent structures (e.g., homesteads, manufacturing buildings); planting of non-native grasses and trees; and significant disturbance of soils and hydrology (e.g., contaminants, sediments). Collectively, these land-use alterations negatively impacted native habitats and associated wildlife to an extent that achieving refuge purposes has required initiation of significant restoration efforts to reclaim soils and native vegetation necessary to support fish and wildlife resources.

In 1983 the U.S. Environmental Protection Agency listed the site as a Superfund Cleanup site. Subsequent cleanup activities included construction of borrow areas, caps, covers, landfills, and other remediation structures that disturbed thousands of acres on the present-day refuge. These activities have been on-going since 1988 and were concluded in the fall of 2011. In some cases (e.g., Section 36), the surface topography of an entire section was completely re-contoured to facilitate cleanup and drainage, whereas in other sections borrow areas had to be excavated to depths ranging from 1 to more than 20 feet (e.g., Borrow Area 10).

Biological integrity, diversity, and environmental health policy (601 FW 3)

A goal of the National Wildlife Refuge System is to restore and maintain the biological integrity, diversity, and environmental health of its lands. Refuge managers are tasked with evaluating and analyzing the needs of their refuges to determine the best management direction to prevent degradation of environmental conditions and restore lost or severely degraded habitat components. The management of refuge wildlife and habitats can range from simple preservation to active manipulation of habitats and populations while considering integrated and holistic practices (U.S. Fish and Wildlife Service 2001). While the ecological benefits of prairie dogs to an ecosystem cannot be denied, their effects on restored grasslands make this issue complicated and difficult. Although considered a keystone species, prairie dogs need to be managed in balance with other refuge herbivores (bison, deer) and grassland bird species that require undisturbed grassland for nesting and forage, in order that a diversity of habitat be provided for many species. Current prairie dog management techniques do not provide *the balance* needed to restore the refuge's habitat successfully.

Current problem

Restoration of short- and mixed-grass prairie are considered to be of primary importance in achieving the purposes of RMANWR because these habitats provide the life requisites of numerous migratory bird species, many of which are considered to be species of conservation concern due to population declines. The large disturbance that occurred on this site has created conditions leading to high prairie dog populations, which is in conflict with larger goals for grassland restoration. Criteria of successful restorations were agreed to by the U.S. Army and Shell Oil Company, who have funded the majority of work, and the Service in an approved Habitat Restoration Plan (HRP) (U.S. Fish and Wildlife Service 1999). These criteria are as follows:

1. Site must be at least 5 years of age and have a minimum of 30% relative live cover of desirable plant species (seeded species and/or native non-seeded species);
2. Have a minimum of 70% total ground cover, including live vegetation, standing dead vegetation, litter and rock;
3. Have a minimum of 50% of the seeded grass species present on the site; and
4. No single species contributes more than 45% of the live vegetation cover (except in areas where a single species or dominance by a few species provides suitable habitat appropriate for long term wildlife management [e.g., western wheatgrass stands for prairie dog colonies] (U.S. Fish and Wildlife Service 1999).

The structure and function of restored short- and mixed-grass prairie ecosystems are influenced by numerous factors; however, climate (e.g., precipitation) and herbivory are considered among the most important ecological drivers of these systems. Prairie dogs (*Cynomys* spp.) are an important herbivore and are considered a keystone species of these systems because they not only alter vegetation composition and structure, but also create extensive burrow systems used by other species and are a prey item of higher trophic organisms. Consequently, prairie dogs are an integral component necessary to ensure the continued perpetuation of many migratory bird populations, which are a primary responsibility of the Service. For example, burrows provide important nest sites for burrowing owls (*Athene cunicularia hypugaea)*, clipping and grazing create sparsely vegetated areas that are suitable for mountain plover (*Charadrius montanus)*, and prairie dogs represent a primary prey item of Swainson's hawk (*Buteo swainsoni*), ferruginous hawks (*Buteo regalis*), and golden eagles (*Aquila chrystaetos*).

Black-tailed prairie dogs inhabit areas of low and sparse vegetation (Clippinger 1989) because the enhanced visibility in these areas provides greater protection from predation. Rangelands that have been subjected to severe disturbance (e.g., overgrazing, agriculture, noxious weed invasion) frequently exhibit such characteristics and are subject to colonization and rapid growth of prairie dogs (Clippinger 1989). RMANWR's history has been riddled with human-induced and agricultural disturbances, which has exacerbated expansion of prairie dogs. This in turn has significantly hindered a primary goal of Refuge staff is repair these disturbed sites by restoring native vegetation.

Although an important component of short- and mixed-grass systems, prairie dogs can negatively impact the structure and function of these systems if populations exceed system capacity. When the carrying capacity of the habitat has been exceeded (evidenced by as little as 25% bare ground within a colony), destruction of natural resources becomes a concern (Dave Seery, USFS, personal communication 2010). Constant grazing and burrowing pressure can elicit denudation of all vegetation in areas requiring years for native grasses to reestablish root systems (Nervig et al. 2002). Shifts in plant species (from grasses to forbs), as well as soil erosion caused by reduced vegetative litter and ground cover also have been reported. All of these consequences have been seen on the RMANWR negatively impacting approximately 1,011 acres of restored lands. For example, uncontrolled expansion and use of a disproportionate amount of grassland habitat by a single species (e.g., prairie dogs) will compromise the integrity of grassland habitat needed by other species (e.g., lark bunting (*Calamospiza melanocorys*), Cassin's sparrow (*Peucaea cassinii*)) which are resources of management concern in the RMANWR draft habitat management plan (2013).

Invasion and expansion of noxious weeds are yet another concern, especially in restoration sites, because prairie dogs tend to selectively forage on palatable native species allowing increased opportunities for weeds (Whicker and Detling 1988, Witmer and Hoffmann 2002). The Federal Noxious Weed Act of 1974 (Public Law 93-629) requires compliance with the control and management of non-indigenous weeds; therefore, allowing the persistence of weeds in prairie dog colonies is in direct violation of this federal law. Finally, noxious weeds are themselves a threat to biodiversity, agriculture, wildlife resources, and public health.

Efforts to restore native short- and mixed-grass prairie on RMANWR have been underway since 1991 beginning with habitat improvements being conducted for the bald eagle (*Haliaeetus leucocephalus*) population under the Endangered Species Act and ending with mitigation work by the Service as part of the restoration effort. Current refuge restoration work is estimated to be completed in 2014 or later. To date, over 9,500 acres have been restored. Prairie dogs have posed a significant problem since restoration efforts were initiated, which was expected given that previous research indicates that temporary removal of prairie dogs is necessary to facilitate restoration of native grasslands (Witmer et al. 2000).

Research suggests more than 4 years of reduced prairie dog presence may be required to increase vegetation production (Uresk 1985). The overall abundance of prairie dogs on the RMANWR has limited the ability to complete restoration projects. Therefore, staff of RMANWR initiated the use of non-lethal methods (e.g., barrier fences, trapping and transport) to prevent prairie dog damage to restoration sites. Unfortunately, these methods have proven ineffective as approximately 1,011 acres of restored sites have already been significantly degraded by prairie dogs and additional acres are in jeopardy of being significantly damaged (Figure 1).

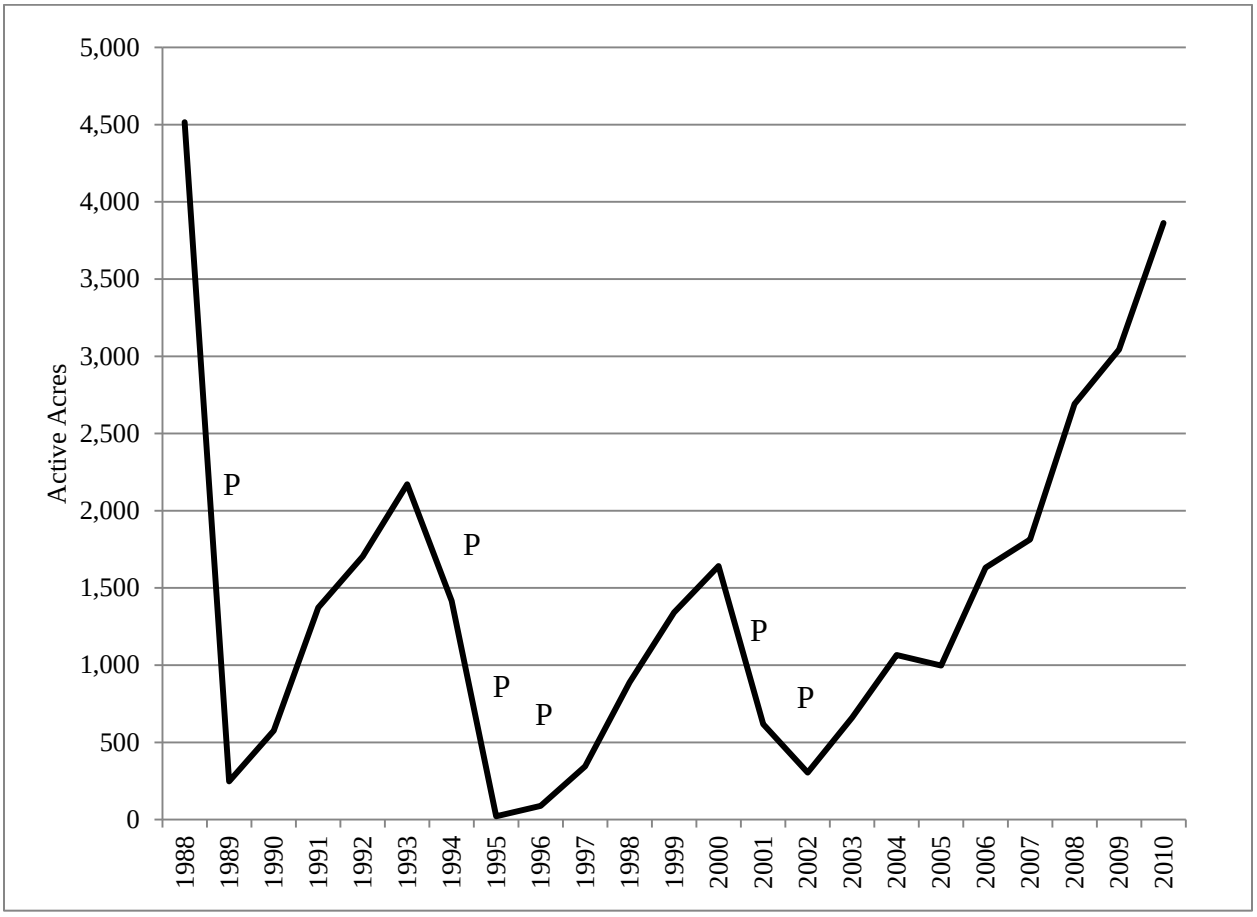

Figure 1. Black-tailed prairie dogs at the Rocky Mountain Arsenal NWR, acres active 1988-2010 (P = plague event)

Given that non-lethal methods have not been effective in controlling prairie dogs *to the extent necessary* (as defined in the draft habitat management plan (2013)) to restore grasslands critical to achieving the purposes of RMANWR, alternative means of prairie dog control must be considered. Based on monitoring data collected on-site, absent prairie dog degradation, an average of 7.8 years is required for restoration to meet success criteria established in the HRP (U.S. Fish and Wildlife Service 1999) (Table 1). Therefore, the goal of this adaptive management strategy is to develop a method, or combination of methods, that (1) increase the probability of restoration success and (2) sustain viable prairie dog populations that provide functions necessary to perpetuate native grasslands and associated migratory birds.

Table 1. Successful establishment of restoration projects at the Rocky Mountain Arsenal NWR

Project Number	***Seeded (Year)***	***Status of Success Met (Year)***	***Years to Successful Establishment (#)***
64	Spring 2000	2009	9
12	Spring 1991	1996	5
40A	Spring 1994	2003	9
5B	Spring 1994	2003	9
F17	Spring 2000	2009	9
56B	Spring 2001	2008	7
5B	Spring 1994	2003	9
59	Spring 2000	2005	5
57	Spring 1998	2009	11
67C	Spring 1999	2004	5
Average # of years to establishment: 8 years ($\bar{x}$ = 7.8 years)			

The method selected to achieve the balance of active restoration within a landscape that includes prairie dogs in the RMANWR draft habitat management plan (2013) is to establish and maintain permanently designated prairie dog zones of 2,585 acres (Figure 2). The 2,585 acres represents approximately 16% of the total refuge, which is consistent with the historical accounts (U.S. Fish and Wildlife Service 2013). These zones overlap much of the historical locations of prairie dog colonies on the RMANWR. As stated in the HMP, "active management of herbivore populations will be required to achieve a balance that provides the resources necessary for all grassland-dependent species identified as resources of concern in the HMP" (U.S. Fish and Wildlife Service 2013).

1.3 Proposed Action

In support of the larger habitat goals and objectives for the RMANWR, the Service proposes implementation of adaptive combination of lethal and non-lethal control measures to actively manage prairie dog populations on the refuge. The Service's draft habitat management plan (U.S. Fish and Wildlife Service 2013) for the RMANWR designates 14 prairie dog zones encompassing 2,585 acres (Figure 2). Removal of prairie dogs outside designated zones will be prioritized according to 1) human health and safety issues, 2) restoration areas that have not had sufficient time to mature, and 3) restoration sites that have been site-prepped and undergoing weed control for eventual restoration.

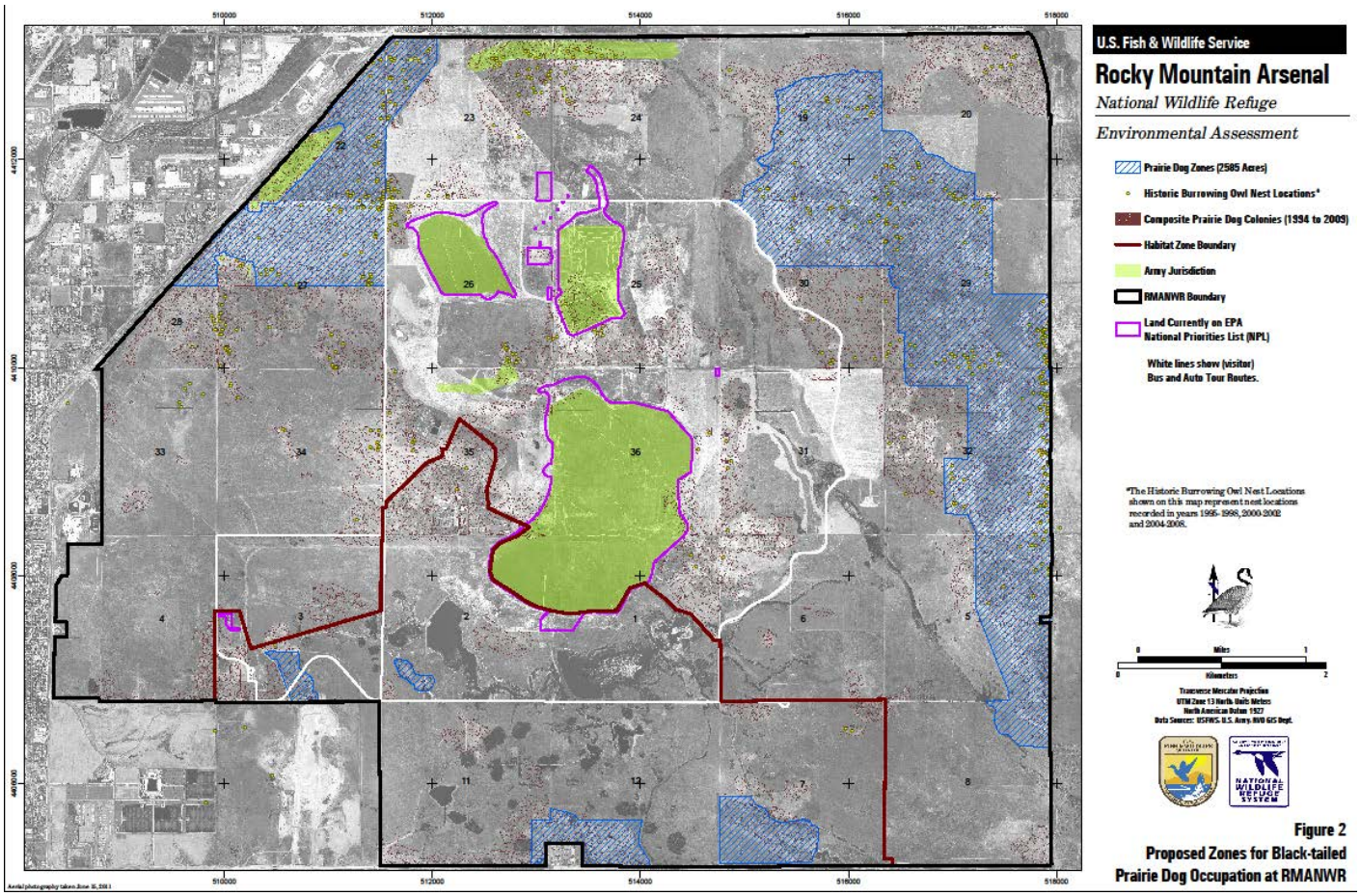

Figure 2. Proposed zones for black-tailed prairie dog management at the Rocky Mountain Arsenal NWR

1.4 Decisions to Be Made

Based on the analysis provided in this final EA, the Service will make two decisions:

1. Determine whether the Service should implement a new adaptive strategy for managing prairie dog populations on the Rocky Mountain Arsenal National Wildlife Refuge.

2. If yes, determine whether the selected alternative will have a significant impact on the quality of the human environment. This decision is required by the National Environmental Policy Act (NEPA). If the quality of the human environment would not be affected, a "finding of no significant impact" will be signed and will be made available to the public. If the preferred alternative would have a significant impact, an environmental impact statement will be prepared to further address those impacts.

1.5 Relation to Statutes, Regulations, and Other Plans

The primary statutory authorities for management of the RMANWR are the Rocky Mountain Arsenal National Wildlife Refuge Act of 1992 (Public Law 102-402) and the National Wildlife Refuge System Administration Act of 1966 (Public Law 89-669), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). Additional relevant statutes, regulations, and/or plans follow:

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)
Pursuant to §120 of CERCLA, some aspects of current management of the RMANWR are included in the Federal Facilities Agreement. The Service currently conducts biomonitoring activities for cleanup parties and must follow certain restrictions on ownership and use including:

- Residential development on the Arsenal shall be prohibited.
- The use of groundwater located under, or surface water located on, the Arsenal as a source of potable water shall be prohibited.
- Consumption of all fish and game taken on the Arsenal shall be prohibited, although hunting and fishing on the Arsenal for non-consumptive use may occur if subject to appropriate restrictions.
- Agricultural, including all farming activities such as the raising of livestock, crops, or vegetables, shall be prohibited. Agricultural practices used in Response Action or used for erosion control, however, shall be permitted.
- Wildlife habitat(s) shall be preserved and managed as necessary to protect endangered species of wildlife to the extent required by the Endangered Species Act, 16 U.S.C. §§ 1531 et seq., migratory birds to the extent required by the Migratory Bird Treaty Act, 16 U.S.C. §§ 703 et seq., and bald eagles to the extent required by the Bald Eagle Protection Act, 16 U.S.C. §§ 668 et seq.
- Other than as many be necessary in connection with a Response Action or as necessary to construct or operate a Response Action Structure, no major alteration shall be permitted in the geophysical characteristics of the Arsenal if such alteration may likely have an adverse effect on the natural drainage of the Arsenal for floodplain management, recharge of groundwater, operation and maintenance of Response Action Structures, or protection of wildlife habitat(s).

National Environmental Policy Act
NEPA (42 USC 4321-4370f) requires federal agencies to examine the environmental impact of their actions, incorporate environmental information, and utilize public participation, as appropriate, in the planning and implementation of their actions. NEPA compliance is required only when a federal agency takes an action.

- Active management of prairie dog populations is included in the habitat and wildlife goals and objectives of the Service's draft habitat management plan (HMP) (2013) for the refuge. This HMP is a step-down management plan identified in the comprehensive management plan (CMP) (U.S. Fish and Wildlife Service 1996a) for the refuge. An environmental impact statement was completed for the CMP in 1996 (U.S. Fish and Wildlife Service 1996b).
- In addition to the HMP and this plan/EA, the Service will release a revised fire management plan and an integrated pest management plan for the RMANWR.
- The RMANWR will begin the process of revising its CMP in May 2013.

National Historic Preservation Act of 1966, as Amended
Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to assess the effects of an undertaking on historical and cultural resource sites. This is accomplished by inventorying proposed disturbance areas or the area of potential effect (APE), evaluating site importance and eligibility to the NRHP, assessing the effect of the undertaking on NRHP-eligible sites, and consulting with appropriate historic preservation agencies. Compliance with Section 106 of NHPA was followed for the disturbance activities described in this plan/EA.

Archaeological Resources Protection Act of 1979
The Archaeological Resources Protection Act of 1979 (16 USC 470aa-470mm) and amendments provide for the protection of archaeological resources on public and Native American lands and provide for exchange of information between governmental entities and academic or private archaeological researchers. An archaeological resource under this act is

defined as material remains of past human life or activities that are of archaeological interest and includes but is not limited to pottery, basketry, bottles, weapons, tools, structures, rock paintings or carvings, intaglios, graves, and human skeletal materials.

Migratory Bird Treaty Act and Migratory Bird Conservation Act
The Migratory Bird Treaty Act (MBTA) (16 USC 703-712) implements various treaties between the United States and other nations of the MBTA, and provides for the protection of migratory birds and specifies penalties for harming or unlawfully killing migratory birds.

Endangered Species Act
The Endangered Species Act (16 USC 1531-1544) provides for the protection of endangered and threatened species and the habitats upon which they depend. Section 7 of the act requires federal agencies to consult with the Secretary of the Interior or the Secretary of Commerce in cases where the agencies' action may affect a listed species, to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of threatened or endangered species or result in the destruction or adverse modification of critical habitat for these species.

Federal Insecticide, Fungicide, and Rodenticide Act of 1996
The Federal Insecticide, Fungicide, and Rodenticide Act of 1996 (7 USC 136-136y) provides federal control of pesticide distribution, sale, and use. All pesticides used in the United States must be registered (licensed) by Environmental Protection Agency (EPA). Registration assures that pesticides will be properly labeled and that, if used in accordance with specifications, they will not cause unreasonable harm to the environment. Use of each registered pesticide must be consistent with use directions contained on the label or labeling.

Noxious Weed Control and Eradication Act of 2004
The Noxious Weed Control and Eradication Act of 2004 (7 USC 7781-7786) requires the Secretary of Agriculture to establish a program to provide assistance to eligible weed management entities to control or eradicate noxious weeds on public and private land.

2.0 Description of Alternatives

This section describes the two alternatives analyzed by the Service to manage black-tailed prairie dog populations on the RMANWR:

- no-action alternative
- proposed action, giving the Service the authority to implement an adaptive combination of lethal and non-lethal control measures to actively manage prairie dog populations on the Rocky Mountain Arsenal National Wildlife Refuge

These alternatives were developed according to NEPA §102(2)(E) requirements to "study, develop, and describe appropriate alternatives to recommend courses of action in any proposal which involves unresolved conflicts concerning alternatives uses of available resources." The alternatives consider the effects of *planned* population control of prairie dogs within the Rocky Mountain Arsenal National Wildlife Refuge boundary.

In addition, several alternatives that were eliminated from further analysis are briefly discussed.

All lethal control methods were analyzed based on efficacy and compliance with the American Veterinary Medical Association Guidelines on Euthanasia (2013). These methods and their impacts have been summarized in Table 2 located in the environmental consequences section. All prairie dogs control activities will be coordinated with visitor services staff to reduce any impacts to public visitation.

2.1 Alternative A – (no action)

Under this alternative, shooting[1] of prairie dogs would be the only lethal control method utilized and current management practices of visual barrier installation and translocation through trapping and burrow-flushing would continue to be employed as a means of protecting newly restored grassland habitats from the effects of grazing, clipping, and burrowing by prairie dogs. Capture and transport of prairie dogs would continue to the National Black-footed Ferret Conservation Center in northern Colorado[2].

Since 1991, refuge staff has been involved in an ongoing effort to restore approximately 11,000 acres of highly disturbed and contaminated lands to native grassland conditions. Following remediation of contaminants by the U.S. Army and Shell Oil Company, areas are restored to grasslands by the Service using a variety of techniques, including plowing, seeding, disking, mowing, and herbicide application. The cost of restoration was funded by the U.S. Army and Shell Corporation until pre-defined success criteria are met, at which time mitigation credit for successfully restored acreage is given to the Army. Under present conditions, prairie dogs can freely move into restoration areas where their foraging activities can seriously damage new and emerging seeded grasslands. In an effort to minimize damage to restoration sites, several non-lethal management techniques have been utilized.

Visual barriers are installed to prevent entry into the sensitive restoration areas. If the visual barriers are ineffective and prairie dogs enter the sites, they are also live-trapped or flushed from burrows and relocated to another area of the refuge. Hygnstrom (1995) reported on the inability of visual barriers to reduce recolonization of prairie dogs in unwanted sites, which has been affirmed at the RMANWR. Additionally, translocation efforts are not always successful and can be labor intensive, especially as the prairie dog populations continue to expand. Based on actual hours of refuge staff, it was calculated that an average employee will spend 170 hours per year trapping and flushing prairie dogs at a cost of $31.71 per prairie dog once the employee's salary and expenses are taken into account. Non-lethal control methods have been utilized for 10 years with 1,011 prairie dogs trapped and relocated in Fiscal Year 2010 alone (unpublished refuge data). Even though non-lethal control methods have been utilized over that time frame, the degradation of habitat has continued and the acres occupied by black-tailed prairie dogs have increased as shown in Figure 1.

Visual barriers

Both vegetative (shrubs and tall grasses) and textile barriers have been installed as measures to discourage prairie dogs from entering restoration sites. The intent is to keep prairie dogs out of areas long enough to allow native vegetation the opportunity to establish and meet their vegetative success criteria, and ultimately provide the intended habitat for prairie dogs, grassland birds, and other wildlife species. This can average 7.8 years (Table 1) and is dependent on soils, slope, moisture, temperature and the cultural maintenance techniques. The textile barrier is placed around the perimeter of the restoration sites with the bottom of the barrier buried in the soil roughly 4-6 inches. It is maintained using patches of barrier, or replaced by sections if the damaged area is large enough, usually torn by high winds. Barriers are checked on a regular basis as employees go to different areas of the refuge to their assigned duties. A map is maintained by refuge staff of areas with barrier fence and areas in need of repair. The visual textile barrier has not proven to be effective as the prairie dogs will either jump over the barrier, burrow under it, or more often chew through it (Chris DiMarco, USFWS, personal communication 2010).

Vegetative barriers are planted using tractors and seeders and are usually shrub species such as four-winged saltbush

[1] Shooting of prairie dogs is currently authorized by the Record of Decision (Foster Wheeler Environmental Corporation 1996) as a method that may be necessary to protect the structural integrity of certain protective measures associated with the cleanup remedy. RMANWR staff work cooperatively with the U.S. Army in determining the need for prairie dog control when associated with the cleanup remedy.

[2] To support captive breeding of the endangered black-footed ferret, the RMANWR supplies live prairie dogs daily to be consumed by ferrets. These prairie dogs are euthanized at the National Black-footed Ferret Conservation Center before feeding to ferrets. Beginning in 2013, the RMANWR will explore euthanizing prairie dogs prior to transporting to the Conservation Center.

(*Atriplex canescens*) or rubber rabbitbrush (*Chrysothamnus nauseous*). There have been instances where tall grasses have been used as a barrier as well. Areas planted are 100-200 feet wide with the hope that the prairie dogs will not investigate areas they cannot see. This method is problematic as it takes years for the shrubs to reach a point where they are effective and even then, prairie dogs have been found on the other side of the vegetative barrier in the areas that are being restored. It also results in the establishment of shrubland vegetation in areas that historically supported grassland.

Trapping and relocation

On-site trapping generally occurs when there is a conflict between prairie dog presence and use of an area, such as construction activities, concern for integrity of utilities and structures, and dispersal into remediated or seeded restoration areas. On-refuge trapping is conducted year-round, with the exception of the breeding season, which usually extends from late February through April. One of the first signs of the breeding season is the increased competition and conflicts observed between male prairie dogs.

The area to be trapped is first evaluated to determine the approximate minimum number of prairie dogs in that area to determine the number of traps required. This is accomplished by conducting two or three visual counts of prairie dogs on the target restoration site from mid- to late-morning (depending on the season; earlier during warm weather) on a sunny day (not temperature dependent). Hav-a-hart© traps are currently used by the refuge. Each uses a hinged door/treadle design that requires a bait to lure the animal into the trap. The traps are checked for smooth operation, and the closing mechanism adjusted if necessary, prior to taking the traps out to the trap site. Following deployment of traps at active burrow entrances, the target area is pre-baited for 2 days with the traps held open to acclimatize the prairie dogs to the traps. The area is not disturbed except for the baiting. Traps are then set with the bait placed in and near the trap door. Traps are checked every 2-3 hours with non-target species released immediately. Captured prairie dogs are taken to the release location where the burrow entrances are examined to find an abandoned burrow, where the prairie dog is released. If more than one prairie dog is caught from the same burrow, they are released to the same spot. The density of prairie dogs in the relocation area is monitored to avoid stressing animals and prevent damage to vegetation. After all prairie dogs are believed to have been trapped from a burrow, the entrance is filled in with soil and checked the next day to assure the burrow has not been reopened.

This method is not considered effective at adequately reducing prairie dog densities necessary for establishment of restoration sites. Trap success declines with time, allowing native vegetation to be damaged by increased herbivory from prairie dogs, allowing noxious weeds to re-establish on site.

Burrow Flushing

The "burrow flush" method is used at ambient temperatures above 70° F to remove remaining prairie dogs from their burrows and *to complement* live-trapping removal efforts. A water truck or water tender is filled with water and soap. The truck is parked near the prairie dog town and a hose is brought to the burrow entrance. The soapy water is slowly added to the burrow to allow the prairie dogs time to evacuate the burrow and prevent drowning. As prairie dogs emerge from the burrow they are grabbed by hand or a cage positioned in such a way in which they have no choice but to enter it.

After towel drying, individuals are placed into pet carriers. As many members of a coterie (family group) as possible are placed into a single carrier, with the exception to not place two or more adult males into the same carrier, and not usually exceeding three dogs in one carrier if possible. The prairie dogs are then transported to the relocation site on the refuge. Selection of suitable relocation sites is based primarily on former occupation of the site by prairie dogs and existence of open burrow systems. Refuge staff identify open burrows that are wide enough to allow passage of prairie dogs and deep enough to provide immediate protection from predators. This is tested by placing a gloved hand down the burrow as far as possible.

Under ideal conditions the relocation site should be of comparable size to the trap site to maximize retention of prairie dogs. This will give new residents a “buffer” zone that may help to ease tensions at the new site. Family groups are released together at the release site, with females, pups and yearlings going into the same burrow systems (3-4 or more per burrow). Adult females with pups are released into the same burrow. Adult males go into nearby burrows by themselves. This helps

reduce fighting immediately after the release.

This method is not effective at reducing prairie dog densities, either alone or in combination with live-trapping, to levels necessary for successful grassland restoration. It is also weather dependent and is costly. Lastly, another habitat area may be stressed to a greater degree by rapidly increasing prairie dog density at the release site.

Use by the National Black-footed Ferret Conservation Center

Beginning in 2012, the Service began trapping and transporting live black-tailed prairie dogs to the Service's National Black-footed Ferret Conservation Center. The State of Colorado allows for the capture, transport, and relocation of black-tailed prairie dogs to the Conservation Center (Colorado Parks and Wildlife 2012). This method not only assists in population control on the RMANWR, but also aids in the recovery efforts of one of the country's most endangered species. A relocation permit from the CPW along with a letter of "non-objection" from the USDA is required annually (Colorado Parks and Wildlife 2012). Following authorization, animals are live-trapped[3] and directly relocated to the Conservation Center. This method results in minimal negative impacts to non-target species as well as no negative secondary environmental toxicity effects. Prairie dogs can only be accepted May to November (Paul Marinari, Black-footed Ferret Center, personal communication 2008). Black-footed ferrets appear to be highly susceptible to plague. In 1995, 30 captive ferrets were accidentally fed pieces of prairie dog meat infected with *Y. pestis* or meat that had come into contact with infected pieces (Godbey et al. 2006). In the future, prairie dogs used for this purpose may be required to come from sites "dusted" with deltamethrin to control fleas, the primary vector of disease transmission (Seery et al. 2003).

Limited shooting

Shooting was initiated on a limited basis to protect certain cleanup infrastructure from prairie dog burrowing beginning in 2012.

2.2 Alternative B – (proposed action)

The proposed action involves an adaptive management framework where the Service will apply a combination of lethal and non-lethal control methods to control prairie dog populations on the RMANWR (Table 2). Additional lethal control methods are proposed, because non-lethal methods alone have proven ineffective in reducing prairie dog densities sufficiently to meet restoration success criteria established in the HRP (U.S. Fish and Wildlife Service 1999). In its draft HMP (2013), the refuge has designated 2,585 acres, or approximately 16% of the refuge, as prairie dog management zones.

Reducing prairie dog populations is necessary due to the continual clipping and foraging activities of such high numbers of prairie dogs which prevents immature restored vegetation from germinating, growing, and becoming established. A continuous grazing regime enacted on the vegetation causes shorter sprouts to form which are concentrated with growth nutrients and therefore have higher nutritional content once they are established (an attractant to a variety of wildlife such as deer and bison). The shift in vegetation composition in prairie dog colonies has enabled the succession of forbs over graminoids that further encourages non-native species invasion. The encroachment of weeds in active prairie dog towns makes restoration efforts difficult even with the use of weed control, seeding, and irrigation (Witmer and Hoffmann 2002).

Complete removal of prairie dogs during the restoration process is recommended for successful establishment of vegetation (Witmer et al. 2000). Keeping prairie dogs off of restoration sites will allow the opportunity for vegetation to become established and grow, ultimately providing better habitat for all species. The refuge staff recognizes that prairie dogs are an integral part of the shortgrass prairie ecosystem, but the continued degradation of restored sites cannot persist.

Lethal Population Control

[3] Prairie dogs are euthanized at the National Black-footed Ferret Conservation Center before feeding to ferrets. Beginning in 2013, the RMANWR will explore euthanizing prairie dogs prior to transporting to the Conservation Center.

When lethal control is determined to be the best management choice available (Figure 3), RMANWR will ensure significant efforts are made to minimize the stress and anxiety of the animal as well as minimize the risk of secondary poisoning to non-target wildlife species by following guidance provided by the American Veterinary Medical Association (American Veterinary Medical Association 2013) and developing protocols that are based on the best available scientific information. It should be noted that lethal population control would be used with the overriding goal of preserving a healthy, sustainable population of black-tailed prairie dogs on the refuge.

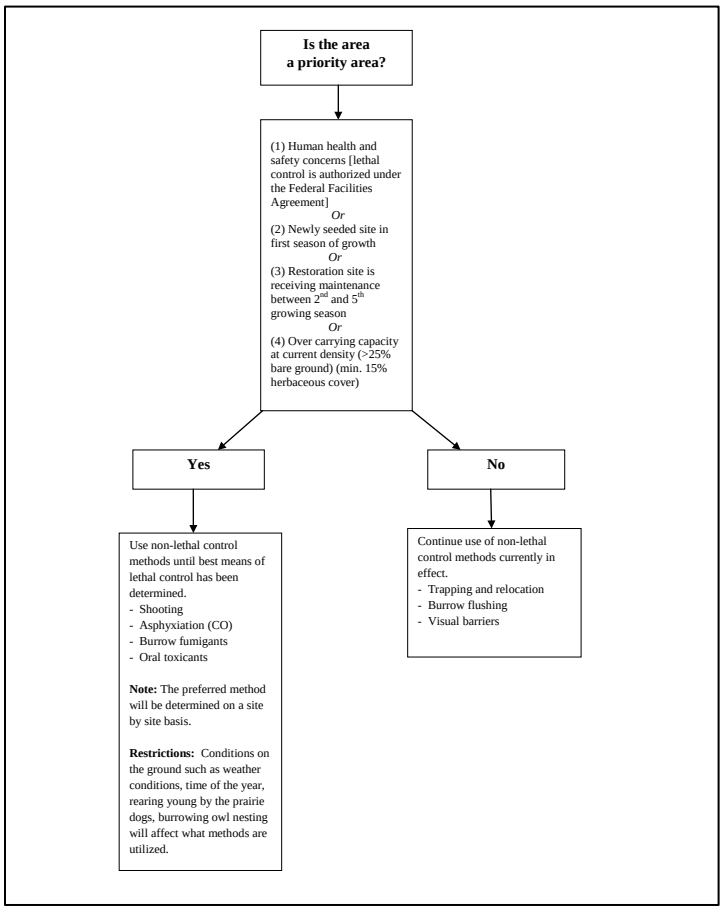

Figure 3. Decision tree for determining the use of lethal control methods

The AVMA Guidelines for Euthanasia (2013) states the amount, degree, and/or cognition of human contact should be considered a priority and suggests minimizing visual, auditory, and tactile stimulation in wildlife management control programs. Additionally, the AVMA states that the same standards of euthanasia (minimization of pain and stress) for domesticated animals be extended to wildlife. These standards outline three modes of actions of euthanizing agents: (1) direct or indirect hypoxia, (2) direct depressions of neurons necessary for life function and (3) physical disruption of brain activity and destruction of neurons necessary for life (American Veterinary Medical Association 2013). If approved, the method utilized would be based on the least impact possible to both the prairie dogs and the habitat using these standards as a guideline (Table 2).

Table 2: Evaluation of lethal black-tailed prairie dog population control methods

Population Control Method	***Effectiveness***	***Advantages***	***Disadvantages***	***AVMA Mode of Action***
Shooting	100%	Instant loss of consciousness	May induce bait shyness Short term noise distraction	1, 3
Chemical asphyxiation by CO	100%	No bio-accumulation; increased anesthetic effect	Heavier than air, which can result in incomplete filling of chamber; low concentrations can result in pulmonary and respiratory tract lesions and prolonged death; increased tolerance to CO2 due to burrowing nature	1, 2
Burrow Fumigant (Aluminum phosphide)	90% reported by Andelt and Hopper (2003); 95% reported by Hygnstrom (1994)	No bio-accumulation	Lack of adequate soil moisture negatively affects the fumigant efficacy; non-target poisoning	2
Oral Toxicant (Zinc phosphide)	90-95% effective according to Shane Koyle (APHIS)	Cost effective and a proven reliable method	Cannot be used July-February Negatively affected by moisture; can be toxic to non-target wildlife and fish; may induce bait shyness after initial treatment	*Not listed*
Ferret Reintroduction	Unknown	Natural predator-prey relationship, supports recovery goals of a highly endangered species	There will be a cost associated with reintroduction and monitoring of a new species.	*Not listed*

AVMA Modes of Action: 1) direct or indirect hypoxia; 2)direct depression of neurons necessary for life function; 3) physical disruption of brain activity and destruction of neurons necessary for life.

Shooting

The AVMA recognizes the use of accurate shooting for wildlife control as an acceptable method of euthanasia. Death occurs rapidly as the direct disruption of brain activity immediately renders the animal unconscious (American Veterinary Medical Association 2013). Also, direct handling of the animal is not necessary and thereby eliminates the possibility of human-contact related distress prior to euthanasia.

Shooting will be implemented during the months of July through March, especially February and March as previous research has indicated success rates are highest during this period. The reproductive activities taking place during this time of year will be disrupted and remove animals before mating can occur. Shooting will not occur between the months of April through June, which will eliminate the chance of pup starvation due to the loss of a parent as pups are not fully weaned until 5 to 7 weeks following birth. The slight increase of noise levels associated with shooting may result in some prairie dogs not emerging from burrows. Until habituation to the noise is developed, oats may be used as bait to encourage more aboveground activity (Andelt and Hopper 2003).

Only Service personnel, who have received firearms training specifically for this purpose, will be permitted to shoot prairie dogs. Recreational shooting will not be allowed. Experience in safe and proper firearm use, accuracy, and compliance with firearm laws and regulations will be implemented to ensure the efficacy of the project and the safety of all staff involved (American Veterinary Medical Association 2013). Concerns regarding lead-poisoning of non-target wildlife (due to

consumption) are considered feasible and warranted (Pauli and Buskirk 2007). As such, actions will be taken to reduce the likelihood of lead toxicity. Non-lead ammunition (such as tungsten-tin) is becoming more widely available and in a greater variety of calibers (Kemsley 2007). RMANWR will explore the various options currently available and implement the appropriate non-lead alternative when choosing ammunition.

Chemical Asphyxiation

Chemical asphyxiation by carbon monoxide is listed as one of the acceptable methods/agents of euthanasia for rodents and other small mammals by the AVMA Guidelines for Euthanasia (2013). The inhalation of high concentrations of carbon monoxide has a rapid anesthetic effect and when administered correctly, results in swift loss of consciousness before death (Mason and Littlin 2003). Only gas cartridges approved by the Environmental Protection Agency (EPA) will be used. One gas cartridge will be introduced into each active burrow followed by closing the burrow entrance with soil to ensure a lethal concentration of carbon monoxide is released. The carbon monoxide does not accumulate in the tissues and can therefore be safely consumed by other wildlife eliminating any risk of secondary toxicity (American Veterinary Medical Association 2013). Direct handling of the animal is not necessary and thereby eliminates the possibility of human-contact related distress prior to euthanasia.

The use of carbon monoxide cartridges to cause asphyxiation will address the physiologic coping mechanism of the burrowing habits of black-tailed prairie dogs. Prairie dogs have adapted to increased levels of carbon dioxide and other inert gases and can withstand a greater concentration of these gases than non-burrowing species (U.S. Humane Society 2009). This makes the use of cartridges an effective and humane means of lethal control. The gas cartridges are approved by the EPA and do not require a certified pesticide applicator license.

This option will only be conducted after burrowing owls have migrated out of the refuge (November through March) or in towns where burrowing owls are known to not nest. The refuge biologist monitors burrowing owl nesting behavior on a regular basis, marking areas where nesting is taking place and units can be evaluated for nesting occurrence prior to any use of this method.

Burrow Fumigant

Burrow fumigants (Aluminum phosphide) contain sodium nitrate and charcoal and release carbon monoxide gas when ignited (Witmer and Fagerstone 2003). The rapid loss of oxygen within the sealed burrow quickly renders the target unconscious, and death occurs by hypoxia making this an AVMA acceptable method of euthanasia. Reported efficacy ratings have been as high as 95% (Hygnstrom 1994) where efficacy ratings positively correlate to adequate soil moisture (Witmer and Fagerstone 2003). A burrow with moist soil conditions creates a better seal that results in a higher concentration of carbon monoxide; therefore, this method will only be utilized when ground conditions are conducive to success and there is enough moisture to properly seal the burrow.

Secondary toxicity is a non-issue as bio-accumulation does not occur (Witmer and Fagerstone 2003). Carbon is a naturally-occurring substance; nitrate acts as a source of plant nutrients within the soil; the charcoal is degraded by microorganisms and is immobile (U.S. Environmental Protection Agency 1991, Witmer and Fagerstone 2003). Additionally, dissipation of carbon monoxide occurs relatively rapidly. Application will only occur within burrows known to be occupied by prairie dogs and therefore does not present a threat to avian or aquatic species (U.S. Environmental Protection Agency 1991). This method will only be initiated by refuge staff.

Considerations regarding the use of burrow fumigants will address non-target species. Fumigants are not species-specific and will kill any wildlife within the burrows (Andelt and Hopper 2003). Therefore, fumigants will only be used on observed, active prairie dog burrows and where burrowing owls are not found in the vicinity. Risk to burrowing owls will be minimized by conducting surveys at regularly scheduled intervals to detect activity. Surveys will be conducted by trained professionals (e.g., refuge biologist) at regularly scheduled intervals. Flags will be placed near the burrows indicating that the area has an active burrowing owl nest. As with the use of chemical asphyxiation, applications will be avoided during the burrowing owl

nesting season. The potential exists that other non-target species such as tiger salamanders, snakes, rabbits, and other small mammals will be negatively affected by burrow fumigants, but will not have a significant adverse impact on the population as a whole.

Oral Toxicant

Zinc phosphide is an acute rodenticide (not an anti-coagulant) that is usually placed on oats and placed near the outside of burrows of prairie dogs. The area to be treated is pre-baited with non-toxic oats to facilitate prairie dog consumption of this food type. There will be a minimum of one pre-baiting session before oats treated with zinc phosphide are placed in the same location. Zinc phosphide is registered for use through the EPA (1998) for the control of prairie dogs and all label instructions will be followed, including application by a certified pesticide applicator.

An essential component for use of this method is pre- and post-monitoring of the area. Before an area is to be treated, surveys will be conducted at various times of the day (morning, afternoon, dusk) using an ATV or by walking the area to be treated. This will enable refuge staff to document which species are present in towns to be treated and assess the risks for primary or secondary toxicity to non-target species. If this method is used, pre-baiting, proper timing to avoid mortality risk of non-target organisms and removal of all prairie dogs that die on the surface will be actions used to minimize risks. Post-treatment surveys to collect and dispose of prairie dogs that have died above ground will be conducted immediately after application and every day for a week following deployment of treated oats as most mortality occurs during this time (Shane Koyle-USDA, personal comm. 2011). Surveys will be conducted by either riding an ATV or walking, depending on the size of the area. It was estimated that following an application of 2% zinc phosphide treated oats in Montana, 12% of the estimated prairie dogs in the town died above ground (Knowles 1986).

A primary concern of using this method is the danger of primary and secondary toxicity. Matschke and Andrews (1990 unpublished report) analyzed the carcasses of black-tailed prairie dogs using zinc phosphide treated bait, and found that 8.9% of the zinc phosphide consumed was outside of the gastrointestinal (GI) tract. Raptors seem to avoid eating the GI tract, reducing the likelihood of secondary poisoning (Johnson and Fagerstone 1994). Glahn and Lamper (1983) concluded that when zinc phosphide applications are used at the recommended rates, they have a minimal impact when alternative food sources are available. Maintaining communication among staff about areas to be treated and non-target species use of those treated areas along with post treatment surveys will help minimize the likelihood of coyotes or any other non-target species consuming prairie dogs that have died as a result of the treatment.

Reintroduction of Black-footed Ferrets

Black-tailed prairie dogs at RMANWR are preyed upon by a variety of species including coyotes, bald eagles, and several other raptor species. However, despite the presence of natural predators, prairie dogs have exhibited steady, and oftentimes increasing, population rates (Figure 1). The addition of another natural predator, the black-footed ferret, is not seen as a detriment to the future survival of prairie dogs at RMANWR. Instead, it can be viewed not only as an opportunity to aid in the recovery efforts of an endangered species, but also as a chance to reintroduce a component of the grassland ecosystem and to learn more about this endangered predator. While reintroduction of black-footed ferrets cannot be utilized as a tool for restoration, the addition of a natural predation process is viewed as a desirable method for managing appropriate prairie dog populations and densities on the RMANWR.

It should be noted that reintroduction of an endangered species raised in captivity has a high risk of failure when it comes to creating a self-sustaining population. This is due to persistent environmental factors that result in population declines, the effects of inbreeding in small populations, and various other behavioral and physiological consequences of their captive up-bringing (Grenier et al. 2007). Reintroduction of black-footed ferrets will be explored in the revision of the RMANWR comprehensive conservation plan and any release would occur when appropriate thereafter.

The ability to choose among multiple population control measures, both lethal and non-lethal, adheres to the Habitat Management Plan's principle of adaptive management. It will also allow virtual year-round management tactics to be

employed (Table 3).

Table 3: Timeframe for application of non-lethal and lethal population control

	January	*February*	*March*	*April*	*May*	*June*	*July*	*August*	*September*	*October*	*November*	*December*
Transfer to BFF Center												
Reintroduce BFF	X	X	X	X	X	X	X	X	X	X	X	X
Shooting	X	X[1]	X[1]				X	X	X	X	X	X
Chemical Asphyxiation	X	X	X				X[2]	X[2]	X[2]	X[2]	X	X
Burrow Fumigant	X	X	X								X	X

[1] Most effective times for implementation

[2] Can only be conducted in sites not inhabited by burrowing owls.

2.3 Alternatives Considered but Eliminated from Further Analysis

The following alternatives were considered by Service staff, but eliminated from further analysis. The rationale for excluding these alternatives is included for each.

Anti-coagulant Rodenticides

Anti-coagulant rodenticides have been found to cause affected animals extended periods of distress, sometimes lasting several weeks, with most mortality occurring within 10 days. Anti-coagulants interfere with Vitamin K metabolism in mammals causing internal bleeding or hemorrhaging with residues accumulating in the animal's liver (Record and Marsh 1988). A poisoned animal experiences loss of blood through various orifices, including the skin membranes, during which time they are known to wander about aboveground making them more susceptible to predation (U.S. Fish and Wildlife Service 2002). Secondary toxicity is a grave concern with anti-coagulants and can be passed readily from dead and dying animals to predators. The animals are likely to die above ground, increasing the risk to raptors and other predators. Not only are the environmental side-effects considered too great, but the extended amount of distress and pain before death does not meet AVMA guidelines. Additionally, the Service has taken steps to help eliminate the method of population control via anticoagulants. In 2009, the Service sent a letter to the EPA requesting specific rodenticides be withdrawn from registration due to their inhumane nature and disconcerting secondary toxicity.

Vacuuming

Vacuuming is a procedure that involves removing prairie dogs from their burrows at speeds reaching up to 60 mph and depositing them in the back of a padded truck (Kelly 2003). Independent tests have not been conducted regarding the humaneness or effectiveness of this technique (Witmer and Hoffmann 2002). However, Fagerstone and Witmer (2003) have reported a 5% direct loss due to mortality or injuries serious enough to require euthanasia from vacuuming. This alternative would not coincide with AVMA guidelines for wildlife euthanasia as the animal would be subjected to intense handling (vacuuming) causing distress and anxiety, and the resultant injuries could also cause significant pain prior to euthanizing (American Veterinary Medical Association 2013). Additionally, non-target species could be negatively affected by this alternative as they could be inadvertently siphoned, causing injury or death.

Natural Processes

Under this alternative, nothing would be done to manage the black-tailed prairie dog population on RMANWR. Black-tailed prairie dogs would be allowed to move freely and inhabit any area regardless of restoration goals or vegetative conditions. This alternative was deemed unacceptable to the refuge as vegetation would continue to be degraded putting previous and current restoration sites at a high risk of failure.

In the past, populations of black-tailed prairie dogs on RMANWR have been reduced by plague events that occurred at infrequent intervals. It is believed that the outbreak of a plague event may be positively correlated, in part, with the density of prairie dogs in towns (i.e., as the density increases, the likelihood of a plague event increases). However, following a plague event, the area that is re-occupied has been no less than double the pre-plague area (Figure 1). Six plague events have occurred from 1989 to 2002. Because the occurrence of plague events is unpredictable, it is unreasonable to completely suspend restoration efforts within colonies until one does strike. This would cause greater damage to vegetation to occur over larger areas, which will require more taxpayer dollars to re-seed and repair.

Contraceptives

The use of contraceptives is gaining acceptance as a non-lethal alternative to managing black-tailed prairie dog populations. Intermittent population growth can be managed and achieved with contraceptives thereby allowing maintenance of genetic diversity. Additionally, contraception provides the ability to reduce the spread of disease by limiting colony size and decreasing overcrowding (Nash et al. 2007).

However, contraceptives can take several years to significantly reduce population densities. Contraception results in a slower rate of decline as opposed to lethal measures (Yoder et al. 2008). A population sink that can arise from rapid population decreases allows for an increase in survival and reproductive rates. This can lead to an unwanted, rapid re-colonization effort by the remaining prairie dogs (Nash et al. 2007).

Concerns with steroid contraception are a considerable drawback to this option. Further research still needs to be conducted addressing impacts to secondary non-target organisms and the long-term capability of the contraceptive to be passed along the food chain (Nash et al. 2007). Steroids are known to be passed along the food chain making them undesirable from an ecological standpoint (Miller 1995a, Miller et al. 1998). Delivery of steroids is also important – the full dose needs to be received prior to the breeding season for greater effectiveness. Nash et al. (2007) reported only a 47% reduction in reproduction due to administration of steroids just prior to breeding. However, for the past 15 years the USDA's National Wildlife Research Center has been involved with promising research and development of wildlife-specific contraception methods aimed at increasing effectiveness/longevity and minimizing secondary environmental concerns (Mauldin and Miller 2007).

Research efforts have not yet provided a proven product that works in the field, so this is not currently considered feasible. One mode of action showing promising potential is the use of immunocontraceptive vaccines. These vaccines are essentially proteins and therefore do not bio-accumulate in the food chain or persist in the environment (Miller 1995b, Miller et al. 1998). Additionally, several immunocontraceptive vaccines are available that produce long-term sterility of up to 4-5 years with one dose (Animal and Plant Health Inspection Service 2010). A reduction in pregnancy of 90% has been reported in female test subjects; similar efficacy in males has been found to occur in smaller doses than those required by females (Mauldin and Miller 2007). While the research is showing some promising results, it is too costly and there are too many unanswered questions regarding potential environmental effects for it to be considered at this time.

3.0 Affected Environment

3.1 Physical Environment

3.1.1 Geology, Soils, and Topography

The RMANWR is located in the Denver basin, a north-south fold in the regional geology that stretches along the Front Range from Cheyenne, Wyoming to Colorado Springs, Colorado. The surfaces deposits are primarily alluvium (unconsolidated river sediment) deposited by the South Platte River system and are partially covered by eolian sediments. The Denver formation

makes up the uppermost bedrock layer and was originally 900 feet thick. However, erosion by the South Platte River has cut back the formation to 500 feet thick in the southeast corner of the refuge (Morrison-Knudsen Environmental Services Inc. 1989). This formation is made of mostly clay, sandstone, shale, siltstone and coal (U.S. Fish and Wildlife Service 1996b).

The surface topography of the RMANWR has largely been shaped as a result of erosion caused by the South Platte River and its tributaries. The topography ranges from gently rolling hills with less than 3% slopes to terraces with up to 10% slopes. The general slope of the refuge is to the northwest with the elevation of the northwest and southeast boundaries of the refuge at 5,138 feet above sea level (ASL) and 5,250 feet ASL, respectively.

The soils on the refuge consists of clays, clay loams, loamy sands and sandy loams with some cobble soils on hills in the Northern sections. Soils that formed under native grasslands are dark colored and high in organic matter content. The Bresser soil type is the most common soil series, which is deep and well drained with medium to coarse textures. Weld soils are commonly found in the northeast sections of the refuge. They were formed by alluvial and wind deposits and are fine to medium textured soils (U.S. Fish and Wildlife Service 1996b). Ascalon soils are present on old alluvial terraces, escarpments, and eolian plains found in the central and northern areas. Nunn soils are a clay-loam and occur mostly in the northern part of the refuge.

3.1.2 Water Resources

The RMANWR encompasses several drainage basins that are tributary to the South Platte River, including Irondale Gulch, First Creek, and Second Creek. Irondale Gulch and First Creek basins cover more than 91 percent of the refuge area.

Both off-site and on-site activities have contributed to the contamination of surface water quality on the refuge. Chemical, inorganic, and organic constituents have negatively affected RMANWR water quality. South of the South Plants area in the Irondale Gulch basin, surface water is the principal pathway for point source pollution by pesticides and organic compounds such as arsenic, mercury, cyanide and trace metals (U.S. Fish and Wildlife Service 1996b). Non-point source pollution by organic compounds has also been detected entering the refuge from residential and industrial areas to the south.

3.1.3 Air Quality and Climate

Climate in the area is categorized as semi-arid with low relative humidity and wide variations in seasonal and daily temperatures. January is typically the coldest month with an average high temperature of 43^{o} F and low temperature of 16^{o} F; July is typically the hottest month with an average high and low temperature of 88^{o} F and 59^{o} F, respectively. Precipitation is variable and ranges from 12 to 16 inches annually, 80% of which occurs between April and September (U.S. Fish and Wildlife Service 1996b).

The Denver metropolitan area has an ongoing problem with carbon monoxide, ozone and particulate matter contributing to air pollution as well as visibility problems due to temperature inversions. These inversions prevent atmospheric mixing which results in pollutant accumulation. The major contributors to these problems are motor vehicles, wood burning, and industrial and agricultural operations. RMANWR is located on the periphery of these polluted areas. Increased air pollutants recorded on the refuge are generally attributable to the metropolitan sources (U.S. Fish and Wildlife Service 1996b).

3.1.4 Noise Pollution

RMANWR is located within a major metropolitan area and noise levels vary widely depending on location. On the western and southern perimeter, the predominant sources of noise are commercial development, traffic, and residential. Within the refuge, noise levels can be similar to rural conditions. Sources of noise are confined to clean-up operations, and mechanized vehicles along roadways, restoration sites, and around buildings. These activities equate to minimum noise disturbances. However, in a small portion of the east perimeter, noise from Denver International Airport air traffic can reach 60 decibels

ratings (U.S. Fish and Wildlife Service 1996b). As urban development continues around the perimeter, noise levels are expected to increase proportionally on the refuge.

3.2 Biological Environment

3.2.1 Vegetation

The vegetation composition of the RMANWR is a result of alteration by human activities including agricultural practices, industrial development and contaminant cleanup activities. European settlement in the 19th Century created both irrigated and non-irrigated farmlands resulting in severe disturbance to the native vegetation. Establishment of the U.S. Army's Rocky Mountain Arsenal in 1942 added to the earlier disturbance and removal of natives that continued late into the 20th Century. However, small pockets of remnant native plants still exist.

Prior to immigration and settlement, RMANWR supported predominantly warm-season, shortgrass steppe and mixed-grass vegetation. Shortgrass species for this area include blue grama (*Bouteloua gracilis*), western wheatgrass (*Pascopyrum smithii*), side-oats grama (*Bouteloua curtipendula*) and buffalograss (*Bouteloua dactyloides*). Common tall- and mixed-grass species include sand bluestem (*Andropogon hallii*), switchgrass (*Panicum virgatum*), Indian ricegrass (*Achnatherum hymendoides*), sand dropseed (*Sporobolus cryptandrus*) and needleandthreadgrass (*Hesperostipa comata*). Common native forbs include blanketflower (*Gallardia aristata*), blue flax (*Linum lewisii*), blazing star (*Mentzelia nuda*), gayfeather (*Liatris punctata*) and silvery lupine (*Lupinus argenteus*).

Current prairie dog management practices of translocation and barrier installation have yielded marginal to no success in achieving restoration criteria at sites where prairie dogs have moved back in before establishment of native vegetation. Table 4 displays vegetation monitoring data from projects that have been re-seeded and were subsequently re-inhabited by prairie dogs prior to the minimum average of 7 years required for the native vegetation to become established. Native plants make up less than half of all live vegetation found at these restoration sites.

Table 4. Vegetation data from re-inhabited prairie dog restoration sites at the Rocky Mountain Arsenal NWR

Restoration Project Number	***Total Live Vegetation (%)***	***Native Vegetation (%)***
21	58.54%	06.04%
42	67.60%	13.61%
41-04	94.50%	21.16%
41C	71.67%	11.63%
85	78.68%	42.50%
F39	64.50%	15.50%
79-04	55.00%	36.36%
F40	58.85%	38.23%
29A	35.09%	20.98%
71	54.47%	39.32%

3.2.2 Wildlife and Fisheries

Once cleanup and restoration is complete, RMANWR will be the largest continuous span of undeveloped land within the Denver metropolitan area (U.S. Fish and Wildlife Service 1996b). The habitat diversity afforded by the refuge provides a unique setting for maintaining and establishing wildlife native to the region. A variety of wildlife species exists on the refuge ranging from mule deer (*Odocoileus hemionus*) and white-tailed deer (*Odocoileus virginianus*) to coyotes (*Canis latrans*) and a herd of introduced American bison (*Bison bison*). The refuge provides important habitat for migratory birds, including bald eagles, ferruginous hawks, prairie falcons (*Falco mexicanus*), burrowing owls, Swainson's hawks, American white pelicans

(*Pelecanus erythrorhynchos*), and many species of migratory waterfowl and songbirds. Fish inhabit Lake Ladora, Lake Mary, and Lower Derby Lake and support a catch and release program on the refuge. Fish species include bluegill (*Lepomis macrochirus*), channel catfish (*Ictalurus punctatus*), northern pike (*Esox lucius*) and largemouth bass (*Micropterus salmoides*).

3.2.3 Threatened, Endangered, and Candidate Species

The RMANWR does not currently support any species listed as threatened or endangered or considered as candidates for listing under the federal Endangered Species Act of 1973. The Service is contemplating reintroduction of endangered black-footed ferrets at the RMANWR. The Service's draft habitat management plan (HMP) (2013) designates 2,585 acres of black-tailed prairie dog management zones capable of supporting populations of ferrets. Reintroduction of ferrets will be considered as a part of the revision to the refuge's 1996 comprehensive management plan.

3.3 Social and Economic Environment

3.3.1 Social

The area surrounding the RMANWR contains both residential and commercial development on the south, agricultural land on the north and east along with Denver International Airport property, and industrial development on the southwest, northwest and west. Adams County, the City and County of Denver, and Commerce City will designate any future land use around the refuge. As one of the nation's premier urban national wildlife refuges, the RMANWR plays a unique and important role in environmental education and connecting a large, diverse population with natural places.

3.3.2 Human Health and Safety

U.S. Army Maintained Lands
For the foreseeable future, approximately 1,084 acres within the RMANWR will remain under U.S. Army jurisdiction. These lands and infrastructure will remain the long-term responsibility of the U.S. Army and are located in the Native Prairie Zone. These areas include the Integrated Cover System (ICS), Hazardous Waste Landfill (HWL), Enhanced Hazardous Waste Landfill (ELF), and Basin F. Approved habitat management goals, objectives, and strategies for maintained lands will be a cooperative effort between the U.S. Army and the Service regarding wildlife management.

Prairie dogs historically occupied several areas within the aforementioned remediation region. However, they have been removed and will not be allowed to re-populate these areas due to the risk of burrowing activities damaging the protective caps and covers, which could possibly re-expose the land and wildlife to hazardous wastes. Additionally, groundwater sources could be contaminated should the integrity of the structures be compromised, resulting in a human health and safety issue.

Sylvatic plague
Plague is an acute infectious zoonotic disease caused by the highly virulent bacteria *Yersinia pestis*. Infections in humans most often result from the bites of fleas that feed on infected rodents, although person-to-person transmission can occur if the bacteria are inhaled (Abbott and Rocke 2012). Contraction of plague by humans, while not necessarily imminent, is still regarded as a feasible concern. The Centers for Disease Control (2012) reports humans can also be infected by handling contaminated animals or exposure to persons or animals with plague pneumonia and cough. Although human plague in the United States is rare (an average of only 5 to 15 cases are reported each year), states in the western portion of the country have reported establishment of plague in local rodent and flea populations thereby creating source areas for infection and outbreak. There have been periodic outbreaks of sylvatic plague on the RMANWR, most recently in 2001-2002.

Rattlesnakes

Human-rattlesnake interactions have the potential to rise with increasing populations of prairie dogs. The prairie rattlesnake (*Crotalus viridus*) is a predator of prairie dogs and other associated small mammals and can occupy abandoned burrows of their prey (National Park Service 2013). An increasing prairie dog population provides greater habitat cover and hibernacula for the snakes. Current prairie dog towns can be found along the refuge borders (near urban and residential development) as well as along roadways, buildings, and infrastructure. Although not aggressive, prairie rattlesnakes will defend themselves if they feel threatened. They are a venomous species and inject their victims with a hemotoxin (red blood cell destroying toxin) which can cause a disruption in clotting, potential organ degeneration, and tissue damage.

3.3.3 Economic

Colorado tourism does and will continue to play a major role in the future attendance at the RMANWR. An estimated seven million individuals per year pass through Colorado with 60% exploring the Denver metropolitan area. Currently, the refuge ranks third as a wildlife-viewing destination in Colorado behind the Denver Zoo and Rocky Mountain National Park. The current public use on or near the refuge consists of scouting programs, bird and deer watching, catch-and-release fishing, wildlife tours of the Bison pilot area, over 200 annual environmental education presentations and special events. A bike trail surrounds a majority of the refuge to accommodate cyclists as well.

4.0 Environmental Consequences

For alternatives A and B described in section 2, the following narrative documents the analysis of any significant environmental effects expected to occur from implementing each of the alternatives. For the purposes of this EA, the Service analyzed the potential effects of implementing each alternative on all resources protected by the refuge, including the following:

4.1 Physical Environment

4.1.1 Geology, Soils, and Topography

Alternative A
Continued use of textile barriers will have negative impacts while habitat restoration continues. Textile barriers demand constant maintenance and degrade in high winds and inclement weather. Inhabitation by black-tailed prairie dogs of a restoration site would result in the displacement of soils that have been seeded. The disturbance of these soils would resurrect the weed seed bank thereby allowing noxious weeds the opportunity to grow, limiting the native vegetation (Terry Wright, USFWS personal communication 2010).

Alternative B
The proposed action will have similar effects on the geography, soils, or topography. Utilization of carbon monoxide gas cartridges (comprised of charcoal and nitrates), although applied directly underground, does not present any harm as it dissipates once exposed to air. Carbon is ubiquitous in the environment and a naturally-occurring substance; nitrates act as a source of plant nutrients within the soil, and the charcoal is degraded by microorganisms and is immobile (U.S. Environmental Protection Agency 1991, Witmer and Fagerstone 2003). Aluminum phosphide has a similar effect as it will dissipate once exposed to air. Zinc phosphide is not thought to have any effect on geology, soils, or topography as it is ingested by the prairie dog and will decompose.

4.1.2 Water Resources

Alternative A
No effect. Current management does not occur in or around waterways, prairie dog colonies are not normally found near

water as the water table is too high and the burrowing activities would flood the burrows. Continued degradation of vegetation and loss of soils may have negative impacts to water quality, but is undetermined.

Alternative B
No effect. Similar to current management, the proposed action will also not take place near water. The use of zinc phosphide is considered toxic to fish and will not be used near water.

4.1.3 Air Quality and Climate

Alternative A
Current management requires using vehicles for prairie dog translocation and transport to alternate locations. Relocation to the National Black-footed Ferret Recovery Center near Fort Collins does require a significantly more use of vehicles. However, regular vehicle traffic activities are not considered significant enough to impact air quality on the refuge or in the larger Denver metropolitan area (U.S. Fish and Wildlife Service 1996b).

Alternative B
No effect. There will be no significant impacts to air quality or climate would result with implementation of either the current action or proposed action alternatives. Both gas cartridges and aluminum phosphide dissipate once exposed to air, so no impacts to their use.

4.1.4 Noise Pollution

Alternative A
Current management includes limited use of shooting to control prairie dogs on and adjacent to U.S. Army maintained lands. The use of .22 caliber rifles can generate decibel ratings of 140dB from the muzzle (American Speech-Language-Hearing Association 2013). The level at which hearing loss may result from prolonged exposure lies between 90 and 95dB (Galen Carol Audio 2007). However, noise dissemination from gunshots occurs over distances, and shooting will not be rapid-fire and continuous for hours on end. The Stanford University Aircraft Aerodynamics and Design Group (1999) reports a 6dB reduction in noise level with each doubling of the distance the sound travels. Thus, the decibel reduction would be low enough to not cause noise impacts adjacent lands. Sharpshooters are required to wear ear protection for their own safety.

Alternative B
The proposed action may lead to minimal increases in shooting and noise pollution, but the change is considered negligible. The use of carbon dioxide cartridges would make a sound after being lit, but would be muffled by the sides of the burrow once thrown in. None of the other methods have noise associated with them.

4.2 Biological Environment

4.2.1 Vegetation

Alternative A
In the absence of natural events reducing prairie dog populations on the RMANWR, no change in management will have significant negative consequences on vegetation. When the carrying capacity of the habitat for prairie dogs has been met (evidenced by as little as 25% bare ground within a colony), destruction of natural resources becomes a concern (Dave Seery, USFS, personal communication 2010). Constant grazing and burrowing pressure can elicit denudation in areas requiring years for native grasses to reestablish root systems (Nervig et al. 2002). Shifts in plant species (from grasses to forbs), as well as soil erosion caused by reduced vegetative litter and ground cover also have been reported. Approximately 1,011 acres of restored sites have already been significantly degraded by prairie dogs and additional acres are in jeopardy of being significantly damaged (Figure 1). Invasion and expansion of noxious weeds is a concern and likely to increase without action.

Alternative B
The draft habitat management plan (HMP) (2013) designates 2,585 acres of prairie dog management zones. Removal of prairie dogs outside those zones and from active restoration sites until native vegetation has successfully established will provide beneficial results to the health and diversity of vegetation. The absence of clipping and burrowing activities for several years will allow the native seeded plants to generate solid root systems and establish. The less competition native plants have while trying to re-establish, the greater the chances for success of the establishment of a naturally functioning, diverse plant community. Increased management activities to reduce prairie dogs could lead to temporary trampling of vegetation.

4.2.2 Wildlife and Fisheries

Alternative A
Current management includes translocation of prairie dogs and the installation of textile barriers result with minimal impact to existing wildlife. The use of translocation does not directly involve population control but merely moves the prairie dogs from one site to another within the refuge. Barriers will present problems once bison pastures expand as the presence of textile barriers in the pastures could potentially harm the bison if they were to get tangled in any loose fabric. Another consideration to barriers is the movement of snakes and smaller wildlife species and the potential disturbance of their movement corridors.

Alternative B
Implementation of a larger program to reduce prairie dog populations, including the use of lethal controls, will have negative impacts to individual prairie dog colonies. However, the reduction of prairie dogs at the RMANWR has little to no effect to larger black-tailed prairie dog populations. In 2009, the Service completed additional reviews of black-tailed prairie dog populations and determined that while considerably reduced from historic levels, black-tailed prairie dog habitat significantly increased to 2.4 million acres nationally (Gober 2009). Reducing prairie dogs on the RMANWR will have positive effects on habitat goals and objectives for bison, grassland birds, and a variety of other prairie species, but will reduce the number of prairie dogs available to predators.

To ensure non-target species will not be effected, use of carbon dioxide cartridges will occur in isolation. This will be accomplished by monitoring the area to be treated as to ascertain any non-target species present. Care will be taken to minimize impacts of non-target species under this control activity by carefully following the label instructions and monitoring the area as before. As mentioned, no prairie dog management activities will take place in or around waterways and therefore have no effect on fisheries.

4.2.3 Threatened, Endangered, and Candidate Species

Alternative A
No effect. No federally listed species currently exist on the RMANWR.

Alternative B
If implemented, prairie dog control and the designation of approximately 2,585 acres for black-tailed prairie dogs will facilitate the stable environment necessary to consider reintroduction of a discrete population of black-footed ferrets on the RMANWR. The decision on whether or not to reintroduce ferrets will ultimately be determined during the revision of the CMP, but the ability to do so will is contingent upon the refuge's ability to properly manage prairie dog populations. In addition, an intra-Service Section 7 consultation (Appendix A) will be completed on the proposed action to ensure there will not be negative impacts to any species listed under the federal Endangered Species Act of 1973.

4.3 Social and Economic Environment

Alternative A
Current prairie dog management does not fully contribute to the restoration of native vegetation thereby creating an area that does not meet the requirements under which the RMANWR was established. Additionally, on-site relocations have proven ineffective at halting prairie dog inhabitation and expansion around the U.S. Army maintained lands and infrastructure creating a potentially hazardous interface for humans if prairie dogs are allowed to burrow within protective areas.

Alternative B
An adaptive approach to prairie dog population control will allow for a more effective management regime for active restoration sites. These restored sites will be closer to the native ecosystem that was present in pre-settlement times, and will attract a greater variety of grassland bird species than unrestored habitat. A diverse landscape will create a more attractive destination for wildlife-oriented recreation.

However, the use of lethal control for controlling prairie dog populations is controversial and expanded use of lethal control methods at the RMANWR will likely elicit negative reactions by the public who always observe the prairie dogs (Lamb and Cline 2003) and rank it as pleasurable when visiting a site. While the ecological benefits of prairie dogs to an ecosystem cannot be denied, their effects on restored grasslands make this issue complicated and difficult. Although considered a keystone species, prairie dogs need to be managed in balance with other refuge herbivores (bison, deer) and grassland bird species that require undisturbed grassland for nesting and forage, in order that a diversity of habitat be provided for many species. Current prairie dog management techniques do not provide *the balance* needed to restore the refuge's habitat successfully.

4.4 Irreversible and Irretrievable Commitment of Resources

Any commitments of resources that may be irreversible or irretrievable because of carrying out alternatives A or B are described below.

Alternative A
There would be no commitment of resources by the Service if alternative A were selected. The Service could still exercise its existing authority to manage the RMANWR in accordance with the 1996 CMP.

Alternative B
Implementation of the proposed action would not, of itself, constitute an irreversible or irretrievable commitment of resources. The implementation of an adaptive management approach to managing prairie dog populations would represent a minor increase in overall Service costs borne by the RMANWR.

4.5 Cumulative Impacts

As defined by NEPA regulations, a cumulative impact on the environment "results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions" (40 CFR 1508.7). The following describes the past, present, and reasonably foreseeable actions related to management of prairie dog populations. A discussion follows regarding the cumulative impacts of these actions in combination with the actions of alternatives A and B.

Past, present, and reasonably foreseeable future actions
The Service completed its CMP in 1996 (U.S. Fish and Wildlife Service 1996a). This CMP provided guidance and direction to the management of the RMANWR during the cleanup process. The RMANWR will begin the process of revising its CMP in May 2013. This revision will guide activities for the next 15 years. In addition to the habitat management plan and this

plan specific to managing black-tailed prairie dog populations, the Service will release a revised fire management plan and an integrated pest management plan.

Alternative A
Under alternative A, there would be no cumulative impacts on the environment since the Service would not undertake any of the prairie dog control activities included in this plan.

Alternative B
The RMANWR is surrounded by urban development. These barriers preclude natural relocation of prairie dogs and the strategies outlined in this plan will not have cumulative impacts to black-tailed prairie dogs at larger scales.

5.0 Coordination and Environmental Review

This section describes how the Service coordinated with others and conducted environmental reviews of various aspects of the project proposal and analysis. Additional coordination and review would be needed to carry out the proposed action, if selected.

5.1 Agency Coordination

The Service has discussed this plan with other federal agencies (U.S. Army and the EPA), State of Colorado (Colorado Parks and Wildlife, Colorado Department of Public Health and Environment), local county governments, and regional entities (Tri-County Health Department, Stapleton Redevelopment Foundation, Denver Water) through a series of meetings and correspondence. Tribes with an aboriginal interest in the Rocky Mountain Arsenal were invited to participate or formally consult in the planning process (Northern Arapaho Tribe, Northern Cheyenne Tribe, Southern Ute Tribe, and the Ute Mountain Ute Tribe). A number of nongovernmental organizations are active in the RMANWR and were also consulted, including the Friend's of the Front Range National Wildlife Refuges.

The Service coordinated internally in the development of this EA as well. RMANWR staff conducted the analysis and prepared this document. An intra-service Endangered Species Act section 7 consultation was conducted, and resulted in a finding of "May affect but not likely to adversely affect" ESA protected or candidate species (Appendix A). Region 6 biological staff assisted with the development of black-tailed prairie dog management strategies (see Appendix B, List of Preparers and Reviewers).

5.2 National Environmental Policy Act

The Service conducted this environmental analysis under the authority of and in compliance with NEPA, which requires an evaluation of reasonable alternatives that will meet stated objectives, and an assessment of the possible effects on the natural and human environment.

5.3 Environmental Assessment

This EA will be the basis for determining whether the implementation of the proposed action would constitute a major federal action significantly affecting the quality of the natural and human environments. NEPA planning for this EA involved other government agencies and the public in the identification of issues and alternatives for the proposed project.

5.4 Distribution and Availability

The Service will make the EA to the project mailing list, which includes federal and State legislative delegations; tribes; federal, State, and local agencies; nongovernmental organizations; and interested individuals. Copies may be requested from the RMANWR.

Appendix A

Environmental Compliance

Environmental Action Statement

U.S. Fish and Wildlife Service, Region 6
Lakewood, Colorado

Within the spirit and intent of the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act and other statutes, orders, and policies that protect fish and wildlife resources, I have established the following administrative record. I have determined that the action of implementing the "Management of black-tailed prairie dog (*Cynomys ludovicianus*) populations at the Rocky Mountain Arsenal National Wildlife Refuge" is found not to have significant environmental effects, as determined by the attached "finding of no significant impact" and the environmental assessment.

_____

Project Leader,
Rocky Mountain Arsenal National Wildlife Refuge
U.S. Fish and Wildlife Service
Commerce City, Colorado

_____

Refuge Supervisor
U.S. Fish and Wildlife Service
Lakewood, Colorado

_____

Assistant Regional Director
National Wildlife Refuge System
U.S. Fish and Wildlife Service
Lakewood, Colorado

The Service has included a draft Finding of No Significant Impact as a part of this document. In accordance with Service policy and NEPA regulations, the Service's Regional Director will make the decision, based on this environmental assessment, on whether this action represents a significant impact.

Finding of No Significant Impact

U.S. Fish and Wildlife Service, Region 6
Lakewood, Colorado

U.S. Department of the Interior
FISH AND WILDLIFE SERVICE
Region 6, Denver, Colorado

FINDING OF NO SIGNIFICANT IMPACT

Management of black-tailed prairie dog (*Cynomys ludovicianus*) populations
at the Rocky Mountain Arsenal National Wildlife Refuge
Adams & Denver Counties, Colorado

The U.S. Fish and Wildlife Service (Service) has completed a habitat management plan to outline the habitat goals and objectives for the Rocky Mountain Arsenal National Wildlife Refuge (Refuge). This plan includes the identification of black-tailed prairie dog management zones as well as the use of an adaptive combination of lethal and non-lethal control measures to actively manage prairie dog populations on the Refuge. The resulting Environmental Assessment (EA) evaluates two alternatives: Alternative A, a no action alternative; and Alternative B, the preferred alternative, to implement active management of prairie dog populations in support of the habitat management plan.

Alternative B, the preferred alternative, was selected for implementation because it best meets the Service's mission to sustain fish and wildlife populations. Restoration of short- and mixed-grass prairie are considered to be of primary importance in achieving the purposes of the Refuge, because these habitats provide the life requisites of numerous migratory bird species, many of which are considered to be species of conservation concern due to population declines. Although an important component of short- and mixed-grass systems, prairie dogs can negatively impact the structure and function of these systems if populations exceed system capacity. When the carrying capacity of the habitat has been met, destruction of natural resources becomes a concern. Invasion and expansion of noxious weeds are yet another concern, especially in restoration sites, because prairie dogs tend to selectively forage on palatable native species. Given that non-lethal methods alone have not been effective in controlling prairie dogs *to the extent necessary* to restore grasslands critical to achieving the purposes of the Refuge, alternative means of prairie dog control must be considered. Therefore, the goal of this adaptive management strategy is to develop a method, or combination of methods, that (1) increase the probability of restoration success and (2) sustain viable prairie dog populations that provide functions necessary to perpetuate native grasslands and associated migratory birds.

Public Involvement

On April 17, 2013, a press release was issued by the Refuge which announced the release of the draft plan and environmental assessment for 30 days of public comment. An informal public meeting was held on May 1, 2013, at the Refuge visitor center. In addition to comments presented by some of the approximately ___ people who attended this meeting, another ___ written comments were received from individuals, organizations, and agencies. Public comments and responses are included as Appendix C of the EA.

Effects of the Proposed Action

This EA has taken a hard look at the environmental impacts to inform the public and ourselves about the consequences of the proposed action (the Service's preferred alternative).

In determining whether this project is a major action significantly affecting the quality of the human environment, we looked at both the context and intensity of the action (40 CFR § 1508.27, 40 CFR § 1508.14) as required by NEPA. In terms of context, the preferred alternative will occur on the Rocky Mountain Arsenal National Wildlife Refuge, but we have evaluated whether it will have effects on the human environment on a broader scale. Because the human environment and the relationship of people with that environment (40 CFR § 1508.14), in addition to our thorough analysis of physical environmental effects, we carefully considered the manner in which the local people and natural resources relate to the surrounding environment, though economic and social effects are not intended by themselves to require preparation of an environmental impact statement (40 CFR § 1508.14).

An adaptive management framework where the Service will apply appropriate combinations of lethal and non-lethal control methods to control prairie dog populations on the Refuge is necessary, because non-lethal methods alone have proven ineffective in reducing prairie dog densities sufficiently to meet restoration success criteria established in the Service's 1999 Habitat Restoration Plan. To find an appropriate balance, the Service has designated 2,585 acres, or approximately 16% of the Refuge, as prairie dog management zones its in 2013 Habitat Management Plan. This allows the Service to actively support viable prairie dogs populations *and* support its prairie restoration goals. The clipping and foraging activities of prairie dogs negatively affects immature restored vegetation. The shift in vegetation composition in prairie dog colonies enables the succession of forbs over graminoids that further encourages non-native species invasion. The encroachment of weeds in active prairie dog towns makes restoration efforts difficult even with the use of weed control, seeding, and irrigation. Keeping prairie dogs off of new sites will allow the opportunity for vegetation to become established and grow providing better habitat for all species.

All lethal control methods were analyzed based on efficacy and compliance with the American Veterinary Medical Association Guidelines on Euthanasia. The AVMA Guidelines for Euthanasia state the amount, degree, and/or cognition of human contact should be considered a priority and suggests minimizing visual, auditory, and tactile stimulation in wildlife management control programs. Additionally, the AVMA states that the same standards of euthanasia (minimization of pain and stress) for domesticated animals be extended to wildlife. When lethal control measures are utilized, the method chosen will be based on the least impact possible to both the prairie dogs and the habitat using these standards as a guideline.

Decision and Finding of No Significant Impact

The analysis indicates that there will not be a significant impact[4], individually or cumulatively, on the quality of the human environment[5] as a result of this proposed action. I agree with this conclusion and therefore find that an EIS need not be prepared. This determination is based on the following factors.

1. Environmental consequences of a larger program to reduce prairie dog populations, including the use of additional lethal controls, will have negative impacts to individual prairie dog colonies. However, the reduction of prairie dogs at the RMANWR has little to no effect to larger black-tailed prairie dog populations. Overall, effects will be beneficial to wildlife habitat, grassland bird populations, and numerous other prairie-dependent species. Based on informal intra-Service section 7 consultation, the proposed action, will not result in the jeopardy of any federally threatened or endangered species, or adversely modify existing designated critical habitat.

[4] 40 CFR § 1508.27 "Significantly" as used in NEPA requires considerations of both context and intensity (a) Context. This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), and affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of site-specific action, significance would usually depend upon the effects in the locale rather than in the world *as a* whole. Both short- and long-term effects are relevant; and (b) Intensity. This refers to the severity of impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action.

[5] 40 CFR § 1508.14 "Human environment" shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment. (See the definition of "effects" (40 CFR § 1508.8).) This means that economic and social effects are not intended by themselves to require preparation of an environmental impact statement. When an environmental impact statement is prepared and economic or social and natural or physical environmental effects are interrelated, then the environmental impact statement will discuss all of these effects on the human environment.

2. The proposed action would pose no known risk to public health or safety.

3. The effect on the quality of the human environment is not highly controversial.

4. The proposed action will not affect sites, structures, or objects listed in or eligible for listing in the National Register of Historic Places, nor would it likely cause any loss or destruction of significant scientific, cultural, or historic resources.

5. No significant cumulative effects were identified through this assessment. The EA discussed the cumulative effects on and off the Refuge with those actions proposed by others.

Therefore, in light of the compelling science in support of the plan, and my review of the information contained in the supporting reference, I have determined that implementing an adaptive approach to prairie dog management on the Rocky Mountain Arsenal National Wildlife Refuge is not a major federal action that would significantly affect the quality of the human environment with the meaning of Section 102(2)(C) of NEPA.

The Finding of No Significant Impact (FONSI) and supporting NEPA analysis will be available to the public upon request. Copies of the EA are available for all affected agencies, private groups, and other interested parties. These documents are on file at the Rocky Mountain Arsenal National Wildlife Refuge, 6550 Gateway Road, Building 121, Commerce City, Colorado 80022 (telephone: 303-289-0232).

_____

Regional Director, Region 6
U.S. Fish and Wildlife Service
Lakewood, Colorado

Supporting Reference:

U.S. Fish and Wildlife Service. 2013. *Environmental Assessment: Management of black-tailed prairie dog (Cynomys ludovicianus) populations on the Rocky Mountain Arsenal National Wildlife Refuge*, Commerce City, Colorado.

Intra-Service Section 7 Consultation

Rocky Mountain Arsenal National Wildlife Refuge
Adams & Denver Counties, Colorado

Originating Person: David Lucas Date Submitted: 17 April 2013

Telephone Number: 303-289-0350

I. **Service Program and Geographic Area or Station Name**:
Rocky Mountain Arsenal National Wildlife Refuge

II. **Flexible Funding Program** (e.g. Joint Venture, etc.) if applicable:
N/A

III. **Location**: Location of the project including County, State and TSR (township, section & range):
Adams and Denver Counties, Colorado (39.85°N 104.86°W)

IV. **Species/Critical Habitat**: List federally endangered, threatened, proposed, and candidate species or designated or proposed critical habitat that may occur within the action area.

Black-footed ferret (*Mustela nigripes*) - The black-footed ferret is an endangered species where it is located. At this time, no ferrets exist on the Refuge.

Eskimo curlew (*Numenius borealis*) - The Eskimo curlew is a wide ranging bird species that favors open grassy meadows. Habitat fragmentation, loss of prey populations of grasshoppers and commercial hunting are thought to have led to their decline. The endangered Eskimo curlew has never been sighted on the Refuge, and has not been sighted in Colorado since 1965.

Ute ladies'-tresses orchid (*Spiranthes diluvialis*) - The Ute ladies' -tresses orchid is a threatened plant species found along streams, in wetlands, and in other moist habitats along Colorado's Front Range and plains areas in elevations below 6,500 feet. The Refuge contains habitat suitable for the orchid, but surveys of the Refuge have not located any populations of this species.

Platte River species - Several threatened and endangered species, such as whooping crane (*Grus americana*) and piping plover (*Charadrius melodus*) may exist on or near the South Platte River.

V. **Project Description:** Describe proposed project or action or, if referencing other documents, prepare an executive summary (attach additional pages as needed):

Located approximately ten miles from downtown Denver, the Rocky Mountain Arsenal National Wildlife Refuge (RMANWR) encompasses 15,988 contiguous acres. Due to contamination from the production of chemical munitions and pesticides, significant portions of this land underwent environmental cleanup as stipulated in the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) administered by the Environmental Protection Agency (EPA). With the exception of about 1,084 acres that will be maintained by the

U.S. Army, the balance of land within the boundary was transferred from EPA to U.S. Fish and Wildlife Service (Service) jurisdiction following completion of remediation activities. Although most environmental cleanup was completed by the fall of 2011, native plant restoration activities continue on most lands.

In 2003, the RMANWR began development of its habitat management plan (HMP). The HMP is a step-down management plan of the Comprehensive Conservation Plan (CCP) or, in the case of the RMANWR, the Comprehensive Management Plan (CMP) that was approved in 1996 (U.S. Fish and Wildlife Service 1996a;b). The intent of the HMP is to provide additional details regarding specific strategies and implementation schedules for meeting goals and objectives set forth in the CCP/CMP during a 15-year period. The RMANWR is a heavily altered landscape and the HMP articulates goals and objectives for habitat restoration consistent with remediation standards (U.S. Fish and Wildlife Service 1999). The HMP includes strategies for forage allocation between herbivores and other trust species and identifies 2,585 acres of the RMANWR that will be managed as black-tailed prairie dog zones. An additional plan and environmental assessment was developed specific to management of black-tailed prairie dogs on the RMANWR.

The Service proposes implementation of adaptive combination of lethal and non-lethal control measures to actively manage prairie dog populations on the Refuge. Removal of prairie dogs outside designated zones will be prioritized according to 1) human health and safety issues, 2) restoration areas that have not had sufficient time to mature, and 3) restoration sites that have been site-prepped and undergoing weed control for eventual restoration.

The HMP and associated plans for fire management, integrated pest management, and for managing populations of black-tailed prairie dogs are interconnected plans and considered important to establish conditions necessary to consider reintroduction of the federally endangered black-footed ferret.

VI. **Determination of Effects:**

(A) Description of Effects: Describe the action(s) that may affect the species and critical habitats listed in item IV. Your rationale for the Section 7 determinations made below (B) should be fully described here.

Black-footed ferret (*Mustela nigripes*)	May Effect (beneficial) – species does not exist on the Refuge at this time, but designation of approximately 2,585 acres for black-tailed prairie dogs will facilitate the stable environment necessary to consider reintroduction of a discrete population of ferrets on the Refuge. The decision on whether or not to reintroduce ferrets will ultimately be determined during the revision of the CMP, but the ability to do so will is contingent upon the habitat goals outlined in the HMP which cannot be implemented without control of black-tailed prairie dog populations.
Eskimo curlew (*Numenius borealis*)	No Effect – species has not been documented on the Refuge or in the State of Colorado in recent history
Ute ladies'-tresses orchid (*Spiranthes diluvialis*)	No Effect – species has not been documented on the Refuge; proposed action is to burn slash in an upland area behind the maintenance facility
Platte River species	No Effect – species are not present; proposed action will occur between 2 and 6 miles from the South Platte River

(B) Determination: Determine the anticipated effects of the proposed project on species and critical habitats listed in item IV. Check all applicable boxes and list the species (or attach a list) associated with each determination**.**

	Determination
No Effect: This determination is appropriate when the proposed project will not directly or indirectly affect (neither negatively nor beneficially) individuals of listed/proposed/candidate species or designated/proposed critical habitat of such species. **No concurrence from ESFO required.**	
May Affect but Not Likely to Adversely Affect: This determination is appropriate when the proposed project is likely to cause insignificant, discountable, or wholly beneficial effects to individuals of listed species and/or designated critical habitat. **Concurrence from ESFO required.**	X
May Affect and Likely to Adversely Affect: This determination is appropriate when the proposed project is likely to adversely impact individuals of listed species and/or designated critical habitat. **Formal consultation with ESFO required.**	
May affect but Not Likely to Jeopardize candidate or proposed species/critical habitat: This determination is appropriate when the proposed project may affect, but is not expected to jeopardize the continued existence of a species proposed for listing or a candidate species, or adversely modify an area proposed for designation as critical habitat. **Concurrence from ESFO optional.**	
Likely to Jeopardize candidate or proposed species/critical habitat: This determination is appropriate when the proposed project is reasonably expected to jeopardize the continued existence of a species proposed for listing or a candidate species, or adversely modify an area proposed for designation as critical habitat. **Conferencing with ESFO required.**	

Signature: **/s/ David Lucas** Date: **April 17, 2013**

Reviewing Ecological Services Office Evaluation (check all that apply):

A. **Concurrence _____** **Nonconcurrence _____**
Explanation for nonconcurrence:

B. Formal consultation required _____
List species or critical habitat unit

C. Conference required _____
List species or critical habitat unit

Name of Reviewing ES Office: _____

Date: _____

Name of Reviewing ES Office: _____

Date: _____

Revised 3/2010

Appendix B

List of Preparers and Reviewers

List of Preparers

Author's Name	*Position*	*Work Unit*
Mark Kalitowski	Refuge GIS Specialist	Rocky Mountain Arsenal NWR (Commerce City, Colo.)
Scott Quayle	Biological Sciences Technician	Rocky Mountain Arsenal NWR (Commerce City, Colo.)

List of Reviewers

Reviewer's Name	*Position*	*Work Unit*
Lindy Garner	Regional Invasive Species Coordinator	Lee Metcalf NWR (Stevensville, Mont.)
Mindy Hetrick	Refuge Biologist	Rocky Mountain Arsenal NWR (Commerce City, Colo.)
Bill Sparklin	Fish & Wildlife Biologist	Lee Metcalf NWR (Stevensville, Mont.)

Appendix C

Public Comments

Appendix D

Job Hazard Analyses

In accordance with Service policy (240 FW 1), a job hazard analysis (JHA) is used to identify existing or potential safety and occupational health hazards associated with operation or job tasks. JHAs are currently on file at the RMANWR for all activities described under Alternative A (no action). New JHAs will be developed for any new tasks implemented under Alternative B (proposed action).

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Abbott, R. C., and T. E. Rocke. 2012. Plague. U.S. Geological Survey, Fort Collins, Colo.

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