Chapter 3

Affected Environment and Environmental Consequences

CHAPTER 3
AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Introduction

Chapter 3 summarizes the physical, biological, social, and economic environments of the project area and the effects of implementing each alternative on that environment. It also presents the scientific and analytical basis for the comparison of alternatives presented in the alternatives chapter. Most of the resource areas include more detailed affected environment and environmental consequences information in the specialist reports, which are included in the project record. The Oglala National Grassland in Nebraska and the Buffalo Gap, and Fort Pierre National Grasslands in South Dakota define the project area (see Figure 1-1, Chapter 1).

The effects analysis considers direct, indirect, and cumulative effects to the resources in the project. **Direct environmental effects** are those that occur at the same time and place as the initial action. An example would be on-site soil compaction from rubber-tired skidders harvesting timber. **Indirect environmental effects** are caused by the action, but occur later in time or are spatially removed from the action. An example would be downwind effects of a power plant on air quality.

Cumulative effects are a combination of direct and indirect effects of an alternative combined with the effects of past, present, and reasonably foreseeable future activities undertaken by either the Forest Service or other parties. In each resource section in this chapter, the cumulative effects discussion defines the cumulative effects analysis area for the resource. Unless a different time period is defined, reasonably foreseeable future actions are bounded in time by those likely to take place within ten years of the decision date. The following table lists the past, present, and reasonably foreseeable actions considered in the cumulative effects analysis. All actions do not apply to each resource. Only those actions with relevant impacts to a specific resource were analyzed and discussed in the following resource sections.

Table 3-1. Past, present, and reasonably foreseeable future actions considered in the cumulative effects analysis for the black-tailed prairie dog management project.

Project/Activity	Location	Description
Past and Concurrent Actions		
Drought	Entire project area	Drought results in reduced plant productivity, therefore, authorized annual livestock numbers. Drought is a recurring event in the project area characterized only by the length and severity of a specific drought.
Livestock grazing management practices	Entire project area.	Livestock grazing has taken place in the project area since the late 1800s and continues today. Federal management of the project area began in the late 1930s, and livestock grazing management changed as a result. The 2001 Forest Plan provides grazing management direction for long-term sustainability of rangeland vegetation for multiple uses.

Project/Activity	Location	Description
Rodenticide use	Black-tailed prairie dog colonies within the boundary management zones (BMZs) in the project area and on adjacent lands (state, private, tribal).	In 2005 and 2006 prairie dogs were treated with rodenticides under the direction of the BTPDCM[1] within all GAs (USDA Forest Service 2005e). In 2004, approximately 24,250 acres of colonies were reported as treated with rodenticide on private land in the vicinity of the Buffalo Gap National Grassland in 2004 (South Dakota 2005). Also in 2004, 6,780 acres were treated with prairie dog rodenticide on the Buffalo Gap National Grassland. During the 1970s and 1980s, over 85%of the prairie dog colony acreage on the National Grassland was treated (USDA Forest Service 1981 and project record). At about the same time, rodenticide was applied to approximately 458,618 acres of colonies on the nearby Pine Ridge Indian Reservation (U.S. Fish and Wildlife Service 2004). From 1985 through 1986, approximately 240,000 acres were re-treated.
Fencing to manage prairie dog populations	Entire project area	Fencing controls livestock grazing in specific areas and at specific times. Its purpose is to allow vegetative growth to potentially produce a visual barrier on treated colonies to stop prairie dog expansion onto adjacent private lands. Fencing installation, either temporary or permanent, began in the summer of 2006; the efficacy of this action is being monitored.
Prescribed burning	Fort Pierre and Fall River Northeast GAs only	Prescribed burning can affect rangeland vegetation response resulting in enhanced prairie dog habitat.
Range allotment management planning	Entire project area	Specific livestock management actions were implemented on all GAs within the last 15 years. The actions were implemented to meet 2001 Forest Plan rangeland vegetation and associated goals and objectives and vegetation conditions have trended upward during that period. Livestock and prairie dogs may compete for available forage depending on management.
Oil and gas exploration	Fall River Southwest GA	About 30,000 acres of federal minerals are currently leased in this GA. There are currently two historical producing sites.
Recreational prairie dog shooting	Project area except Conata Basin and MA 3.63 and adjacent state and private lands.	There is the potential for collateral damage to other species from recreational prairie dog shooting (e.g. burrowing owls/black-footed ferrets shot by mistake, predators/scavengers ingesting lead from the shot used to kill the prairie dogs). Reductions in prairie dog densities may affect vegetation conditions.
Black-footed ferret translocations	Conata Basin MA 3.63	Since 1999, wildborn black-footed ferrets from Conata Basin have been translocated to reintroduction sites on non National Forest System lands outside Conata Basin.

[1] *Record of Decision for Black-tailed Prairie Dog Conservation and Management on the Nebraska National Forest and Associated Units, Including Land and Resource Management Plan Amendment 2* (BTPDCM).

Project/Activity	Location	Description
Past and Concurrent Actions		
Plague	Shannon County Fall River West and Fall River SE GAs Conata Basin MA 3.63	In 2005, plague was discovered in Shannon County less than 25 air miles from Conata Basin. Observations lead specialists to believe plague to be in Fall River West and Fall River SE GAs. In 2008, a plague outbreak occurred in Conata Basin.
Insecticide applications to reduce flea populations	Conata Basin MA 3.63	In response to the discovery of plague in Shannon County, select prairie dog colonies in Conata Basin were "dusted" with an insecticide to kill fleas and disrupt the main vector believed responsible for plague outbreaks. Dusting began in Conata Basin MA 3.63 in response to the 2008 plague outbreak.
Reasonably Foreseeable Future Actions		
Drought	Entire project area	Drought results in reduced plant productivity, therefore, authorized annual livestock numbers. Drought is a recurring event in the project area characterized only by the length and severity of a specific drought.
Rodenticide use	Boundary management zones on NFS lands. Adjacent state and private land.	Use will continue on state and private lands, especially during drought conditions. The Forest Service will continue to poison in the boundary management zones as prairie dog colonies expand.
Plague	In 2008, a plague outbreak occurred in Conata Basin. Approximately 8,000 to 9,000 acres have been affected.	Plague is a major factor currently influencing black-tailed prairie dog populations and distribution across much of the range of the species. Future efforts to dust select prairie dog colonies to prevent plague outbreaks are expected to occur. Dusting is expected to continue in Conata Basin MA 3.63 in the response to the 2008 outbreak.
Livestock grazing management, Range Allotment Management Plans (RAMPs)	Oglala, Fall River West and Wall Southwest GAs	RAMPs will be completed and specific livestock management actions will be implemented within the next 3 years. The actions will be implemented to meet Forest Plan rangeland vegetation and associated goals and objectives at that time. Livestock and prairie dogs may compete for available forage depending on management objectives.
Fencing to control livestock grazing on treated prairie dog colonies in the BMZ	All GAs	Fencing controls livestock grazing in specific areas and at specific times. Its purpose is to allow vegetative growth to potentially produce a visual barrier on treated colonies to stop prairie dog expansion onto adjacent private lands. Fencing installation, either temporary or permanent, will continue for the next 5 years.
Oil and gas exploration	Fall River Southwest GA	Exploration has not occurred for 3 years, even with high crude oil prices, and exploration is expected to remain very low for the next 10-year period.
Travel management	Entire project area	Travel management assessments will be completed on all units of the Nebraska National Forest by 2009. Changes in motorized access could decrease opportunities for prairie dog recreational shooting, which in turn may result in increased prairie dog colonies and subsequent decline in vegetation conditions.
Recreational prairie dog shooting	Entire project area, minus Conata Basin and MA 3.63. Adjacent state and private lands.	There is the potential for collateral damage to other species from recreational prairie dog shooting (e.g. burrowing owls/black-footed ferrets shot by mistake, predators/scavengers ingesting lead from the shot used to kill the prairie dogs).

Air Resources

Affected Environment

The project area occurs in two designated airsheds:

- North Plains (Fort Pierre and Buffalo Gap National Grasslands - East Half).
- Thunder Basin (Oglala and Buffalo Gap National Grasslands – West Half).

The airsheds are discussed in more detail in the *Final Environmental Impact Statement for the Northern Great Plains Management Plans Revision* (USDA Forest Service 2001b). Criteria to determine airshed boundaries include topography, upper-level air flows, and political/civil boundaries where physical boundaries are not apparent. Airsheds are not fixed boundaries like watersheds; however, they serve as useful mechanisms for grouping management areas likely to have similar air quality. Each airshed has the potential to be affected by pollution sources and management activities both in and outside airshed boundaries.

Environmental Consequences

There are no direct, indirect, and cumulative effects of the alternatives on air quality for the following reasons:

- Currently, air quality standards are being met in the North Plains airshed. There is one non-attainment area in the Thunder Basin airshed; it is associated with oil and gas development in Montana and Wyoming (USDA Forest Service 2001b).
- Black-tailed prairie dogs were not considered air pollution sources in the 2001 Forest Plan FEIS. Though wind erosion may be accelerated on some prairie dog colonies (USDA Forest Service 2001b)), the relatively small acreages of prairie dog colonies in each airshed makes it highly unlikely that prairie dog colonies are a significant air quality factor in any airshed within the project area.
- There appears to be no published or unpublished references documenting and quantifying comparative wind (or water) erosion rates on and off prairie dog colonies.

Soil and Water Resources

Watershed health is integral to all aspects of resource management and use. Good watershed management maintains the productive capacity of national forest system (NFS) lands, protects soil and water quality, water quantity, provides beneficial uses, and reduces the threat of flood.

Watersheds are characterized as having high geomorphic, hydrologic, and biotic integrity relative to natural potential. Physical, chemical, and biologic conditions suggest that soil, aquatic, and riparian systems are predominantly functional in terms of supporting beneficial uses (FSM 2521.1)

Soil is a fundamental component of the environment. It is the growing medium for most plants. Soil absorbs and stores water, releasing it slowly over time. All renewable resources are dependent upon soils. Soil is considered a nonrenewable resource because of the length of time required for its formation.

Methodology for Analysis

Information from the rangeland management specialist report dealing with ecological site descriptions (ESDs) for each GA (used dominant 3 ESDs by geographic area) provided the major vegetation groups for the analysis area. Natural Resources Conservation Service (NRCS)-published soil surveys were used to determine the major soil mapping units for each ecological site description by geographic area (GA). Most of the analysis focused on these major soil mapping units (refer to Appendix B of the *Soil and Water Resource Specialist Report* for a table listing soil mapping unit by ESD).

The water erosion prediction project (WEPP) soil erosion model was used to calculate erosion occurring on the major soil types. The model was run at different slope percentages and different ground cover and buffer thickness (refer to Appendix C of the soil and water resource specialist report for more description of modeling method used). For management-induced actions, usually soil erosion is a short-term impact, especially since vegetation grows back in the short-term (3 to 5 years) and provides effective ground cover.

Affected Environment

Precipitation in the project area comes primarily as rain. Normal precipitation ranges from 15 to 21 inches per year. Precipitation events are typically high intensity storms of short duration resulting in localized flooding in certain landforms. Drought is a common and reoccurring event in the project area. Drought is defined as any year or successive years with 75 percent or less of average annual precipitation, recognizing that seasonal distribution of precipitation also influences drought severity (Reece et al. 1991). From 1910 through 1980 (71 years), annual precipitation was below average for 37 years. On seven occasions, at least three consecutive years were below average at the Cottonwood Range Experiment Station east of Wall, South Dakota (Johnson 1981). Eighteen (25 percent) of the 71 years met the drought criterion and during two of those years (1936 and 1939), annual precipitation was approximately 50 percent of average. Information presented by Holechek et al. (2001) indicates that for the period 1944 through 1984, drought occurred in 21 percent of the years on the Northern Plains.

Watersheds within the project area in South Dakota include tributaries to Bad River, Cheyenne River, Rapid Creek, and White River. The watershed in Nebraska is Hat Creek and its tributaries. Hat Creek is a tributary to the White River. Watersheds range in elevation from approximately 1,800 to 4,000 feet. Impaired waterbodies in the project areas on the South Dakota 303(d) list (Clean Water Act) include segments of Rapid Creek and Cheyenne, Bad, and White Rivers. Each of these waterbodies have dissolved or suspended solids as a basis for their listing, pursuant to the Clean Water Act. There are no waterbodies in the Nebraska portion of the project area that are known to exceed dissolved or suspended solids standards.

Natural waterbodies within or near prairie dog colonies consists primarily of a few perennial or intermittent streams and rivers, mostly on the Buffalo Gap National Grassland. Small ponds have been constructed on the national grasslands for livestock, wildlife, and recreation; they are commonly found within or near prairie dog colonies. The streams and rivers support native fish species, including some sensitive fish species. Some of the small impoundments support both introduced and native fish species but no “at risk” species.

The South Dakota Department of Environment and Natural Resources has conducted a water quality study in the Conata Basin. The purpose of the study was to collect annual sediment and pathogen loads in some watershed in the Conata Basin. As information from this study becomes available, it can be referenced for adaptive management responses to soil and water resource issues.

Major land resource areas (MLRA) are large geographic areas that contain similar dominant physical characteristics of land use, elevation and topography, climate, water, soils, and potential natural vegetation. The project area is found in the following three MLRAs:

- MLRA 60A – Pierre Shale Plains covers the Fall River Ranger District and the Oglala National Grassland.
- MLRA 63A – Northern Rolling Pierre Shale Plains (NRCS draft form only, Jan. 07) covers the entire Fort Pierre National Grasslands.
- MLRA 64 – Mixed Sandy and Silty Tableland covers the majority of the Wall Ranger District. .

For both MLRA 60A and 63A, the dominant geology is Pierre shale. This is a marine sediment having layers of volcanic ash that has been altered to clay. This clay shrinks as it dries and swells as it gets wet. Fine texture soils are formed from this geology.

For MLRA 64 the dominant geology is continental sediments consisting of sandstone, siltstone, and claystone. The Badlands are part of this MLRA. Soils in this geology tend to be coarse to medium textured.

Soils in the project area are predominately from shale and condiments (sandstone, siltstone and claystone). Much of the upland area is considered to be moderate to well-drained with moderate to slow infiltration rates; slower infiltration rates occur on the soils with higher clay content in the surface. The soils in the area are subject to wind and water erosion. Water erosion rates increase as slopes exceed 5 to 10 percent.

Within the MLRA, ecological site descriptions (ESDs) are defined as "a distinctive kind of land with specific characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation" (USDA Natural Resource Conservation Service 2003). Grouping similar soil types together in ecological site descriptions, (i.e., shallow clayey) provides a good starting point for a large scale analysis.

Environmental Consequences

For all the alternatives, the minimum and maximum range of acres occupied by black-tailed prairie dogs within the interior-colony management zone (IMZ) was used for comparing potential effects. See Chapter 2 for complete descriptions of the alternatives and the range of acres by geographic area (GA) by alternative. See the rangeland vegetation section for a description of changes in vegetation production by alternative.

Effects Common to all Alternatives

There are no direct effects to the soil and water resources from the proposed actions. Neither prairie dog poisoning nor setting a range of prairie dog acres causes soil erosion. Rodenticide will be applied at the prairie dog burrow holes and not directly in a water feature.

The indirect effects of the proposed actions stem from prairie dog burrowing and foraging and from changes to livestock management practices relative to the management of prairie dogs, such as buffer maintenance, exclusion, etc. Prairie dog burrowing activities expose recently excavated soils and bare mounds to wind and water erosion, resulting in increased soil loss. Long-term prairie dog foraging, in combination with permitted livestock grazing, reduces vegetative cover and increases wind and water erosion, also resulting in increased soil loss. However, soil and prairie dog interactions are poorly studied and understood.

Predicting runoff and soil erosion is imprecise. Erosion rates are highly variable, and most models can predict only a single value. Any predicted runoff or erosion value, by any model, will only be within

plus or minus 50 percent of the true value. Replicated research has shown that observed values vary widely for identical plots, or the same plot from year to year (Elliot et al. 1994). If a better understanding of the range of possible sediment yield is desired, the WEPP model suggests users may wish to consider range of cover amounts within each area.

Soil mixing (pedoturbation) from prairie dog burrowing is undoubtedly important to soil development (Carlson and White 1987) but the extent that prairie dogs contribute to soil development compared to soil loss from wind and water surface erosion on prairie dog colonies is unknown. Working on a white-tailed prairie dog colony on the Hutton Lake National Wildlife Refuge in eastern Wyoming, Clark (1970) reported no evidence of increased erosion on the colony and suggested that the benefits from prairie dogs adding organic materials, increasing air and water penetration, and mixing soils might more than offset any accelerated erosion that might occur on a prairie dog colony. Koford (1958) reported that we do not know enough about prairie dog-soil interactions to adequately assess of the comparative effects of prairie dog colonization on soil development and erosion rates.

Elliot et al. (2000) reported that forest and rangelands generally have very low erosion rates unless they are disturbed. Common disturbance include prescribed and wildfire, harvesting and grazing by domestic and wild animals. The impact of these operations, however, last only for a short time, perhaps one or two years, unless the disturbance is excessive and sustained over a period of years as can happen in prairie dog colonies. After that, the rapid regrowth of vegetation soon covers the surface with plant litter, and potential erosion is quickly reduced.

Alternative1

Indirect Effects

For the minimum acres, there are similar effects to the no action alternative, with slight improvement in vegetation production in 6 of 8 GAs with reduction of prairie dogs from current active acres back to 2001 Forest Plan direction. The maximum prairie dog colony acres in this alternative are lower than the no action. The potential for increased soil erosion would be lower than in the no action alternative even at the upper end of acres. Since the potential for soil erosion would be lower, the risk of sedimentation affecting water quality would be lower also.

Alternative2 – No Action (current Forest Plan direction)

Indirect Effects

At the minimum acres, this alternative shows no change in vegetation production as it sets the minimum acres at the current active prairie dog levels. Current erosion (whether natural or management induced) would be occurring. Prairie dog towns without a vegetative buffer between it and a drainage feature would have sedimentation occurring, affecting water quality.

Alternative 3

Indirect Effects

This alternative lists maximum acres by GAs for prairie dogs. This alternative would be similar in effects to Alternative 1 at the maximum acres. The maximum amount of acres in this alternative is lower than the no action. This would result in fewer acres in prairie dog colonies. The potential for increased soil erosion would be lower than in the no action alternative at the upper end of acres. Since the potential for soil erosion would be lower, the risk of sedimentation affecting water quality would be lower also.

Alternative 4

Indirect Effects

This alternative only represents a range of acres for the Wall SW, Management Area 3.63. Within this management area (MA), the result would be fewer acres supporting prairie dogs. The resulting vegetation would result in more effective ground cover, thus reducing the potential for soil erosion. No minimum and maximum ranges for the other GAs were established and thus the effects can not be compared to the other alternatives and between GAs.

Alternative 5

Indirect Effects

This alternative at the minimum acreage would see a modest decrease in vegetation production in all but one of the GAs due to increased acreages in prairie dog colonies. The highest potential soil erosion at the minimum acres is expected with this alternative compared to the other alternatives. At the maximum acre, this alternative would be less than the no action at maximum acres. Water quality effects would be similar to the no action alternative.

Cumulative Effects

The effects on the watersheds from prairie dogs colonies are minor when compared to the other land uses in the watersheds. As stated in *Black-tailed Prairie Dog Conservation and Management on the Nebraska National Forest and Associated Units - Final Environmental Impact Statement* (USDA Forest Service 2005c), prairie dogs colonies range from 0 to 1.2 percent of the watershed (4th order). In the majority of these watersheds, Badlands landforms are more dominant, with slopes that are steeper and will be producing more sediment than the prairie dog colonies.

Other factors that have an influence in cumulative effects for this project in the past and present are drought, rodenticide use, and livestock grazing. These will also be reasonably foreseeable future actions and natural occurrences.

The key aspect is how these factors influence the vegetation and the resulting ground cover that should be on site and would be an important factor in reducing soil erosion. Decreasing soil erosion would decrease the potential of sedimentation which would be a benefit to water quality.

Those alternatives with the lower numbers of prairie dogs colonies (in terms of acreage) would have lower potential cumulative effects from the combination of prairie dogs and other activities (see above for acreage by alternatives). Effects would continue from other activities listed above (see Table 3-1 cumulative effects).

The drought and livestock grazing would tend to increase the acreage in prairie dog colonies, whereas the rodenticide use and plague (when it reached the project area) may reduce or keep static the acres in dog colonies. Following label direction for rodenticide use will help ensure that the effects will be minimal and soil and water resource will not be impacted to a level of concern. Depending on climate and residual vegetation remaining on the dog colonies, some sites may need to be re-seeded to help restore ground cover.

Heritage Resources

Affected Environment

Evidence for human activity within the project area spans the entire chronological sequence of the Great Plains culture area (see following table) (Hannus and Winham 1999, Prentiss and Rosenberg 1996). Paleoindians are typically characterized as big game hunters who occupied large territories, tracking herds and utilizing a communal hunting strategy. Site types are generally kill and butchery localities. In response to significant climatic changes, Plains groups appear to have adapted their subsistence strategies accordingly during the Archaic period. However, evidence for increased utilization of plant and small game resources may be as much a product of differential preservation. Temporally diagnostic projectile point styles change from lanceolate to large side notched types. Site types are generally scatters of chipped stone representing quarry sites or short-term occupation. Hearth features may be present.

The Late Prehistoric period is recognized typologically by a technological shift from the atlatl and dart to the bow and arrow; projectile points change from large to small side notched types. Site types are similar to the Archaic period. "Direct or indirect contact with European groups ushered in the Protohistoric period … (with) … the introduction of the horse and the gun" (Hannus and Winham 1999:37). Euro-American settlement in the project area occurred mainly during the homesteading era between the 1880s and 1930s. Site features generally include depressions, foundations, and concentrations of historic artifacts. Prairie dogs colonies are commonly found in areas with past homesteading activity. Documented, undocumented, and/or buried cultural resources are at risk in areas where vegetation has been removed by prairie dogs to the point where bare soil is exposed to wind and water erosion.

Table 3-2. Approximate chronology for the project area.

Cultural Tradition	Time Period
Paleoindian	12,000 – 8000 years before present (BP)
Early Archaic	8000 – 4500 BP
Middle Archaic	4500 – 3500 BP
Late Archaic	3500 – 1500 BP (AD 450)
Late Prehistoric	1500 BP (AD 450) – 400 BP (AD 1550)
Protohistoric	AD 1550 - 1750
Historic	AD 1750 - 1950

Approximately 16 percent of the project area has been intensively surveyed for cultural resources and approximately 1,175 sites have been recorded. Approximately 60 percent have been identified as prehistoric resources and 40 percent as historic resources. Two sites, the historic Bessey Nursery and the Hudson-Meng Bison Kill Site, are listed on the National Register of Historic Places (NRHP). Approximately 10 percent have been evaluated as eligible to the NRHP, 53 percent are not eligible to the NRHP, and 36 percent have not been evaluated against the criteria for eligibility to the NRHP.

All undertakings (as defined in 36 CFR part 800.16[y]) are conducted in accordance with section 106 of the National Historic Preservation Act, as amended (NHPA). Heritage resources listed on or eligible to the NRHP are avoided during the implementation phase of any new ground disturbing project proposed on the Forest. If a resource cannot be avoided, mitigation measures are applied to resolve any potential adverse effects to the resource. Any new and unforeseen ground-disturbing activities proposed as a result of this project will be treated as a separate and distinct undertaking, triggering its own section 106 process. The only potential ground-disturbing activity resulting from the proposed management tools is new fence construction, which will be treated as a separate undertaking.

The present condition of heritage resources on the Forest is on course with the desired condition described in Chapter 1 of the 2001 Forest Plan.

Environmental Consequences

Prairie dog management activities in the alternatives have no potential to directly or indirectly affect heritage resources in the project area. The absence of direct and indirect effects means there are no cumulative effects. None of the tools, including rodenticide use, live trapping, regulated prairie dog shooting, vegetation management, livestock grazing coordination, or landownership adjustment, involve significant new ground disturbing activities. Since the project will not affect heritage resources, it will not change the current condition of heritage resources on the forest, and it will not move it towards or away from the desired condition as described in the 2001 Forest Plan.

With the exception of the minor changes noted above, the heritage resources analysis is the same as the analysis conducted for the 2005 black-tailed prairie dog management effort (USDA Forest Service 2005c). Refer to the heritage resources specialist report for that document (Hicks 2004).

Paleontological Resources

Affected Environment

The paleontological resource within the project area spans a wide realm of depositional environments ranging from deep marine deposits to terrestrial volcanic deposits containing paleosols. However, geologic and paleontologic records span a relatively short time with the oldest exposed unit, the Late Cretaceous Mowry formation, located on the Fall River Ranger District (west half Buffalo Gap National Grassland) to the youngest unit, Pleistocene deposits which have produced the well-known Hudson-Meng Bison Kill Site, located on the Oglala National Grassland and the two bull mammoths that locked tusks and died joined together.

Marine geologic units from the Buffalo Gap and Fort Pierre National Grasslands and northern portion of the Oglala National Grassland were deposited from the Late Cretaceous Interior Seaway as shales, siltstones, and limestones. Terrestrial geologic units were deposited on top of the cretaceous units from volcanic activity west on these NFS units. Preservation of the paleontological resources in the project area varies from museum quality to very poorly preserved. Vertebrate fossils range from marine reptiles, such as 25-foot mosasaurs and 15-foot fish, to terrestrial mammals such as brontotheres (three ton rhino-looking animal) to invertebrates such as bivalves, lobsters, ammonites, and snails.

Various partners and fossil permittees have documented 822 paleontological sites in the project area since 1991. Five areas are established as paleontological special interest areas, requiring a permit to collect any fossil. These areas are to protect the resource, as it is intact.

Environmental Consequences

There were no direct, indirect, and cumulative effects of the alternatives on paleontological resources in the project area because the alternatives prescribe mostly non ground-disturbing activities and new ground disturbance will be minimal, any new disturbance requires additional environmental analysis and public disclosure, and the activities prescribed under the alternatives comply with the paleontological resources direction in the 2001 Forest Plan, Chapter 1 Grassland-wide Direction, Section E – Paleontological Resources (USDA Forest Service 2001c).

Rangeland Vegetation

Across all GAs in the project area, current seral stages of rangeland vegetation were evaluated to determine to what degree the 2001 Forest Plan rangeland vegetative goals and objectives are being met. This analysis also determines the amount of current prairie dog acres that exist in the dominant ecological sites within each GA. From this information the herbage production was determined and converted to animal unit months (AUMs). The change for each alternative by GA was analyzed.

Methodology for Analysis

USDA-NRCS methodology of major land and resource areas (MLRA) with associated ecological site descriptions (ESD), which incorporates the state and transition model, was used to describe the rangeland vegetation for the entire project area. In this model, vegetation types are called "states" and the processes that cause vegetation types or states to change to different types/states are called "transitions" (USDA Natural Resource Conservation Service 1996).

Major land and resource areas (MLRAs) are large geographic areas that contain similar dominant physical characteristics of land use, elevation and topography, climate, water, soils, and potential natural vegetation. Within the MLRA, ecological site descriptions (ESD) are defined as "a distinctive kind of land with specific characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation" (USDA Natural Resource Conservation Service 2003). MLRA and ESD descriptions can be found in FEIS Appendix A.

Suitable and unsuitable acres of prairie dog habitat by geographic area and management area were derived from a geographical information system utilizing the most current rangeland analysis information on the Nebraska National Forest. Historical forest vegetation data was collected in old NRCS terms of range condition. Rangeland condition was measured in relation to a known potential vegetative condition or climax for a particular range site and expressed as percent departure from 100 percent climax vegetation.

The 2001 Forest Plan describes vegetation condition in terms of ecological seral stages. To analyze changes in current conditions and relate them to forest plan standards, the range condition terminology was cross-walked to the ecological seral stages (early, early intermediate, late intermediate and late) as described in the 2001 Forest Plan. See the following table.

Table 3-3. Cross-walk from range condition to seral stage.

Range Condition	Seral Stage
Excellent	Late
Good	Late Intermediate
Fair	Early Intermediate
Poor	Early

The rate of change in vegetation condition resulting from prairie dog management will vary and is highly dependent on many outside variables (e.g., livestock management, fire, drought, etc.). Due to this complexity, a straight line method of plant community movement to determine predicted seral stages under each alternative was used. The plant community typically occurring in long-term inhabited prairie dog colonies is early seral (see references in Effects section). The plant community that typically occurs just below the historical climax plant community (HCPC) (the column just right of HCPC in table titled "Potential Plant Communities within an Ecological Site Description") which is late intermediate seral stage, is the reference point to which the existing early seral plant community will move to when prairie dogs are controlled and livestock management implemented. An increase in prairie dog acres will move late seral to early intermediate seral and late intermediate seral and early intermediate seral to early seral.

The alternatives present minimum and maximum predicted thresholds of active prairie dog acres by geographic area within the IMZ. Change in active acres, on ecological sites, from their current size to the minimum or maximum presented in each alternative had to be detailed enough to analyze effects to herbage production as a basis for an economic analysis in the FEIS. This change was modeled by first determining current active prairie dog acres on the 3 dominant ecological sites, within each GA, while other active acres on all other ecological sites were grouped into a 4th category called "Other." Second, the current active prairie dog acres in each category were calculated as a percentage of the total active prairie dog acres in the geographic area. Third, the growth or decrease in acres of prairie dogs within each ecological site category was based on the percentage of active prairie dog acres occupied by that ecological category within each of the 8 geographic areas and 2 management areas.

Affected Environment

Desired Condition

Desired vegetation conditions are defined at the geographic area in the 2001 Forest Plan (USDA Forest Service 2001c). Each geographic area includes a general description of the physical setting, important features, and direction to achieve the desired conditions. The vegetation conditions are tailored to the vegetation types, climate, and productivity of those specific areas. Vegetation composition is described in desired seral stage objectives across the geographic area. Measurements of seral stages over time under different management strategies determine the direction towards or away from the vegetation composition objectives (seral stages). The following table summarizes the seral stage objectives for each of the geographic areas.

Table 3-4. Desired vegetation condition by GA (2001 Forest Plan).

GA	Late Seral	Late Intermediate Seral	Early Intermediate Seral	Early Seral
Oglala	10-30%	50-70%	10-20%	1-10%
Fall River NE	20-40%	40-60%	5-15%	5-15%
Fall River W	10-30%	50-70%	10-20%	1-10%
Fall River SE	20-30%	40-60%	15-25%	1-10%
Fall River SE 3.63	See footnote below	See footnote below	See footnote below	See footnote below
Wall N	20-40%	30-50%	10-30%	1-20%
Wall SE	20-40%	30-50%	10-30%	1-20%
Wall SW	20-40%	20-40%	10-30%	10-30%
Wall SW 3.63	See footnote below	See footnote below	See footnote below	See footnote below
Fort Pierre	20-40%	30-50%	10-30%	1-20%
Note: Fall River SE 3.63 and Wall SW 3.63 management areas in the 2001 Forest Plan do not contain specific vegetation composition objectives but do contribute towards the total of their geographic area.				

The 2001 Forest Plan provides a desired plant composition condition (early seral) and vegetation structure (low) objectives specifically for prairie dog colonies on the Fall River, Oglala, and Fort Pierre geographic areas. The Wall geographic areas only provide desired vegetation structure objectives (low structure) for prairie dog colonies (USDA Forest Service 2001c).

Prairie Dog Colony Desired Vegetation Condition (Plant Community)

In this rangeland vegetation analysis, 2001 Forest Plan direction for desired vegetation on prairie dog colonies is further refined using NRCS's state and transition model as a starting point. Potential plant communities for the MLRAs and ESDs in the Oglala, Buffalo Gap, and Fort Pierre National Grassland are shown in the following table. The historical climax plant communities on the left will change over time and with disturbance (e.g., grazing or clipping, fire, drought, etc.) to the plant communities on the right side of the table.

Table 3-5. Potential plant communities within an ecological site description.

ESD	Historical Climax Plant Community (HCPC) ⟷ Transition may not be linear				Long-term disturbance
MLRA 64					
Clayey 17-20	Western wheatgrass /green needlegrass	Western wheatgrass /blue grama /buffalograss		Blue grama /buffalograss sod	Threeawn/annuals
Loamy 17-20"	Western wheatgrass /needleandthread	Blue grama /buffalograss /western wheatgrass	Western wheatgrass /bluegrass /annuals	Blue grama /buffalograss sod	Threeawn/annuals
Shallow Clay	Western wheatgrass / sideoats grama / green needlegrass	Western wheatgrass/grama sedge			Blue grama / sedge
Dense Clay	Western wheatgrass				Western wheatgrass / bare ground
Badlands Overflow	Switchgrass /wheatgrass /needlegrass	Wheatgrass / needlegrass / prairie sandreed/ shrubs	Wheatgrass / needlegrass / Indian ricegrass / shrubs / bare ground		Wheatgrass /inland saltgrass /knotweed
Thin Claypan	Western wheatgrass/blue grama				Blue Grama/Cactus
MLRA 60A					
Clayey 13-16"	Western wheatgrass /green needlegrass	Western wheatgrass /blue grama /buffalograss	Blue grama/ buffalograss sod		Blue grama/ buffalograss/ threeawn
Shallow Clayey	Western wheatgrass /sideoats grama /green needlegrass	Western wheatgrass /grama/sedge			Blue grama/sedge
Thin Upland	Needlegrass / blue grama / little bluestem	Little bluestem /grama			Blue grama/sedge
Clayey 16-18"	Western wheatgrass/ green needlegrass	Western wheatgrass /buffalograss/ blue grama	Buffalograss / blue grama sod		Threeawn/annuals
Dense Clay	Western wheatgrass				Western Wheatgrass/ Bare Ground

ESD	Historical Climax Plant Community (HCPC) ⟷ Transition may not be linear				Long-term disturbance
MLRA 63A					
Clayey	Western wheatgrass /green needlegrass	Western wheatgrass/blue grama/buffalograss	Blue grama/ buffalograss sod		Threeawn/annuals
Shallow Clay	Western wheatgrass /green needlegrass /sideoats grama	Western wheatgrass/ grama/sedge			Blue grama/sedge
Thin Upland	Western wheatgrass/needlegrass/ sideoats grama/bluestem	Little bluestem/ western wheatgrass/ grama	Western wheatgrass/ buffalograss/ blue grama		Blue grama/sedge

Sod forming grasses are important to minimize the potential for soil erosion in areas subjected to disturbance (e.g., prairie dog colonies). All ESDs within the project area provide blue grama/buffalograss/sedges sod-forming perennial grasses, except for Dense Clay and Badlands Overflow ESDs which primarily provide for no sod-forming grasses and are predominately made up of western wheatgrass.

Plant communities that contain primarily sod-forming perennial grasses are typically in an early seral stage. This vegetation state is very resistant to change, probably 4 to 7 years (Uresk 1989). The herbaceous species present are well adapted to grazing; however, composition can be altered to a forb dominated community through long-term prairie dog activity. These forb-dominated plant communities have higher soil erosion potential due to marked increases in bare ground. This change in composition is very abrupt, usually after the 4-7 year period, when the shortgrass "threshold" falls below 75 percent cover (Uresk 1989).

The following table describes the desired plant community for prairie dog colonies in the major land resource areas (MLRAs) and ecological site descriptions (ESDs) for the Oglala, Buffalo Gap, and Fort Pierre National Grasslands.

Table 3-6. Desired plant communities for prairie dog colonies within each ecological site description.

MLRA	ESD	Desired Plant Community	Plant Community Description
64 60A 63A	Clayey 17-20" Loamy 17-20" Clayey 13-16" Clayey 16-18 Clayey	Blue grama /Buffalograss sod	The potential vegetation is made up of approximately 75-90 percent grasses (primarily short, warm season grasses), 5-10 percent forbs, and 5-15 percent shrubs. The dominant grasses include blue grama and buffalograss. Other grasses may include western wheatgrass, prairie junegrass, threeawn, and annual brome. The dominant forbs include slimflower scurfpea, pussytoes, curlycup gumweed, and scarlet globemallow. The dominant shrub is plains pricklypear.
64 60A 63A	Shallow Clay Shallow Clayey Thin Upland Shallow Clay	Blue grama / Sedge	The potential vegetation is made up of approximately 90 percent grasses (primarily short, warm season grasses), 5 percent forbs, and 5 percent shrubs. The dominant grasses or grass-likes include blue grama, buffalograss and sedge. Other grasses may include western wheatgrass, prairie junegrass, threeawn, and annual brome. The dominant forbs include slimflower scurfpea, pussytoes, curlycup gumweed and scarlet globemallow. The dominant shrubs are fringed sagewort and plains pricklypear.

MLRA	ESD	Desired Plant Community	Plant Community Description
64 60A	Dense Clay Dense Clay	Western wheatgrass / Bareground	The potential vegetation is made up of 75-90% grasses and grass-likes, 10-20% forbs and 0-10% shrubs. The grass component is almost entirely western wheatgrass. Other perennial grasses are generally not found. Forbs found in this plant community include pennycress, curlycup gumweed, sweetclover and annual forbs. Shrubs found include brittle cactus and plains pricklypear
64	Badlands Overflow	Wheatgrass /Inland saltgrass /Knotweed	The vegetation is mainly made up of western wheatgrass and/or thickspike wheatgrass, inland saltgrass, and knotweed. Most other species are either greatly diminished or absent. Silver sagebrush, rose and broom snakeweed may survive under extreme conditions.
64	Thin Claypan	Blue grama/Cactus	Blue grama and cactus are the dominant species. Other grasses and grass-likes occurring include western wheatgrass, sedge, buffalograss, inland saltgrass, needleandthread, prairie junegrass, and annual grasses. Forbs such as broom snakeweed, cudweed sagewort, heath aster and western yarrow may also be present. Some non-native species will begin to invade this plant community including salsify, sweetclover and annual bromes. There is usually more than 25% bare ground.
63A	Thin Upland	Blue grama/Sedge/ Threeawn	Thin upland ecological range site is currently in draft form. Rick Peterson, NRCS-Kadoka, SD, indicates that this site is similar to Thin upland in MLRA 60A, but more field work is to be completed before the final version is published.

Existing Condition

Existing vegetation conditions by GA (see following table) in the project area were developed using a current Forest geographical information system. Information for all GAs was formulated based upon the following conditions:

- Seral stages by geographic area with current active prairie dog towns assigned an early seral condition on suitable prairie dog habitat in the IMZ only (Uresk 1983, Uresk 1985, Uresk 1990).
- Existing seral stage inventory by geographic area on unsuitable prairie dog habitat in the IMZ only.
- Seral stages by geographic area within the boundary management zone (BMZ) with current active prairie dog towns assigned an early seral condition (Uresk 1983, Uresk 1985, Uresk 1990).
- Existing seral stage inventory by geographic area on unsuitable prairie dog habitat in the BMZ only.

All tables used to develop the following summary table of existing vegetation conditions in the project area can be found in FEIS Appendix C.

Because predictive analysis is not a precise tool, and because some vegetation data is outdated, some error is expected to occur in the tables used to develop the summary of existing vegetation conditions. For the purposes of determining if each seral stage percentage was within the compliance range with the 2001 Forest Plan vegetation objectives for each GA, the summary of existing seral stages percentages for all 4 seral stages were considered accurate to + or – 5 percent.

Table 3-7. Summary of existing vegetation condition by geographic area (GA) as it relates to desired conditions.

Geographic Area		Seral Stages				
		Late %	Late Intermediate %	Early Intermediate %	Early %	Unknown %
Oglala	Existing condition	19.24%	49.42%	20.53%	6.69%	4.12%
	*Desired condition	10-30%	50-70%	10-20%	1-10%	
	**Meets Forest Plan	YES	YES	YES	YES	
Fall River NE	Existing condition	13.92%	50.58%	23.83%	6.02%	5.66%
	*Desired condition	20-40%	40-60%	5-15%	5-15%	
	** Meets Forest Plan	NO	YES	NO	YES	
Fall River West	Existing condition	17.62%	51.82%	23.65%	4.27%	2.64%
	*Desired condition	10-30%	50-70%	10-20%	1-10%	
	** Meets Forest Plan	YES	YES	YES	YES	
Fall River SE & Fall River SE 3.63	Existing condition	26.82%	54.93%	15.12%	1.46%	1.68%
	*Desired condition	20-30%	40-60%	15-25%	1-10%	
	** Meets Forest Plan	YES	YES	YES	YES	
Wall North	Existing condition	14.88%	65.33%	15.49%	2.13%	2.17%
	*Desired condition	20-40%	30-50%	10-30%	1-20%	
	** Meets Forest Plan	NO	NO	YES	YES	
Wall SE	Existing condition	10.03%	56.19%	17.48%	3.71%	12.58%
	*Desired condition	20-40%	30-50%	10-30%	1-20%	
	** Meets Forest Plan	NO	NO	YES	YES	
Wall SW & Wall SW 3.63	Existing condition	4.51%	34.82%	11.81%	31.90%	16.97%
	*Desired condition	20-40%	20-40%	10-30%	10-30%	
	** Meets Forest Plan	NO	YES	YES	YES	

Geographic Area		Seral Stages				
		Late %	**Late Intermediate %**	**Early Intermediate %**	**Early %**	**Unknown %**
Fort Pierre	Existing condition	20.83%	64.33%	8.10%	4.62%	2.11%
	*Desired condition	20-40%	30-50%	10-30%	1-20%	
	** Meets Forest Plan	YES	NO	YES	YES	

*Desired condition is expressed as a range in the 2001 Forest Plan.

**As long as the existing condition is within plus or minus 5 percent of the range of the desired condition, the existing condition is acceptable and meets 2001 Forest Plan goals and objectives for the GA.

Environmental Consequences

Effects – General

The overall vegetative response to prairie dog and/or livestock management will vary depending upon how much of the control efforts fall within the edge or core of a prairie dog complex. Vegetation response will vary if the colony is old (greater than 11 to 13 years) or young (less than 11 years) (Cincotta, Uresk, and Hansen 1989), if desirable native perennial grass species are remaining or lost, if bare ground exists or not, and if plant community conversion has occurred.

In old colonies, it may take re-seeding of native species such as western wheatgrass in order to move the plant community from annuals/bare ground to perennial mid-grasses if that is the desired objective. On young colonies, this conversion may take place on its own since perennial grass species may still exist in the plant community type.

If control efforts in the boundary management zone take place on the edge of a prairie dog colony, then the vegetative response will likely be positive since the edges of prairie dog colonies typically still contain perennial grasses.

Direct Effects

The proposed actions (under all alternatives except Alternative 2), poisoning prairie dogs and setting a range of prairie dog acres, do not have a direct effect on rangeland vegetation, either composition or production. The direct effect of poisoning is the death of prairie dogs.

Indirect Effects

There are two indirect effects from prairie dog grazing and clipping or the lack of it through all alternatives. Prairie dog grazing and clipping can impact the amount of herbage production and it can change the species composition and therefore shift plant communities to different seral stages. As prairie dog acres increase, herbage production decreases, and plant communities often shift to early intermediate or early seral stages. As prairie dog acres decrease, herbage production will increase and plant communities often shift to late intermediate and late seral stages. However, significant vegetative response to reduction of prairie dog colonies by use of rodenticides is not immediate and may take years as shown in Uresk's research in Conata Basin (Uresk 1985).

Herbage Production

Forage production is expressed as an animal unit month (AUM) which is based upon the forage needed to sustain a 1,000 pound cow with calf up to weaning age for a month. To sustain itself, a cow needs 26 pounds of air dry weight forage daily or 790 pounds per month (USDA Natural Resource Conservation Service 1997). This document uses AUMs as a measurement of change in total forage production only. The tables for all alternatives displaying detailed changes in forage production by ecological site description (ESD) by GA are in FEIS Appendix B.

The potential change in AUMs is discussed because the economic analysis in the FEIS needed a value-based factor on which to analyze economic changes. Any potential change in forage production (increase or decrease in AUMs) does not imply that the potential additional herbage or reduction in herbage in these areas would be allocated or taken away from existing permitted AUMs. Any allocation, reservation, or reduction of forage could be made when grazing allotment management plans are revised and updated, and this involves a separate environmental analysis and public disclosure process.

Alternative 1

Minimum acres: There are variable effects across all GAs. The largest potential increase in herbage production and AUMs (3,267) is on the Wall SW 3.63 because of the large decrease in prairie dog acres. Three of the GAs (FRW, FRSE 3.63, WN) show a small potential decrease in herbage production and AUMs (<1,000). The remaining seven GAs show a small potential increase in herbage production and AUMs (<250).

Maximum acres: There are variable effects across all GAs. The largest potential increase in herbage production and AUMs (1,626) is again on the Wall SW 3.63 because of the large decrease in prairie dog acres. Six of the GAs (OG, FRNE, FRW, WN, WSE, FP) show a small potential decrease in herbage production and AUMs (<1,000). Two GAs (FRSE, WSW) show little change. The Fall River SE 3.63 management area experiences the greatest potential loss of herbage production and AUMs (1,278) due to the need to increase prairie dog acres to facilitate black-footed ferret re-introduction.

Alternative 2

Minimum acres: This alternative shows no change in herbage production as it sets the minimum acres based at the current active prairie dog levels. With passive management no improvement in production is predicted since prairie dog acres are not expected to decrease.

Maximum acres: There are negative potential impacts to herbage production and AUMs across all GAs because rodenticide use in the IMZ would be limited to areas where human health and safety or infrastructures are threatened. The potential decrease of 22,063 AUMs in the project area represents 9.2 percent of the currently permitted 238,953 AUMs on the Fort Pierre, Buffalo Gap, and Oglala National Grasslands.

Alternative 3

Minimum acres: This alternative establishes no minimum acreage for the GAs and management areas, except for the Oglala, and thus the significance of effects can not be analyzed. The Oglala GA that was assigned a minimum acreage experiences only a slight potential increase in herbage production and AUMs.

Maximum acres: The largest potential increase in herbage production and AUMs (5,867) is again on the Wall SW 3.63 because of the large decrease in prairie dog acres. The Oglala GA shows a small potential increase in herbage production and AUMs (<250). All other GAs show a small potential decrease in herbage production and AUMs (<1,000).

Alternative 4

Minimum and Maximum acres: This alternative only represents a range of acres for the Wall SW 3.63 GA. Within that GA, the potential results would be positive, increasing AUMs by 3,393 to 4,403 from the current conditions. No minimum and maximum ranges for the other GAs were established and thus the significance of the effects can not be analyzed.

Alternative 5

Minimum acres: There are negative potential impacts to herbage production and AUMs across all GAs. Three of the GAs (FRSE, WSW, WAW 3.63) show a small potential decrease in herbage production and AUMs (<1,000). All other GAs show a large potential decrease in herbage production and AUMs (>1,000).

Maximum acres: There are negative potential impacts to herbage production and AUMs across all GAs. One of the GAs (FRSE) shows a small potential decrease in herbage production and AUMs (<1,000).). All other GAs show a large potential decrease in herbage production and AUMs (>1,500). Overall, this alternative will have a greater negative impact than the Alternative 2 maximum acres and represents a decrease of 42,350 AUMs (17.7 percent) of the currently permitted 238,953 AUMs on the Fort Pierre, Buffalo Gap, and Oglala National Grasslands. To achieve these acres, livestock management and other management tools will need to be implemented to increase forage use levels that will encourage prairie dog expansion. When desired expansion is achieved, future livestock use levels would be considerably less than current levels.

Seral Stage

The following discussion summarizes the seral stage changes from existing condition on only suitable prairie dog habitat in the IMZ for each of the geographic and management areas. Changes from existing condition are rated on the following: 0-5 percent (+/-) is little to no change; 6-25 percent (+/-) is a minor change, 26-66 percent (+/-) is a moderate change; and 67-100% (+/-) is a major change from existing conditions.

Late Seral Stage:

- Alternative 1 predicts no noticeable change to a minor decrease across all GAs.
- Alternative 2, at the minimum range of prairie dog acres, predicts no noticeable change across all GAs. Alternative 2, at the maximum range of prairie dog acres, predicts a minor to moderate decrease across all GAs, except for WSW where a major decrease is predicted.
- Alternative 3, at the minimum range of prairie dog acres, predicts no noticeable change in the OG GA. All other GAs could not be analyzed. Alternative 3, at the maximum range of prairie dog acres, predicts no noticeable change in all GAs, except FRW, where a minor decrease is predicted.
- Alternative 4 predicts no noticeable change in the WSW GA. All other GAs could not be analyzed.
- Alternative 5, at the minimum range of prairie dog acres, predicts a minor to moderate decrease in all GAs. Alternative 5, at the maximum range of prairie dog acres, predicts a moderate to major decrease with a potential total loss of this seral stage in the OG and WSW GAs.

Late Intermediate Seral Stage:

- Alternative 1, at the minimum range of prairie dog acres, predicts no noticeable change in all GAs, except WSW, where a major increase is predicted. Alternative 1, at the maximum range of prairie dog acres, predicts no noticeable change to a minor decrease across all GAs, except WSW, where a moderate increase is predicted.
- Alternative 2, at the minimum range of prairie dog acres, predicts no noticeable change across all GAs. Alternative 2, at the maximum range of prairie dog acres, predicts no noticeable change in the FRW GA, a major decrease in the WSW GA, and from a minor to moderate decrease across all other GAs.
- Alternative 3, at the minimum range of prairie dog acres, predicts a minor increase in the OG GA. All other GAs could not be analyzed. Alternative 3, at the maximum range of prairie dog acres, predicts no noticeable change to minor decreases in all GAs, except WSW, where a major increase is predicted.
- Alternative 4 predicts major increases in the WSW GA. All other GAs could not be analyzed.
- Alternative 5, at the minimum range of prairie dog acres, predicts a minor to moderate decrease in all GAs. Alternative 5, at the maximum range of prairie dog acres, predicts a moderate to major decrease with a potential total loss of this seral stage in the OG, WN, and WSW GAs.

Early Intermediate Seral Stage:

- Alternative 1, at the minimum range of prairie dog acres, predicts no noticeable change in all GAs, except FRSE, where a minor increase is predicted. Alternative 1, at the maximum range of prairie dog acres, predicts no noticeable change across all GAs, except FRSE, where a moderate increase is predicted.
- Alternative 2, at the minimum range of prairie dog acres, predicts no noticeable change across all GAs. Alternative 2, at the maximum range of prairie dog acres, predicts a variety of change across all GAs, from no noticeable change to moderate increases and decreases.
- Alternative 3, at the minimum range of prairie dog acres, predicts no noticeable change in the OG GA. All other GAs could not be analyzed. Alternative 3, at the maximum range of prairie dog acres, predicts no noticeable change in all GAs.
- Alternative 4 predicts no noticeable change in the WSW GA. All other GAs could not be analyzed.
- Alternative 5, at the minimum range of prairie dog acres, predicts a variety of change across all GAs, from no noticeable change to minor decreases and major increases. Alternative 5, at the maximum range of prairie dog acres, predicts a variety of change across all GAs, from no noticeable change to moderate decreases and major increases.

Early Seral Stage:

- Alternative 1, at the minimum range of prairie dog acres, predicts a variety of change across all GAs, from no noticeable change, to moderate decreases and major increases. Alternative 1, at the maximum range of prairie dog acres, predicts a minor decrease in the WSW GA, however all other GAs experience moderate to major increases.
- Alternative 2, at the minimum range of prairie dog acres, predicts no noticeable change across all GAs. Alternative 2, at the maximum range of prairie dog acres, predicts a major increase across all GAs.
- Alternative 3, at the minimum range of prairie dog acres, predicts a major decrease in the OG GA. All other GAs could not be analyzed. Alternative 3, at the maximum range of prairie dog acres, predicts a variety of change from a major decrease in the WSW GA to moderate and major increases in most other GAs.

- Alternative 4 predicts a moderate to major decrease in the WSW GA. All other GAs could not be analyzed.
- Alternative 5, at the minimum range of prairie dog acres, predicts a minor increase in the WSW GA, while all other GAs experience a major increase. Alternative 5, at the maximum range of prairie dog acres, predicts a major increase across all GAs.

Cumulative Effects

Within the IMZ, the proposed action results in potential minor vegetation condition improvement in Alternative 1 minimum and Alternative 3 maximum. Potentially, no vegetation condition change is expected in Alternative 1 maximum. Potential moderate deterioration in vegetation condition may occur in Alternative 2 maximum and Alternative 5 minimum. Potential major deterioration of vegetation condition may occur in Alternative 5 maximum due to the significant increase in prairie dog acres across the IMZ.

The past and present actions and the potential direct and indirect effects they may have had on vegetation condition are consistently either positive or negative across all alternatives. This is because the past actions do not drive differences in the proposed range of prairie dog acres, nor have the differences in the proposed range of prairie dog acres under each alternative driven any of the past effects.

The last seven years of drought have had a moderate negative impact on vegetation condition. The duration has been long, and certain years were extremely drier than others, especially in 2002 and 2006. Past rodenticide use in the BMZ should be viewed as having a potential minor improvement on vegetation conditions, although the rate of improvement has been dependent on drought conditions and on livestock grazing practices that were or were not implemented in 2005. Past prescribed fire generally improved vegetation conditions by releasing nutrients to the soil. Oil and gas exploration is a minor program, only in the FRW GA, and disturbance has been so minimal that there have been no effects to vegetation conditions from this past action. Recreational shooting does not directly affect vegetation condition, although if enough shooting reduces prairie dog populations, indirectly vegetation conditions may have improved. It is not documented that this has occurred.

The reasonably foreseeable actions that have potential direct and indirect effects consistent across all alternatives are: drought, livestock grazing practices, livestock grazing in conjunction with prairie dog control in the BMZ, prescribed fire, oil and gas exploration, plague, travel management, and recreational shooting. The potential effects are minimally positive or negative. Again, the actions are not driven by the difference in the proposed range of prairie dog acres, nor do the actions drive the proposed range of prairie dog acres under any of the alternatives.

The effects from the reasonably foreseeable action of rodenticide use in the BMZ will be variable on vegetation conditions. Conditions are expected to improve minimally in Alternative 1 and Alternative 3 maximum. They will improve minimally in Alternative 2 minimum, but are expected to minimally deteriorate in Alternative 2 maximum and Alternative 5 minimum as the moderate increase in prairie dog acres in the IMZ continually expand into the BMZ and onto other state, tribal, and private lands. Effects to vegetation conditions will be negatively noticeable under Alternative 5 maximum as the large increase in prairie dog acres in the IMZ will continually expand into the BMZ and onto other state, tribal, and private lands, and rodenticide use in the BMZ will be ineffective.

The cumulative effects from the proposed, past, present, and reasonably foreseeable actions are:

- Alternative 1: Vegetation conditions will show modest improvement under the minimum acres of prairie dogs; however they will show no cumulative effects under the maximum acres. Overall, cumulative effects from all actions will be insignificant on vegetation conditions in the eight Geographic Areas and adjacent state, tribal, and private lands.
- Alternative 2: Vegetation condition will show minor improvement under the minimum acres of prairie dogs; however they will show a moderate deterioration under the maximum acres. Overall, cumulative effects from all actions will be moderately negative on vegetation conditions in the eight geographic areas and adjacent state, tribal, and private lands.
- Alternative 3: The cumulative effects could not be analyzed under the minimum acres of prairie dogs. Cumulative effects from all actions under the maximum acres of prairie dogs will have a modest improvement on vegetation conditions in the eight geographic areas and adjacent state, tribal, and private lands.
- Alternative 4: The cumulative effects could not be analyzed.
- Alternative 5: Vegetation conditions will show a modest deterioration under the minimum acres of prairie dogs. Vegetation conditions will show a major deterioration under the maximum acres of prairie dogs. Overall, cumulative effects from all actions will have a major negative impact on vegetation conditions in the eight geographic areas and adjacent state, tribal, and private lands.

Compliance with Forest Plan and Other Regulatory Direction

The following discussion summarizes compliance to the 2001 Forest Plan vegetation condition seral stage objectives for each GA. It is based on the following premises that may occur by the end of this project period:

- Intended to only show compliance from the results of increased or decreased prairie dog acres in the IMZ as proposed in each alternative.
- Boundary management zones in suitable prairie dog habitat remain prairie dog free.
- Current vegetation conditions in the BMZ unsuitable prairie dog habitat remain stable.
- Current vegetation conditions in the IMZ unsuitable prairie dog habitat remain stable.
- Predicted vegetation conditions in the IMZ on suitable prairie dog habitat occur with changes in the alternative range of prairie dog acres.

No alternative in its entirety, with its proposed range of prairie dog acres, will be in compliance with the 2001 Forest Plan vegetation objectives across all GAs at this point in time. Implementation of all management tools available to line officers over the life of this project, especially on prairie dog free habitats, could trend vegetation conditions towards 2001 Forest Plan objectives.

Oglala Geographic Area – The 2001 Forest Plan desired condition for this area in terms of seral stages are late seral 10-30 percent late intermediate seral 50-70 percent; early intermediate seral 10-20 percent; and early seral 1-10 percent. Alternative 4 was not analyzed for this geographic area as it only pertains to the Wall Southwest Geographic Area and Wall Southwest 3.63 Management Areas.

- Late seral stage: All alternatives predicted conditions meet the desired range.
- Late intermediate seral stage: Alternatives 1 and 3, and Alternatives 2 and 5 minimum predicted condition meets the desired range while Alternatives 2 and 5 maximum predicted conditions fall below the desired range.

- Early intermediate seral stage: All alternatives predicted conditions meet the desired range.
- Early seral stage: All alternatives predicted conditions meet the desired range.

Fall River Northeast Geographic Area – The 2001 Forest Plan desired condition for this area in terms of seral stages are late seral 20-40 percent; late intermediate seral 40-60 percent; early intermediate seral 5-15 percent; and early seral 5-15 percent. Alternative 3 minimum and Alternative 4 were not analyzed as they only pertain to the Wall Southwest Geographic Area and Wall Southwest 3.63 Management Areas.

- Late seral stage: All alternatives predicted conditions fall below the desired range.
- Late intermediate seral stage: All alternatives predicted conditions meet the desired range.
- Early intermediate seral stage: All alternatives predicted conditions exceed the desired range.
- Early seral stage: All alternatives predicted conditions meet the desired range.

Fall River West Geographic Area – The 2001 Forest Plan desired condition for this geographic area in terms of seral stages are late seral 10-30 percent; late intermediate seral 50-70 percent; early intermediate seral 10-20 percent; and early seral 1-10 percent. Alternative 3 minimum and Alternative 4 were not analyzed as they only pertain to the Wall Southwest Geographic Area and Wall Southwest 3.63 Management Areas.

- Late seral stage: All alternatives predicted conditions meet the desired range.
- Late intermediate seral stage: All alternatives predicted conditions meet the desired range except for alternative 5 predicted conditions which fall below the desired range.
- Early intermediate seral stage: All alternatives predicted conditions meet the desired range.
- Early seral stage: All alternatives predicted conditions meet the desired range except for Alternative 5 maximum predicted condition which exceeds the desired range.

Fall River Southeast Geographic Area and Fall River 3.63 Management Area – The 2001 Forest Plan desired condition for this area in terms of seral stages are late seral 20-30 percent; late intermediate seral 40-60 percent; early intermediate seral 15-25 percent; and early seral 1-10 percent. Alternative 3 minimum and Alternative 4 were not analyzed as they only pertain to the Wall Southwest Geographic Area and Wall Southwest 3.63 Management Areas.

- Late seral stage: All alternatives predicted conditions meet the desired range except for Alternative 5 maximum predicted condition which falls below the desired range.
- Late intermediate seral stage: All alternatives predicted conditions meet the desired range.
- Early intermediate seral stage: All alternatives predicted conditions meet the desired range.
- Early seral stage: All alternatives predicted conditions meet the desired range except for Alternative 5 maximum predicted condition which exceeds the desired range.

Wall North Geographic Area – The 2001 Forest Plan desired condition for this area in terms of seral stages are late seral 20-40 percent; late intermediate seral 30-50 percent; early intermediate seral 10-30 percent; and early seral 1-20 percent. Alternative 3 minimum and Alternative 4 were not analyzed as they only pertain to the Wall Southwest Geographic Area and Wall Southwest 3.63 Management Areas.

- Late seral stage: All alternatives predicted conditions fall below the desired range.
- Late intermediate seral stage: All alternatives predicted conditions exceed the desired range while Alternative 5 maximum predicted condition meets the desired range.
- Early intermediate seral stage: All alternatives predicted conditions meet the desired range.
- Early seral stage: All alternatives predicted conditions meet the desired range.

Wall Southeast Geographic Area - The 2001 Forest Plan desired condition for this area in terms of seral stages are late seral 20-40 percent; late intermediate seral 30-50 percent; early intermediate seral 10-30 percent; and early seral 1-20 percent. Alternative 3 minimum and Alternative 4 were not analyzed as they only pertain to the Wall Southwest Geographic Area and Wall Southwest 3.63 Management Areas.

- Late seral stage: All alternatives predicted conditions fall below the desired range.
- Late intermediate seral stage: Alternative 2 maximum and Alternative 5 minimum/maximum predicted conditions meet the desired range. All other alternatives predicted conditions rise above the desired range.
- Early intermediate seral stage: All alternatives predicted conditions meet the desired range.
- Early seral stage: All alternatives predicted conditions meet the desired range.

Wall Southwest Geographic Area and Wall Southwest 3.63 Management Area - The 2001 Forest Plan desired condition for this area in terms of seral stages are late seral 20-40 percent; late intermediate seral 20-40 percent; early intermediate seral 10-30 percent; and early seral 10-30 percent. There is no Alternative 3 minimum for this area.

- Late seral stage: All alternatives predicted conditions fall below the desired range.
- Late intermediate seral stage: Alternative 1 maximum, Alternatives 2 and 5 min/max predicted conditions meet the desired range. All other alternatives predicted conditions exceed the desired range.
- Early intermediate seral stage: All alternatives predicted conditions meet the desired range.
- Early seral stage: Alternatives 1 and 4, and Alternatives 2 and 5 minimum, predicted conditions meet the desired range. All other alternatives predicted conditions exceed or fall below the desired range.

Fort Pierre Geographic Area - The 2001 Forest Plan desired condition for this area in terms of seral stages are late seral 20-40 percent; late intermediate seral 30-50 percent; early intermediate seral 10-30 percent; and early seral 1-20 percent. Alternative 3 minimum and Alternative 4 were not analyzed as they only pertain to the Wall Southwest Geographic Area and Wall Southwest 3.63 Management Areas.

- Late seral stage: All alternatives predicted conditions meet the desired range.
- Late intermediate seral stage: All alternatives predicted conditions exceed the desired range except for Alternative 5 maximum predicted conditions which meets the desired range.
- Early intermediate seral stage: All alternatives predicted conditions meet the desired conditions.
- Early seral stage: All alternatives predicted conditions meet the desired range.

Species at Risk

Affected Environment

The species at risk in this analysis include federally listed threatened, endangered, and proposed species and species designated as sensitive by Region 2 of the Forest Service. Effects of prairie dog management on most of these species were initially evaluated as part of the recent (2001 – 2002) forest plan revision process (evaluations are documented in Chapter 3 and Appendix H of the forest plan FEIS). However, several new species were added to the sensitive species list after 2002. These species are evaluated either in this analysis (Appendix N – Biological Evaluation, Appendix O – Biological Effects) or in *Black-tailed Prairie Dog Conservation and Management on the Nebraska National Forest and Associated Units - Final Environmental Impact* Statement (BTPDCM FEIS) (USDA Forest Service 2005e). Evaluations are documented in Chapter 3 and Appendix E – Biological Assessment and Evaluation. To reduce the

number of analyses, any species listed in the following two species tables that meet one or more of following criteria (screens) was eliminated from further analyses:

- Screen 1 - (Importance of area) Presence of the species or suitable habitat is doubtful or has not been documented.
- Screen 2 - (Threats) The species or potential habitat for the species may occur, but it's highly unlikely that land uses and allocations authorized by the Forest Service would affect the species and/or its habitat either on NFS lands or downstream.

Federally listed species located on national forest system (NFS) lands that could occur in the project area are listed in Table 3-8 and Region 2 sensitive species located on NFS lands in the project area are listed in Table 3 9.

Table 3-8. Federally listed species located on National Forest System lands in the project area.

	Buffalo Gap National Grassland						Fort Pierre GA	Oglala GA
	FRRD West GA	FRRD SE GA	FRRD NE GA	WRD North GA	WRD SW GA	WRD SE GA		
Status: Endangered								
Mammals								
Black-footed ferret[2]	---	---	---	---	K	K	---	---
Birds								
Whooping crane[3]	P	P	P	P	P	P	P	P
Least tern	---	---	---	---	---	---	---	---
Invertebrates								
American burying beetle	---	---	---	---	---	---	---	---
Plants								
Penstemon haydenii	---	---	---	---	---	---	---	---
Status: Threatened								
Piping plover	---	---	---	---	---	---	---	---

K = Known occurrence in vicinity; date of last observation indicates that species still occurs in area.

P = Possible but unconfirmed occurrence.

Federally Listed Species Not Analyzed in Detail

Four federally protected species were eliminated from further detailed analysis; the least tern and piping plover (Screen 1) and the American burying beetle and blowout penstemon (Screen 2). All species are listed as endangered except the threatened piping plover. The piping plover and least tern are found along the Missouri River and its western tributaries. Both are rare migrants and are not found on prairie dog colonies. The American burying beetle and blowout penstemon are found on NFS lands in the Nebraska Sand Hills. Because there is no rodenticide use prescribed under any of the alternatives for this area, there are no possible effects on American burying beetles. Blowout penstemon was eliminated from further detailed analysis because it occurs on unstable soils in sand blowouts, unsuitable sites for prairie dog colonization.

[2] Non-essential experimental population.
[3] Downstream from Nebraska N.F.

Federally Listed Species Analyzed in Detail

Two federally listed species were identified for further detailed analysis in Appendix O – Biological Effects: black-footed ferret and whooping crane.

Whooping crane: Migrating whooping cranes are rarely observed on National Forest System (NSF) lands and waters in the project area. Past confirmed sightings occurred on uplands for resting and feeding and on the Middle Loup River near the Nebraska National Forest, Bessey Ranger District. For a detailed description and determination of how this project will affect the whooping crane, see Appendix O – Biological Effects.

Black-footed ferret: The black-footed ferret inhabits large complexes of prairie dog colonies almost exclusively. Prairie dogs provide the black-footed ferret with its primary food source and their burrows provide shelter. The black-footed ferret population in the Conata Basin/Badlands black-footed ferret reintroduction area on the Buffalo Gap National Grassland and Badlands National Park is listed as a non-essential experimental population under Section 10j of the Endangered Species Act (ESA). Under this classification, that portion of the population on the national grassland is treated as a "proposed" species for Section 7 consultation purposes under ESA. On the adjoining Badlands National Park, the ferret population is treated as a "threatened" species for consultation purposes.

Conata Basin supports a large black-footed ferret population and has provided kits for translocation to other reintroduction areas (Lockhart et al. 2006). The Conata Basin ferret reintroduction site is paramount to the success of the ferret program in North America. The U.S. Fish and Wildlife Service estimates there are 647 total ferrets (adults and young) in the wild to date. Forty one percent (268) of these ferrets are located in Conata Basin. For a more complete discussion of the black-footed ferret, see Appendix O – Biological Effects Analysis.

The results of population modeling indicate that very small black-footed ferret populations – for example, those with N<40 – are highly susceptible to extinction within 30 – 50 years in the absence of intensive management (Conservation Breeding Specialist Group 2004). Larger populations show a much greater degree of persistence, with growth rates ranging from 3 percent to 4 percent per year and extinction risks less than 10 percent over 40 years and less than 20 percent over 100 years. Typically, population viability analysis tools recommend at least a 95 percent probability of persistence over 100 years. The CBSG modeling provides a perspective on the black-footed ferret numbers. The numbers are not absolutes but rather crude estimates for a best-case scenario. Indeed, many model inputs are not available for the Conata Basin black-footed ferrets.

The CBSG (2004) modeled the potential effect of the introduction of plague on ferret populations in Conata Basin. Their scenarios simulated an outbreak of plague within the prairie dog colonies, a tractable scenario because the consequence of this disease event can be defined as a severe reduction in black-footed ferret carrying capacity. Plague can also directly affect ferrets, but the dynamics of infection among both prairie dogs and ferrets, and the ways in which infection in one species can influence infection in the other, are poorly known. Two different scenarios were modeled; ferret carrying capacity of the Conata Basin black-footed ferret population was reduced by either 50 percent or 75 percent of a baseline value of 250 breeding individuals. Such an event would occur, on average, every 20 years and after the plague event, CBSG's simulation included a linear increase in black-footed ferret carrying capacity over a period of six years to the original baseline value. Model results indicated a dramatic reduction in the size of prairie dog colonies (and, consequently, black-footed ferret carrying capacity) that can have a significant impact on the viability of black-footed ferret populations associated with them. When plague leads to a 50 percent reduction in black-footed ferret carrying capacity, the risk of population extinction climbs dramatically to more than 80 percent. Extinction is virtually guaranteed within 30 years when carrying capacity is reduced by 75 percent due to an outbreak. High levels of annual environmentally induced variation in black-footed ferret

demographic rates can lead to considerable instability in population growth, making random extinction much more likely when population size is small. It is feasible to apply this model to periodic poisoning of prairie dog colonies because it has the same effect of plague – the elimination of large areas of black-footed ferret habitat.

Studies of black-footed ferret home ranges in Conata Basin indicate the mean home range of 11 females was 193 acres and 351.2 acres for the wet and dry years, respectively. . Taking into account the pitfalls of using home range values, 120 breeding black-footed ferrets, the viable number estimated by CBSG (2004) for >90 percent population persistence, would require from 16,366 to 29,704 acres during wet and dry years, respectively (80 female black-footed ferrets x 193 acres + 6 percent = 16,336 acres; 80 female black-footed ferrets x 351.2 acres + 6 percent = 29,704 acres). For >95 percent population persistence 125 breeding adult black-footed ferrets would require from 16,878 to 31,189 acres of prairie dog colonies during wet and dry years, respectively. One-hundred thirty breeding adult black-footed ferrets would require from 17,798 to 32,400 acres of prairie dog colonies.

To reclassify the black-footed ferret from endangered to threatened status, recovery criteria have been established in the 1988 recovery plan (U.S. Fish and Wildlife Service 1988). The 2006 draft revision of the recovery plan maintains the same criteria (U.S. Fish and Wildlife Service 2006a):

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

The 2006 draft revision of the recovery plan states that delisting may occur when the following additional recovery criteria are met:

- Establish a pre-breeding census population of 3,000 free-ranging black-footed ferret breeding adults in 30 or more populations, with no fewer than 30 breeding adults in any population and at least 10 populations with 100 or more breeding adults.
- Encourage the widest possible distribution of reintroduced black-footed ferret populations.

Sensitive Species

The same criteria screens described above were used for the sensitive species to determine which species would or would not be further analyzed in detail.

Table 3-9. Region 2 sensitive species located on NFS lands in the project area

	Buffalo Gap National Grassland						Fort Pierre NG & GA	Oglala NG & GA
	FRRD West GA	FRRD SE GA	FRRD NE GA	WRD North GA	WRD SW GA.	WRD SE GA		
Mammals								
Fringed myotis	P	P	K	P	K	P	---	K
Townsend's big-eared bat	P	P	P	P	K	K	---	P
Black-tailed prairie dog	K	K	K	K	K	K	K	K
Swift fox	P	K	K	K	K	K	K	K
Birds								
American bittern	K	K	P	P	P	P	K	K
Greater prairie-chicken	---	---	---	---	---	---	K	---
Yellow-billed cuckoo	---	---	K	P	P	P	P	K
Long-billed curlew	K	K	K	K	K	K	K	K

	Buffalo Gap National Grassland						Fort Pierre NG & GA	Oglala NG & GA
	FRRD West GA	FRRD SE GA	FRRD NE GA	WRD North GA	WRD SW GA.	WRD SE GA		
Bald eagle	K	K	K	K	K	K	K	K
American peregrine falcon	P	K	K	P	P	P	K	K
Northern goshawk	P	P	K	P	P	P	P	P
Greater sage grouse	K	---	---	---	---	---	---	---
Northern harrier	K	K	K	K	K	K	K	K
Ferruginous hawk	K	K	K	K	K	K	K	K
Chestnut-collared longspur	K	K	P	P	P	P	K	K
McCown's longspur	---	---	---	---	---	---	---	K
Short-eared owl	K	K	K	K	K	P	K	K
Western burrowing owl	K	K	K	K	K	K	K	K
Mountain plover	---	---	---	---	K	---	---	---
Loggerhead shrike	K	K	K	K	K	K	K	K
Brewer's sparrow	K	---	---	---	---	---	---	K
Grasshopper sparrow	K	K	K	K	K	K	K	K
Trumpeter swan	---	---	---	---	K	K	---	---
Black tern	K	K	---	K	---	---	K	K
Lewis's woodpecker	---	---	---	---	---	---	---	K
Amphibians								
Plains leopard frog	---	---	---	---	---	---	---	---
Northern leopard frog	K	K	K	K	K	K	K	K
Fish								
Sturgeon chub	---	---	K	---	K	---	---	---
Pearl dace	---	---	---	---	---	---	---	---
Finescale dace	---	---	---	---	---	---	---	---
Plains minnow	P	P	P	P	P	P	P	P
Flathead chub	K	K	K	K	K	K	---	K
Molluscs								
Cooper's Rocky mountain snail	---	---	---	---	---	---	---	---
Insects								
Regal fritillary butterfly	K	---	K	P	---	P	K	---
Ottoe skipper	---	---	---	---	---	---	P	---
Plants – Monocots								
Carex diandra	---	---	---	---	---	---	---	---
Cypripedium parviflorum	---	---	---	---	---	---	---	---
Eriophorum gracile	---	---	---	---	---	---	---	---
Liparis loeselii	---	---	---	---	---	---	---	---
Schoenoplectus hallii	---	---	---	---	---	---	---	---
Plants – Dicots								
Astragalus barrii	P	K	K	P	K	P	---	P
Eriogonum visheri	P	P	P	P	K	K	---	P
Utricularia minor	---	---	---	---	---	---	---	---

K = Known occurrence in vicinity; date of last observation indicates that species still occurs in area
P = Possible but unconfirmed occurrence

Sensitive Species Not Analyzed in Detail

Numerous sensitive species were eliminated from further detailed analysis. Screen 1 identified the following species as not known or suspected of occurring in the general project area or not known to occur in, or make significant use of, prairie dog colonies: greater prairie chicken (all GAs except Ft. Pierre GA), American peregrine falcon, northern goshawk, greater sage grouse (all GAs except Fall River West GA), McCown's longspur (all GAs except Oglala GA), mountain plover (Ft. Pierre GA only), Brewer's sparrow (all GAs except Fall River West GA and the Oglala GA), trumpeter swan (Ft. Pierre GA and Oglala GA), Lewis' woodpecker, Plains and northern leopard frogs, sturgeon chub, pearl dace, finescale dace, Plains minnow, flathead chub, Cooper's Rocky mountain snail, lesser panicled sedge, lesser yellow lady's slipper, slender cotton grass, yellow widelip orchid, Hall's bulrush, and the lesser bladderwort.

Screen 2 identified the following species as occurring but are unaffected by prairie dog foraging, burrowing or management activities, including rodenticide use: fringed myotis, Townsend's big-eared bat, American bittern, yellow-billed cuckoo, loggerhead shrike, black tern, Barr's orphaca (Barr's milkvetch), and Visher's erigonum (Dakota buckwheat).

Sensitive Species Analyzed in Detail

Seventeen sensitive species were identified for further detailed analysis. Because the black-tailed prairie dogs are the pivotal species in this analysis, the sensitive species analyzed in detail are broken into two groups; those that are closely related to prairie dogs and those that are not.

Species not closely associated with prairie dogs: The sensitive species that are not known to be closely associated with prairie dogs but are analyzed in detail in this analysis include the greater prairie chicken (Ft. Pierre GA only), long-billed curlew, greater sage grouse (Fall River West GA only), northern harrier, chestnut-collared longspur, McCown's longspur (Oglala GA only), short-eared owl, Brewer's sparrow, grasshopper sparrow, trumpeter swan, and the regal fritillary butterfly. For a detailed description and determination of how this project will affect these species see Appendix N

Species believed to be closely associated with prairie dogs: mountain plover, swift fox, ferruginous hawk, burrowing owl, and black-tailed prairie dog.

The **mountain plover** is commonly associated with prairie dog colonies. The Forest Service has carried out numerous systematic and random searches for mountain plover. Survey results did not identify any plover nesting sites nor plover observations (Reports of the mountain plover surveys can be found in the administrative record). The only confirmed record in recent years occurred during the summer of 2004 when a single bird was observed in Conata Basin. The project area is considered outside their current breeding range (see Appendix N – Biological Evaluation).

The **swift fox** is native to the short grass and mixed grass prairie in the Great Plains region of North America. Swift fox have been located on all three of the national grasslands. The swift fox that have been sighted on the Fort Pierre National Grassland are a result of a reintroduction effort initiated by the Turner Endangered Species Fund (TESF) on the Bad River Ranch west of Fort Pierre National Grassland. The swift fox that have been sighted on the east half of the Buffalo Gap National Grassland are a result of a reintroduction effort initiated by the Badlands National Park. Swift fox populations have blinked in and out on different areas of the west half of the Buffalo Gap National Grassland (Hetlet 1991-2006) (Hodorff 2004). The only population that has persisted is located near Ardmore, South Dakota. On the Oglala National Grassland, there have been incidental sightings and denning activities of swift fox, but there is no evidence of a resident population.

The association between swift fox and black-tailed prairie dog continues to be debated. Uresk and Sharps (1986) found swift fox in close association with prairie dog colonies in Shannon County, South Dakota. Other studies have found swift fox to thrive without prairie dog colonies (Allardyce and Sovada 2003). Size of prairie dog complexes could be very important in determining whether or not swift fox will use prairie dog colonies. Prairie dog colonies, because of the abundant prey, attract many predators. There is a possibility (although not documented in the literature) that swift fox could actually avoid prairie dog colonies because the abundance of predators could outweigh the benefits of an increased forage base. Allardyce and Sovada (2003) state "It is apparent from the studies done by the Swift Fox Conservation Team and the individual states during the past 3 to 5 years that swift fox populations in today's altered landscape are not necessarily dependent on the availability of prairie dog colonies and complexes." There is one prairie dog colony near the swift fox population that is on the Buffalo Gap National Grassland near Ardmore, South Dakota. None of the bait stations within 1.5 miles of this prairie dog colony had swift fox tracks in them during the 2003-4 survey (Hetlet 1991-2006). Clearly more research needs to be done on swift fox / prairie dog relationships.

The **ferruginous hawk** is an open-country raptor that inhabits grasslands, shrub steppes, and deserts in the central and western part of North America (Bechard and Schmutz 1995). These hawks are a summer resident and rare winter visitor on all the units included in this evaluation (Peterson et al. 1991, Graupman et al. 1991, Mollhoff et al. 1993, and Peterson 1993). The species was petitioned for listing under the Endangered Species Act in 1991 but was rejected (Ure et al. 1991). Cultivation of the prairie, grazing, poisoning small mammals, along with mining and fire in nesting habitats, were factors that caused ferruginous hawk declines (Olendorff 1993), with cultivation being the most serious. The ferruginous hawk is listed as a sensitive species in Region 2, which includes the project area.

Unlike the black-footed ferret and the burrowing owl, the ferruginous hawk is not highly dependent on prairie dogs or prairie dog colonies for their survival. That being said, ferruginous hawks can be closely associated with prairie dogs in many areas. Research in the Estancia Valley of New Mexico has shown that ferruginous hawks prefer to nest within 0.7-2.8 km of a prairie dog colony. Additionally, there was a positive relationship between the abundance of prairie dog remains located at a nest site and the number of young fledged per nest, and a negative logarithmic relationship between abundance of prairie dog remains at a nest site and distance to the nearest prairie dog colony. This suggests that ferruginous hawks nesting closer to prairie dog colonies consume more prairie dogs and have greater reproductive success (i.e., greater number of young surviving to fledging age) than those nesting farther away (Cook et al. 2003). Prairie dog colonies additionally serve as fall and winter habitat for the species (Plumpton and Andersen 1997, Seery and Matiatos 2000, Smith and Lomolino 2004). Numbers of wintering ferruginous hawks in the Rocky Mountain Arsenal National Wildlife Refuge in Colorado were highly correlated with black-tailed prairie dog populations ($r2 = 0.97$, $P < 0.001$) and area occupied by prairie dogs ($r2 = 0.96$, $P < 0.001$) (Seery and Matiatos 2000).

Ferruginous hawk observations have been well distributed across NNF. The birds are seen both on and off prairie dog colonies, although the majority of observations have been off colonies (Appendix N Biological Evaluation).

Tying the viability of the ferruginous hawk to a number of prairie dogs has not been accomplished in the literature and will not be attempted in this document. But, a general statement can be supported that if prairie dogs are drastically reduced in an area there would be a corresponding reduction in the number of ferruginous hawks that are currently using that area. To quantify that reduction is difficult without intensive monitoring.

Burrowing owl habitat typically consists of open, dry, treeless areas on plains, prairies, and deserts. These areas are also occupied by burrowing mammals and other animals that provide nest burrows. The prairie dog burrows are the principal breeding habitat of the burrowing owl. Burrowing owls are capable of using badger and coyote burrows, and use the burrows of Richardson's ground squirrel

(*Spermophilus richardsonii*) in the far northern Great Plains, in grasslands without prairie dogs burrowing owls occur at very low densities. Throughout the years burrowing owls have been seen on almost all of the established prairie dog colonies in the project area at one time or another.

Breeding bird survey (BBS) data is frequently cited to display population trends for certain species. However, the downfall is that this is a road-side survey and doesn't necessarily reflect the actual regional habitat change. Burrowing owls are almost completely relegated to prairie dog colonies in this part of their range. For example, a colony with a few owls along a particular BBS route may shrink or become extirpated from poisoning or plague, and thus, there would be a decreasing trend in the population for later years. However, there could be several thousand acres of prairie dog expansion happening nearby where burrowing owl numbers are actually increasing but since the BBS route doesn't go near that site the trend will be declining.

There is a slight negative trend in BBS sightings survey-wide (-1.6) and within South Dakota (-4.8) from 1966-2006 while there has been a relatively large positive trend for Nebraska (32.8) during this same time-period. However, research conducted in western Nebraska from 1989-1993 indicated a decline in the burrowing population and subsequent poor reproductive output from extensive prairie dog poisoning on and around the study site (Desmond et al. 2000).

A closer look indicates that there are a total of 72 BBS routes in South Dakota, but only 16 of these have any trend data for burrowing owls. There are two routes on the Wall Ranger District; (1) the Badlands route, which is entirely within Badlands National Park except for Conata Basin Road in the south, and (2) the Cedar Pass route in the eastern part of the District. The Badlands route has a positive trend of 41.68 because three owls were observed in 2005 and 2006. Cedar pass is negative at -2.26, but there have only been three years owls have ever been recorded on that route. A good example of "issues" with a route is the Rosebud route, which is probably a major contributor to the statewide declining trend, which was at -75.0 up to 2003 but is now at -49.7 for 2006 even though very few owls have ever been observed along that route (Sauer et al. 2007). There are no other BBS routes through either the Conata Basin or Scenic Basin where available habitat has fluctuated from 17,648 acres in 1993 to 9,370 acres in 1999 to 31,372 acres in 2007.

The most relevant and extensive data collection related to actual burrowing owl populations and nesting success in western South Dakota took place from 1999-2000 in the Conata and Scenic Basin of the Wall Ranger District (Griebel 2000, 2007). There were 63 prairie dog colonies totaling 5,123 acres in 1999 and 6,126 acres in 2000 that were extensively surveyed. This period saw above average rainfall and active prairie dog colony acreage in the Conata and Scenic Basin was 9,370 acres in 1999 (lowest amount recorded in last 15 years). Over the two-year period, burrowing owls nested on 70 percent of the sampled prairie dog colonies (range in size: 3.7 - 1,729 acres); most (85 percent) of the unoccupied colonies were <25 acres in size (Griebel 2000, 2007). Burrowing owl breeding pair density, figured as breeding pairs/ha of each occupied prairie dog colony averaged 0.16 pairs per hectare (.064 pairs per acre) (15.625 acres per pair) of prairie dog colony (Griebel 2000). Including all colonies, even those not selected, breeding pair density averaged 0.12 pairs per hectare (.049 pairs per acre) (20.408 acres per pair) of prairie dog colony. It is this data that the potential habitat for burrowing owl breeding pair population is based-on and alternatives analyzed.

The **black-tailed prairie dog** occurs mostly on shortgrass and mixed grass prairie. Suitability of habitats for this species is enhanced by low vegetative cover and increased visibility to detect predators and enhance social behaviors. Because of this, these animals prefer areas with disturbed soils and/or grasslands grazed by cattle or bison. They typically colonize grasslands of a wide variety of soil types that are flat to gently rolling. For a more complete discussion of the black-tailed prairie dog see Appendix N – Biological Evaluation.

The U.S. Fish and Wildlife Service (2000b) determined that listing of the black-tailed prairie dog was warranted but precluded by other higher priority listing actions. Later, the U.S. Fish and Wildlife Service (2004a) concluded that the black-tailed prairie dog did not warrant listing. The black-tailed prairie dog is listed as a sensitive species in Region 2, which includes the project area.

The 2001 Forest Plan (Appendix G) defines a viable population of prairie dogs as follows:

> "A group of individuals of a particular species that produces enough offspring for long-term persistence and adaptation of the species or population in a given place. For planning purposes, 36 CFR 219.19 defines a viable population as one that has the estimated numbers and distribution of reproductive individuals to ensure that a continued viable population is well-distributed in the planning area. A planning area is further defined by 36 CFR 219.3 as the "area of the National Forest System covered by a regional guide or forest plan." Direction estimated numbers and distribution of reproductive individuals to ensure the continued existence of the species throughout its existing range (or range required to meet recovery for listed species) within the planning area." (USDA Forest Service 2001c)

Prairie dog viability: Many factors need to be considered when attempting to determine species viability, including the number of individuals, number of colonies, environmental variables, and their juxtaposition on the landscape. When attempting to determine the viability of prairie dogs, there are two different prairie dog population levels that could be considered: 1) the number of prairie dogs it takes to ensure the long-term survival of the prairie dog as a species (prairie dog species viability) and 2) the number of prairie dogs it takes to ensure the long-term survival of the species that depend on prairie dog colonies for their continued existence (associated species viability). Another element that factors into the viability of prairie dogs is the presence or absence of plague.

The authors of the 2001 Forest Plan (USDA Forest Service 2001c) proposed that large prairie dog complexes are the best approach to ensure prairie dog population viability. They based their definition of a colony complex on several sources of viability information, including the *Northern Great Plains Terrestrial Assessment* NGPTA (USDA Forest Service 2000), and literature found in the 2001 Forest Plan FEIS Bibliography by Hanski and Lande (Hanski 1997; Lande 1995) and Knowles (2000). Elements considered in defining a prairie dog colony complex included genetics, metapopulation principles, dispersion distances, effective population size and average adult animals per acre. The definition for a prairie dog colony complex in Appendix G of the 2001 Forest Plan is:

> "A group of at least 10 prairie dog colonies with nearest-neighbor intercolony distances not exceeding 6 miles and with a total colony complex acreage of at least 1,000 acres."

In the *Northern Great Plains Terrestrial Assessment* NGPTA (USDA Forest Service 2000), a conservation strategy for maximizing the contribution that the Forest Service and national grasslands add to the long term viability of black-tailed prairie dogs is to establish 2 or more prairie dog colony complexes on each national grassland within the range of the black-tailed prairie dog. The assessment does not state an optimum size of a prairie dog complex but does state there should be at least 10, and preferably 15 colonies, in a complex, and the complexes should be identified and managed on the basis of maximum effective dispersal distance of prairie dogs which was 10 km (6.21 miles). The only reference to the size of prairie dog colonies in the NGPTA is:

> "Although not specific to long term viability of black-tailed prairie dog populations, complexes should be or have the potential of growing to a size capable of supporting future reintroductions of black-footed ferrets." (USDA Forest Service 2000)

This statement reiterates that there is a difference between prairie dog species viability and associated species viability.

The authors of the *Multi-State Conservation Plan for the Black-tailed Prairie Dog Cynomys ludovicianus in the United States – Addendum 2003* (MCP) (Luce 2003) use 1,000 acres of prairie dogs as a minimum in their definition of conservation focus areas (CFA) which is:

> "An area greater than 1,000 acres of suitable prairie dog habitat, encompassing either an existing complex of occupied prairie dog colonies or an area where a complex of colonies can be created to sustain a viable population of prairie dogs for long-term management."

There are differences throughout the literature as to the definition of a complex with the center of contention revolving around the distance between colonies. This is discussed in further detail in Appendix N - Biological Evaluation.

The forest plan and multi-state conservation plan rely upon several reports and papers, including Knowles (2000) who discusses five levels of prairie dog population viability, including the 1,000-acre level. Knowles suggest that for long-term viability (51-100 years) without plague, the larger complexes approaching 1,000 acres appear to contain a suitable population base to survive environmental variables (including drought, extremely cold winters, and flooding). Knowles goes on to say that prairie dog complexes occupying about 1 percent of the landscape and a minimum of 1,000 acres are probably necessary to assure long-term population viability of prairie dogs in the absence of plague.

The 2001 Forest Plan FEIS also discusses viability (USDA Forest Service 2001b). Recommendations from the NGPTA (USDA Forest Service 2000) for maintaining viable prairie dog populations on the national grasslands in the planning area were incorporated into 2001 Forest Plan direction. This increased the probability of maintaining viable populations of the prairie dog across the planning unit. These additional conservation measures for the species increase the probability of sustaining viable populations in the future if plague epizootics become problematic (USDA Forest Service 2001b).

Knowles viewed 51 years (1947-1997) as an adequate time for genetic and demographic problems to emerge and for environmental variables to affect the prairie dog population. Knowles concluded that in the absence of plague, a "50,000-acre block of land with 1-2 percent prairie dog occupancy distributed among approximately 20 population centers (500 to 1,000 acres, or an estimated 5,000 to 10,000 individual prairie dogs)" would be suitable for long-term prairie dog population viability. A metapopulation can persist as long as rate of recolonization exceeds rate of extinction, even though no local population may survive continuously over time (McCullough 1996). Ability of prairie dogs to disperse among colonies is critical because recolonization after local extinction is essential for regional persistence of metapopulations (Fahrig and Merriam 1994, Hanski 1999, Hanski and Simberloff 1997, Harrison and Taylor 1997, Roach et al. 2001)

The black-tailed prairie dog management plan for Wind Cave National Park set limits for prairie dog colonies in the park between 1,000 to 3,000 acres (National Park Service 2006b). This range is 3.6 percent to 11 percent of the park's land base and 12 percent to 35 percent of the park's 8,566 acres of suitable prairie dog habitat. This alternative represents natural regulation, with the acreage range allowing for natural variation while maintaining a sustainable level, for both the long-term viability of the prairie dog population and the availability of forage and habitat for other species within the park.

Larger catastrophic events, such as plague, would require a much larger population level to reduce the likelihood of extinction from an area. Knowles (2000) recommends that at least 10,000 acres of prairie dog colonies be maintained for long-term population viability.

Plague is a serious catastrophic event and has the capability to reduce a large viable prairie dog colony complex to the point where genetic viability and even random demographic events become important factors. A plague epizootic event can depopulate large prairie dog complexes in a matter of a few years. Typically, when a plague epizootic occurs in a prairie dog colony, at best only a few individuals survive the event and in some cases none survive. For example, on the Northern Cheyenne Indian Reservation in south-central Montana, a plague epizootic reduced an 11,000 acre prairie dog colony complex to about 650 acres in approximately three years. This colony complex was situated within a corridor of approximately 75,000 acres of prairie and breaks habitats along the Tongue River. Prairie dog numbers dropped below the long-term viability level (10,000 individuals) but did not reach a point that genetic or demographic viability would be an issue. Subsequently, prairie dog numbers have increased well above the point that long-term viability would be a concern. Plague, however, will probably always be a factor with this complex and only over the long-term will it be known if prairie dogs will be able to maintain a viable population.

Prairie dog population viability with plague is a completely different situation than in areas without plague. Prairie dogs have no immunity to plague and their dense colonial life style makes them highly vulnerable to epizootics. Population reductions of greater than 99 percent have been reported in individual prairie dog colonies and prairie dog complex acreage reductions of 57 to 96 percent have been documented in Montana. Plague has the potential to decimate prairie dog complexes, and at present there is no cost effective method of controlling plague epizootics.

Data collected in Montana would suggest the prairie dog complexes of 10,000 acres or larger can survive a plague epizootic. In Montana, the population consequences of plague have been monitored at two major prairie dog complexes that originally exceeded 10,000 acres. The Phillips and Blaine Counties prairie dog complex in north-central Montana was, and still is, Montana's largest prairie dog complex. This complex reached its peak acreage around 1990 when mapping data indicated approximately 51,000 acres of prairie dogs and 450 colonies. Plague was first suspected in 1992 and occupied prairie dog acreage began a downward trend. It should be noted that in the 20-year period where prairie dogs increased from 5,000 acres in 1972 to 51,000 acres in 1990, there was no official prairie dog control program.

The distinction that Knowles (2000) makes between 1,000 and ≥10,000 acres is important. Prairie dog colony acreage goals for viability depend on the presence or absence of plague. A management objective for prairie dog viability in an area without plague requires significantly less acreage (1,000 acres) of prairie dog colonies than an area where plague is present. A management objective for prairie dog viability in an area with plague requires significantly more acreage (10,000 acres) of prairie dog colonies (Knowles 2000). Plague was not known to occur in the Nebraska National Forest planning area at the time of the 2001 Forest Plan. Since then, plague has been documented in the Conata Basin MA 3.63 which is located in the Wall Southwest GA and on Pine Ridge Indian Reservation which adjoins Fall River Northeast, and Fall River Southeast GAs. Although not documented, prairie dog die-offs that occurred in the Fall River West, Fall River Northeast and Fall River Southeast GAs are believed to have been caused by plague. Elsewhere in South Dakota, plague is present in prairie dog colonies on Cheyenne River Indian Reservation.

Associated species viability: Prairie dogs are considered a keystone species. The multi-state conservation plan defines a keystone species as follows:

> "A species that (1) has a large overall effect on ecosystem structure or function, (2) has a disproportionately large effect relative to its abundance, (3) has a unique function in the system not provided by other species."

The number of prairie dogs needed to maintain viable populations of each species found on a prairie dog colony is highly variable depending on the individual species and degree of dependence

on prairie dogs for survival. Proctor et al. (2006) attempt to quantify the number of prairie dogs needed as a result of the prairie dog's status as a keystone species in their definition of focal areas:

> "A "focal area" for the restoration and conservation of prairie dogs is a site of sufficient size so that a colony or complex can be large enough to provide suitable habitat for black-footed ferrets, burrowing owls, mountain plovers and other species that depend on prairie dogs for their survival. But, what do we mean by 'sufficient size?' Bigger is always better, but an area of 4,000 hectares (9,884 acres) for a colony complex is probably the minimum necessary for a fully functional grassland ecosystem."

Knowles (2000) again suggests in his viability assessment that prairie-dog-associated species would benefit by an increased abundance and distribution of prairie dogs. A functional prairie dog ecosystem can be achieved with about 1% of the landscape being inhabited by prairie dogs.

Ecological effective density is a broader aspect of species viability (Soule' et. al. 2005). Ecological effective density is defined as the population level that prevents undesired changes in a defined ecological setting. Soule' suggests that strongly interactive species, such as the prairie dog, should receive special attention for recovery – beyond demographic viability if its absence or unusual rarity causes undesired changes to the functionality or composition of ecosystems. With the possibility of plague occurrence, estimating ecological effective densities of prairie dogs is difficult due to changing prairie dog numbers and the historic "shifting mosaic" between prairie dog colonies and grasslands. However, he indicates it is clear that ecologically effective densities of prairie dogs are far higher than the densities required for population persistence. Estimating effective density is strongly contextual and depends on variables that fluctuate spatially and temporally (e.g., locality, season, and productivity). A challenge for natural resource managers is that ecological effectiveness for strongly interactive species is not specifically addressed in current environmental laws. Soule' continues by saying that biodiversity of ecosystems will degrade unless the interactions of species are maintained in as many regions as feasible, particularly those areas within the historic range. It is critical that these species be distributed as broadly as possible and protected within well-distributed secure areas.

Managers are often inhibited by the constraints of multiple uses, funding, and social-political issues when considering implementing management prescriptions to address new ecological concepts such as ecological effective density. As a whole, addressing ecological effective density must be addressed by policymakers and multiple land management entities and across a much broader geographic scale than this proposed action on the Nebraska National Forest. Proposed actions within the alternatives that provide for more than minimum viability requirements (1,000 acre colony complex as discussed above) and increasing species distribution would lend towards addressing this broader ecological diversity and resiliency of ecosystems.

Environmental Consequences

This section summarizes direct, indirect, and cumulative effects on species at risk from the proposed desired range of prairie dog acres for each GA and the expanded prairie dog rodenticide use within those acres. The "best available science" has been used in this analysis by referencing recent Forest monitoring data for all identified species at risk; recent applicable research; and recent forestwide and regionwide species assessments. References throughout this section demonstrate that the best available science has been used; these references can be found in FEIS Appendix G.

Direct Effects Under All Alternatives

Direct effects are caused by the action and occur at the same time and place (50 CFR 1508.8). Application of rodenticide is proposed in all the action alternatives (Alternatives 1, 3, 4, and 5) and therefore, the following effects analysis would apply to all action alternatives. Under the no action alternative (Alternative 2), rodenticide use would continue in the boundary management zones as directed in the forest plan amendment 2 (USDA Forest Service 2005e). However, no additional rodenticide use would be allowed in the interior-colony management zones.

The 2001 Forest Plan prohibits the use of rodenticides (above-ground baits) for reducing prairie dog populations outside the period October 1 to January 31 to reduce risks to migratory birds. To reduce risk to other wildlife, the 2001 Forest Plan does not allow burrow fumigants in prairie dog colonies.

Prairie dog rodenticide (2 percent zinc phosphide bait) when properly applied is highly effective in reducing prairie dog populations. Poisoning of non-target species can occur but is minimized when the rodenticide is applied according to label specifications, time of year, and during favorable weather. In studies conducted in Conata Basin, measurable reductions in non-target populations were documented for deer mice (*Peromyscus maniculatus*), ants (Hymenoptera), and darkling beetles (Coleoptera), but there was no measurable reduction in avian and other invertebrate populations (Apa et al. 1991, Deisch et al. 1990, Uresk et al. 1985a, Uresk et al. 1985b, and Uresk et al. 1986).

Zinc phosphide is a heavy, finely ground gray black powder that is practically insoluble in water. When exposed to moisture, it decomposes slowly and releases phosphine gas. Phosphine may be generated rapidly if the material comes in contact with dilute acids. When zinc phosphide comes in contact with dilute acids in the stomach, phosphine is released and causes death. Animals that ingest lethal amounts of bait usually die from asphyxiation within 3-5 hours (Timm 1983). Translocation of phosphine gas has been demonstrated, but it is rapidly converted to harmless phosphates (Timm 1983). Zinc phosphide is a strong emetic (cause vomiting) which can factor into how much of the chemical it takes to kill the animal and whether or not an animal dies after ingesting the chemical (Schitoskey 1975).

The chemical zinc phosphide is used to treat grain bait (oats) for consumption by prairie dogs. Untreated grain is typically applied to the application area a few days prior to zinc phosphide application to promote consumption of the grain. Prairie dogs, in most cases, will not eat the grain bait until early in the fall when their natural forage matures and dries (South Dakota Department of Agriculture et al. 1994). When proper procedures are followed, efficacy of zinc phosphide bait is typically 90 percent or higher (South Dakota Department of Agriculture et al. 1994).

Zinc phosphide is highly toxic to wild birds. It is also toxic to non-target mammals. Nearly sixty studies have been conducted on the toxicity of this rodenticide to wild animals. The most sensitive bird species which have been evaluated are geese. Pheasants, morning doves, quail, mallard ducks, and the horned lark are also very susceptible to this compound. Blackbirds are less sensitive (Extension Toxicology Network 1993). The seed-eating animals of the project area would be at risk of being poisoned by the zinc phosphide treated oats that could be applied as a result of proposed actions. Granivorous species that exist in the project area that are either threatened, endangered or Forest Service sensitive are black-tailed prairie dogs, whooping cranes, greater prairie chickens, chestnut-collared longspurs, McCown's longspurs, Brewer's sparrows, grasshopper sparrows, and trumpeter swans.

There is only a small amount of deterioration of zinc phosphide baits due to the evolution of phosphide gas; therefore, dry baits must be considered toxic indefinitely. Lecithin-mineral oil, added to zinc phosphide to adhere to grain bait, offers protection against moisture and therefore increases its stability. Under field conditions, zinc phosphide baits may remain toxic several months until eroded by weather or decomposition of the carrier or the grain is removed by insects (Timm 1983).

Results of laboratory studies generally indicate that zinc phosphide poses little secondary risk to non-target wildlife. Zinc phosphide breaks down rapidly in the digestive tract of affected animals, so predators and scavengers are generally not exposed to the compound. Species that were fed zinc phosphide-poisoned prey during lab studies and showed no negative physiological symptoms included Siberian ferrets, mongooses, coyotes, kit foxes, mink, black vultures, bald eagles, golden eagle, and great-horned owls (USDA Animal Plant and Health Inspection Service 1994).

Zinc phosphide is not stored in the muscle or other tissue of poisoned animals. There is no true secondary poisoning. However, it does remain toxic for as long as several days in the intestinal tract of dead rodents. Other animals can be poisoned if they eat enough of the intestinal tract content of rodents recently poisoned zinc phosphide (Timm 1983). This threat is lessened because most prairie dogs poisoned with zinc-phosphide-treated grains die inside their burrows (Tietjen 1976).

Predators and scavengers are the species that could be at risk of secondary poisoning from the zinc phosphide treated oats. As explained above this risk is very small. The animals that exist in the project area that are either threatened, endangered or Forest Service sensitive that could be at risk of secondary poisoning are black-footed ferrets, bald eagles, swift foxes, northern harriers, ferruginous hawks, short-eared owls, and burrowing owls.

The act of applying rodenticide may also directly affect some species. Trucks are used to haul pre-bait and bait over two-track trails to the application site. Once at the site, all-terrain vehicles are operated on the prairie dog colonies to allow people applying the oats to reach all prairie dog holes. The use of vehicles in the areas may directly impact some species.

Indirect Effects Under All Alternatives

Indirect effects are caused by the action and are later in time or farther removed in distance but still reasonably foreseeable (50 CFR 1508.8). All four action alternatives propose objectives for prairie dog acres by GA. The No Action Alternative does not propose any specific range of acres. In general, the alternatives can be grouped or displayed by total amount of prairie dog acres allowed by GA. Thus for analysis purposes, Alternative 5 would display the most potential prairie dog acres within the GAs, followed by Alternative 2. Alternative 3 displays the lowest objectives for prairie dog acres, while Alternative 1 falls in between both groups. Alternative 4 only displays proposed acres for the Conata Basin MA 3.63.

An indirect effect is the loss of habitat as a result of rodenticide use and reductions in prairie dog populations. Prairie dogs tend to cut down all tall vegetation in the vicinity of the colony, creating low structure grassland. Permanently removing prairie dog populations from an area could result in shift in the vegetative community from a buffalograss/ blue grama sod to a western wheatgrass/green needle community (this is dependent on the soil type for the particular site where the prairie dog colony is located). This, in turn, could alter habitat suitability for a variety of wildlife species in the area. The animal species that are either threatened, endangered or Forest Service sensitive that prefer tall vegetation and may be negatively impacted by an increase in prairie dog colonies acreages are greater prairie chickens, greater sage grouse, northern harriers, short-eared owls, grasshopper sparrows, and regal fritillary butterflies. The animal species that are either threatened, endangered or Forest Service sensitive that prefer short vegetation and may be positively impacted by an increase in prairie dog colonies acreages are black-footed ferret, burrowing owls, mountain plovers, McCown's longspurs, chestnut-collared longspurs, long-billed curlews, and swift foxes.

Prairie dog burrows create a unique habitat for other creatures, including burrowing owls, badgers, rabbits, black-footed ferrets, snakes, salamanders, and insects. Without live prairie dogs to maintain the burrow system, the burrows will deteriorate. Within a few years, the burrow system breaks down, and its value to other wildlife diminishes. The animal species that are either threatened, endangered, or

Forest Service sensitive that use the prairie dog burrow systems are burrowing owls and black-footed ferrets.

Another indirect effect is reduction of prey base as a result of rodenticide use in prairie dog colonies. In the long-term, vegetation on inactive prairie dog colonies can shift to a mixed grass prairie, with reduced densities of both small mammals and birds (Agnew 1983). Predatory animals that exist in the project area that are either threatened, endangered or Forest Service sensitive are black-footed ferrets, bald eagles, swift foxes, northern harriers, ferruginous hawks, short-eared owls, and burrowing owls.

Cumulative Effects

From an ESA perspective, cumulative effects are defined as those effects of future state or private activities, not involving federal activities, that are reasonably certain to occur within the action area (future federal actions will be subject to their own consultation). This cumulative effects definition applies to federally listed species carried forward for analysis: black-footed ferret and whooping crane.

From a NEPA perspective, cumulative effects are defined as the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of landownership. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (50 CFR 1508.7). This cumulative effects definition applies to the sensitive species carried forward for analysis: bald eagle, black-tailed prairie dog, swift fox, greater prairie chicken (Ft. Pierre GA only), long-billed curlew, greater sage grouse (Fall River West GA only), northern harrier, chestnut-collared longspur, McCown's longspur (Oglala GA only), western burrowing owl, mountain plover, ferruginous hawk, short-eared owl, Brewer's sparrow, grasshopper sparrow, trumpeter swan, and the regal fritillary butterfly.

To frame the cumulative effects of the alternatives, several actions have been identified to occur that are also affecting these species and are considered along with the projected additive effects of the management alternatives presented in this FEIS. They include drought, rodenticide use, livestock grazing, plague, recreational shooting and secondary effects, land use conversions, and future travel management direction.

In general, the alternatives can be grouped or displayed by prairie dog acres allowed by GA. Thus for analysis purposes, Alternative 5 would display the most potential prairie dog acres within the GAs, followed by Alternative 2. Alternative 3 displays the lowest range of prairie dog acres, while Alternative 1 falls in between both groups. Alternative 4 only displays a proposed range of acres for the Conata Basin MA 3.63.

The comparison of total interior prairie dog acreages between alternatives frames the effects analysis for the species at risk being evaluated. We acknowledge that vegetative structure can vary throughout a prairie dog colony, however, the assumption is if there are more acres of prairie dogs in the interior; there would be more low structure habitat in the interior. This condition would likely benefit or impact to a lesser degree the low structure dependent species. However, this scenario would likely negatively impact the high structure dependent species. Conversely, if there are fewer acres of prairie dogs in the interior, there would be more high structure habitat in the interior. This condition would likely benefit or impact to a lesser degree the high structure dependent species. However, this scenario would likely negatively impact the low structure dependent species. The same concept would hold true for burrow and prey dependent species. More acres of prairie dogs would likely benefit these species and fewer acres would likely be detrimental to these species.

The following evaluation of the interaction of past, present, and reasonably foreseeable future actions with the proposed actions of each alternative will satisfy the hard look required for cumulative effects.

Cumulative Effects for Federally Listed Species (ESA definition)

Drought has resulted in a reduction of plant productivity on and off prairie dog colonies. Drought also expands prairie dog colonies. Because resources are limited in drought periods, these larger colonies would contain lower densities of prairie dogs. To compensate for a lower density of prey, many carnivores (including the black-footed ferret) increase their home range. In the case of the black-footed ferret which is not a top carnivore in the system, this increase in home range could result in more ferrets falling prey to other predators like coyotes, foxes, or raptors. During drought, the alternatives that result in an increase in acreages of prairie dog colonies may not result in an increase in black-footed ferrets but may only result in maintaining current populations. Therefore, alternatives that maintain larger acreages would increase the probability for the survival of the ferrets in an area. Alternatives that favor reducing prairie dog acreages, especially drastic reductions during drought, could have serious impacts on black-footed ferret populations. Simulated and observed drastic reductions in colony acreage due to plague have a similar effect on black-footed ferret populations (Conservation Breeding Specialist Group 2004). Effects of drought on whooping cranes would likely be minimized in or near the project area.

Prairie dog control on state and private land: Prairie dogs and livestock consume many of the same species of plants and it seems logical to conclude that this dietary overlap affects livestock at least under some circumstances (Detling 2006). Cumulatively, the effects of drought would only heighten this effect, but the effect remains small (Derner et al. 2006). Many ranchers believe prairie dogs compete with their livestock for forage or that a cow or a horse will break a leg after stepping in a prairie dog burrow (Lamb et al. 2006). They view prairie dog colonies as an economic hardship to their operations and will only tolerate prairie dogs in small numbers on their private land. Therefore, most prairie dogs on private land would be subject to periodic control. Consequently, it is unlikely that black-footed ferret populations would persist on many private lands, thereby making the federal land with large complexes of prairie dog colonies the only likely places for black-footed ferrets.

The state of South Dakota controlled prairie dogs on 24,369 acres in 2004, 14,725 acres in 2005, and 29,502 acres in 2006 (Smith 2007) to help private land owners control prairie dogs that were moving from public lands onto private land. It should be noted that the acres controlled by the state of South Dakota are not additive. Many of the same prairie dog colonies were controlled in successive years. The majority of this control work was completed in the vicinity of the project area.

An additional number that can be presented to attempt to quantify the number of prairie dogs controlled outside of the national grassland area is the amount of bait sold at the South Dakota bait plant located in Pierre SD. Between July 1, 2006 and mid December 2006, the bait plant sold 274,500 lbs of zinc phosphide treated oats (South Dakota State Department of Agriculture 2007). To control a typical prairie dog colony-site about 6 ounces of zinc phosphide treated oats are applied per acre (Andelt 2006). Consequently, enough bait was sold to control 732,000 acres of prairie dogs between July 1 of 2006 and the issue date of the winter South Dakota State Department of Agriculture newsletter. There are currently an estimated 1.8 millions acres of black-tailed prairie dog colonies in the Great Plains (Luce et al. 2006); therefore enough bait was sold at the South Dakota bait plant to control roughly 40 % of the prairie dog colonies in the Great Plains. It should be noted that all of the prairie dogs controlled by the state of South Dakota was completed with bait that was produced at the South Dakota bait plant and not all of the bait produced at the bait plant is sold in the study area or even in the state of South Dakota. Conversely the South Dakota bait plant is not the only source of zinc phosphide treated oats in the area. The numbers can be manipulated in different ways and produce different acreages but the point of this discussion is that a large number of prairie dogs have been controlled in 2006, and there is no indication that this trend would not continue.

Since black-footed ferrets depend on prairie dogs for their survival, control of prairie dogs on state and private land has a major impact on them. Considering that there is small chance of black-footed ferret

habitat being available on non-federal lands, the importance of retaining large acreages of prairie dog colonies on federal lands such as in Conata Basin/Badlands is heightened. Effects of prairie dog control on whooping cranes would likely be minimized.

Prairie dog shooting may significantly reduce prairie dog densities (Vosburg and Irby 1998) and indefinitely maintain reduced densities in smaller isolated colonies (Knowles 1987). Since black-footed ferrets are known to exist only on the federally administered Conata Basin/Badland complex area and shooting is currently not allowed in this area, impacts to ferrets from shooting are minimal. The impact to whooping cranes from shooting is negligible.

Shooting prairie dogs in colonies that have been previously poisoned could likely prevent or slow population recovery in those colonies. Gunfire and other related activity and disturbances may disrupt prairie dog foraging and other activities for extended periods of time. Prairie dogs exhibit different behavioral patterns in colonies where shooting occurs compared to colonies where there is no shooting. Prairie dogs in hunted colonies were more wary and responded more quickly to humans on foot and in vehicles, and may have spent less time foraging than individuals in non-hunted colonies (Vosburgh and Irby 1998). In a study conducted in eastern Wyoming, recreational shooting increased the alertness and decreased above-ground activity of black-tailed prairie dogs, which in turn reduced the time spent foraging and resting. This resulted in a decrease in body condition of surviving adult prairie dogs, reduced pregnancy rate, and reproductive output (Pauli 2005).

Inadvertent or intentional killing of non-target animals while shooting prairie dogs: The extent of this problem is likely tied to two factors: how much a non-target animal looks like a prairie dog and the experience and scruples of the person doing the shooting. Since black-footed ferrets are known to exist only on the federally administered Conata Basin/Badland complex area, impacts from shooting prairie dogs on adjacent non-federal lands are minimized. However, it would be possible to mistake a black-footed ferret for a prairie dog if one is not careful but impossible to mistake a whooping crane for a prairie dog. It is always possible for an unethical prairie dog shooter to kill anything that is within shooting range.

Secondary lead poisoning of non-target species caused by lead fragments left in the prairie dog carcasses after they have been shot by prairie dog shooters is another potential effect. Since black-footed ferrets are known to exist only on the federally administered Conata Basin/Badland complex area, impacts from secondary lead poisoning of ferrets are unlikely. There would be no impact to the whooping crane from secondary lead poisoning since cranes are not scavengers.

In a study conducted in eastern Wyoming, two types of bullets were tested to determine how much lead was present in the prairie dog carcasses after they had been shot: a soft point and a full metal jacket (both from .223 caliber rifles). Eighty-seven percent of prairie dogs shot with soft point bullets contained bullet fragments compared to 7 percent of those shot with full metal jackets. Furthermore, the amount of lead found in prairie dog carcasses differed between the two bullet types; full metal jacket only averaged 19.8 mg of lead, while soft point averaged 225.2 mg of lead (Pauli and Buskirk 2007).

Recreational shooting of prairie dogs contributes to the problem of lead intoxication in wildlife food chains that include prairie dogs. Some features of recreational shooting, including the killing of large numbers of animals, not removing carcasses from the field, and using expanding bullets, are in contrast to traditional forms of hunting and may present potentially dangerous amounts and particle sizes of metallic lead to scavengers and predators of prairie dogs. Recreational shooting of black-tailed prairie dogs occurs with minimal regulation, yet appears to provide a readily available source of lead to scavenging vertebrates. Few agencies regulate recreational shooting intensity and duration, and none currently regulate the type of ammunition that can be used.

Plague: The potential for plague to persist in prairie dog populations on the national grasslands and Forests in the project area is unknown, but it is acknowledged that plague can have dramatic impacts on prairie dog populations and black-footed ferrets. Plague would have no impacts on whooping cranes.

Prairie dogs are highly susceptible to sylvatic plague, which is considered to be a serious threat to the persistence of local prairie dog populations. Plague has been annihilating prairie dogs in the western two thirds of their geographic range since the 1940s. In the recent past, incidences of plague have been rare. Plague has been almost totally absent among prairie dogs east of a line that approximates the 102nd meridian (Cully et al. 2006). In the project area, this line is very close to the Wyoming state line.

In September, 2004, plague was confirmed in a prairie dog colony in western Custer County, South Dakota near the border of Wyoming and South Dakota. This is less than 10 miles from the northern most boundary of the Fall River West GA.

Plague positive prairie dogs were also found on the Pine Ridge Indian Reservation in Shannon County in 2005, less than 10 miles from the eastern boundary of the Fall River Southeast GA and 25 miles from Conata Basin.

Plague is likely responsible for prairie dog die-offs in all three of the GAs located on the District – Fall River Southeast GA, Fall River Northeast GA, and Fall River West GA – due to their proximity to documented plague occurrences to the Fall River Ranger District.

In the spring of 2008, plague was responsible for a large die-off of prairie dogs in the Conata Basin MA 3.63 black-footed ferret reintroduction area (U.S. Fish and Wildlife Service 2008). Plague-positive prairie dogs have been collected, and the area is being surveyed to assess the extent of the die-offs. Action is being considered (dusting of the holes with insecticide to kill fleas) to attempt to stop the spread of the disease. Additional discussion of the discovery of plague in Conata Basin MA 3.63 is presented in Appendix N – Biological Evaluation.

Cumulative Effects for Sensitive Species (NEPA definition)

Drought has resulted in a reduction of plant productivity and has accelerated expansion and establishment of prairie dog colonies. Because resources are limited in drought periods, these larger colonies would contain lower densities of prairie dogs and other prey species. In general, predatory species would benefit as prairie dog colonies expand. The degree in which they would benefit would depend on availability of prey species. The increase in prairie dogs resulting from drought in combination with action alternatives that favor higher prairie dog acreages would likely benefit the low-structure-dependent sensitive species such as burrowing owls, mountain plovers, McCown's longspurs, chestnut-collared longspurs, long-billed curlews, and swift foxes. Drought, in general, is detrimental to species that use the high structure habitats because of the overall reduction in plant productivity. Alternatives that favor reducing prairie dog acreages in combination with drought would be difficult to quantify, but it would be fair to say that species inhabiting high structure habitats, such as greater prairie chickens, greater sage grouse, northern harriers, short-eared owls, grasshopper sparrows, and regal fritillary butterflies, could benefit, but likely at a lower level.

Prairie dog control: The overall impacts from control of prairie dogs on both federal and private lands would favor high-structure-dependent sensitive species if livestock grazing utilization remained conservative and normal precipitation occurred. The opposite would be true for low-structure-dependent sensitive species. In general the control of prairie dogs would be detrimental to predatory species.

Prairie dogs and livestock consume many of the same species of plants, and there is some dietary overlap that adversely affects livestock at least under some circumstances (Detling 2006, Derner et al.

2006). Cumulatively, the effects of drought would only heighten this affect. Many ranchers believe that prairie dogs compete with their livestock for forage or that a cow or a horse will break a leg after stepping in a prairie dog burrow (Lamb et al. 2006). They view prairie dog colonies as an economic hardship and will only tolerate prairie dogs in small numbers on their private land. Therefore, most prairie dogs on private land would be subject to periodic control.

An obvious cumulative effect to this action is the reduction of prairie dog populations resulting from rodenticide use by the Forest Service in their boundary management program and other entities on nearby private or tribal lands (including but not limited to the state of South Dakota and private land owners). A suspension of prairie dog rodenticide control on the national grasslands with certain exceptions for public health and safety reasons started in 1999 and continued until the fall of 2004. Control programs resumed in the boundary management zones of the Nebraska National Forest in November of 2004. The Forest Service authorized the control of 6,733 acres of prairie dog colonies in 2004, 8,110 acres in 2005, and 12,905 acres in 2006 on lands administered by the Nebraska National Forest (see following table). In addition, the state of South Dakota controlled prairie dogs on 24,369 acres in 2004, 14,725 acres in 2005, and 29,502 acres in 2006 (Smith 2007) to help private land owners control prairie dogs that were moving from public lands onto private land. It should be noted that the acres controlled by both agencies are not additive. The majority of this control work was completed in the vicinity of the project area.

Table 3-10. Prairie dog control conducted on the Nebraska National Forest by geographic area (GA) in the fall and winter of 2004, 2005, and 2006.

		Acres controlled			
National Grassland	**Geographic Area**	**2004**	**2005**	**2006**	**2 and 3-yr ave.**
Oglala	Oglala GA	0	1,011	926	969
Buffalo Gap	Fall River Northeast GA	2,106	1,998	2,844	2,316
	Fall River West GA	768	780	372	640
	Fall River Southeast GA	363	411	282	352
	Fall River Southeast GA Smithwick MA 3.63	3	68	20	30
	Wall North GA	60	497	940	499
	Wall Southeast GA	237	950	1,370	852
	Wall Southwest GA	0	0	279	279
	Wall Southwest GA Conata Basin MA 3.63	3,196	2,184	5,251	3,544
	Buffalo Gap non MA 3.63	3,199	2,252	5,271	3,574
	Buffalo Gap MA 3.63	3,534	4,636	6,087	4,752
	Buffalo Gap Total	6,733	6,888	11,358	8,326
Fort Pierre	Fort Pierre GA	0	211	621	416
Total		**6,733**	**8,111**	**13,027**	

An additional number that can be presented to attempt to quantify the number of prairie dogs controlled outside of the study area is the amount of bait sold at the South Dakota bait plant located in

Pierre SD. Between July 1, 2006 and mid December 2006, the bait plant sold 274,500 lbs of zinc phosphide treated oats (South Dakota State Department of Agriculture 2007). To control a typical prairie dog colony-site, about 6 ounces of zinc phosphide treated oats are applied per acre (Andelt 2006). Consequently, enough bait was sold to control 732,000 acres of prairie dogs between July 1 of 2006 and the issue date of the winter South Dakota State Department of Agriculture newsletter. It should be noted that all of the prairie dogs controlled by both the state of South Dakota and the Forest Service were completed with bait that was produced at the South Dakota bait plant and not all of the bait produced at the bait plant is sold in the study area or even in the state of South Dakota. Conversely the South Dakota bait plant is not the only source of zinc phosphide treated oats in the area. The numbers can be manipulated in different ways and produce different acreages, but the point of this discussion is that a large number of prairie dogs have been controlled in 2006 and there is no indication that this trend would not continue.

Prairie dog shooting significantly reduces prairie dog densities (Vosburg and Irby 1998) and indefinitely maintains reduced densities in smaller isolated colonies (Knowles 1987). The overall impacts from the recreational shooting of prairie dogs on both federal and private lands would favor high-structure-dependent sensitive species if the shooting activity resulted in substantial reductions of prairie dogs. The opposite would be true for low-structure-dependent sensitive species. In general, prairie dog shooting would be detrimental to predatory species

Shooting prairie dogs in colonies that have been previously poisoned could likely prevent or slow population recovery in those colonies. Gunfire and other related activity and disturbances may disrupt prairie dog foraging and other activities for extended periods of time. Prairie dogs exhibit different behavioral patterns in colonies where shooting occurs compared to colonies where there is no shooting. Prairie dogs in hunted colonies were more wary and responded more quickly to humans on foot and in vehicles and may have spent less time foraging than individuals in non-hunted colonies (Vosburgh and Irby 1998). In a study conducted in eastern Wyoming, recreational shooting increased the alertness and decreased above-ground activity of black-tailed prairie dogs, which in turn reduced the time spent foraging and resting. This resulted in a decrease in body condition of surviving adult prairie dogs, reduced pregnancy rate, and reproductive output (Pauli 2005). In South Dakota, prairie dog shooting is allowed between June 15 and February 28 on all areas of the national grasslands except for 73,590 acres of the 3.63 MA (Conata Basin Black-footed Ferret Reintroduction Habitat) located in the Wall Southwest GA.

Inadvertent or intentional killing of non-target animals while shooting prairie dogs: The extent of this problem is likely tied to two factors: how much a non-target animal looks like a prairie dog and the experience and scruples of the person doing the shooting. It would be possible to mistake a burrowing owl for a prairie dog if one is not careful. It is always possible for an unethical prairie dog shooter to kill anything that is within shooting range.

Travel management planning and potential changes in motorized access could increase or decrease opportunities for prairie dog viewing/recreational shooting and would result in similar impacts discussed above related to shooting activities.

Another effect is **secondary lead poisoning of non-target species** caused by lead fragments left in the prairie dog carcasses after they have been shot by prairie dog shooters. It would be likely that a scavenger, such as the ferruginous hawk or swift fox, could eat a prairie dog carcass and suffer from lead poisoning. In a study conducted in eastern Wyoming, two types of bullets were tested to determine how much lead was present in the prairie dog carcasses after they had been shot: a soft point and a full metal jacket (both from .223 caliber rifles). Eighty-seven percent of prairie dogs shot with soft point bullets contained bullet fragments compared to 7 percent of those shot with full metal jackets. Furthermore, the amount of lead found in prairie dog carcasses differed between the two

bullet types; full metal jacket only averaged 19.8 mg of lead, while soft point averaged 225.2 mg of lead (Pauli, personal comm).

Plague: The presence of plague would affect the ability of land managers to maintain acreages of prairie dog colonies suggested in any of the alternatives. Negative impacts from plague resulting in a reduction of prairie dog acreages could impact some sensitive species including the black-tailed prairie dog, burrowing owls, mountain plovers, McCown's longspurs, chestnut-collared longspurs, long-billed curlews, and swift foxes. The result from an epidemic of plague in the long-term would positively impact several sensitive species, such as the greater prairie chickens, greater sage grouse, northern harriers, short-eared owls, grasshopper sparrows, and regal fritillary butterflies. In general, plague would be detrimental to predatory species.

The potential for plague to persist in prairie dog populations on the national grasslands and Forests in the project area is unknown, but it is acknowledged that plague can have dramatic impacts on prairie dog populations. Plague appears to have already reduced some populations of prairie dogs within the IMZ on some GAs of the Fall River Ranger District.

Prairie dogs are highly susceptible to sylvatic plague, which is considered to be a serious threat to the persistence of local prairie dog populations. Plague has been annihilating prairie dogs in the western two thirds of their geographic range since the 1940s. In the recent past, incidences of plague have been rare. Plague has been almost totally absent among prairie dogs east of a line that approximates the 102nd meridian (Cully et al. 2006). In the project area, this line is very close to the Wyoming state line.

In the spring of 2008, plague was responsible for a large die-off of prairie dogs in the Conata Basin MA 3.63 black-footed ferret reintroduction area (U.S. Fish and Wildlife Service 2008). Plague positive prairie dogs have been collected, and the area is being surveyed to assess the extents of the die-offs. Action is being considered (dusting of the holes with insecticide to kill fleas) to attempt to stop the spread of the disease. Additional discussion of the discovery of plague in Conata Basin MA 3.63 is presented in Appendix N – Biological Evaluation.

Plague was confirmed in a prairie dog colony in western Custer County, South Dakota in September, 2004 near the border of Wyoming and South Dakota. This is less than 10 miles from the northern most boundary of the Fall River West GA. In the summer of 2005, prairie dog densities within some of the colonies north of Highway 18 in the Fall River West GA were noticeably reduced. Although not officially documented, it is believed that plague has occurred within these colonies. Plague positive prairie dogs were also found in Shannon County in 2005. This plague documentation is less than 10 miles from the eastern boundary of the Fall River Southeast GA. In the summer of 2005, prairie dog densities within some of the colonies in the Fall River Southeast GA were noticeably reduced. Once again, although undocumented, it is suspected that plague may have contributed to reductions of prairie dogs in these areas.

Relative Effects Summarized

The impacts of the alternatives to the different wildlife species can best be summarized by grouping the species into 5 categories: granivorous (seed eaters), predators, animals that prefer high structured grassland habitat, animals that prefer low structure grassland habitat, and animals that use or live in the burrows created by the prairie dogs (see following table).

Granivorous animals could be directly affected by eating the poison grain and dying. The alternatives are ranked as to the estimated amount of control to maintain the proposed range of acres in each of the alternatives. It is logical to assume that the more prairie dogs allowed in the IMZ of each GA, the less poisoning that would take place. This is true within the IMZ, but the possibility exists that, as prairie dogs are allowed to expand in the IMZ, more control would take place in the BMZ and adjacent

private lands. This analysis is limited to the IMZ and assumes the BMZ is "prairie dog free" for analysis purposes.

Predators are attracted to the prairie dog colonies by the abundant prey that exists in and around the colony. An increase in prairie dog acreages would have a positive impact on these species, while a decrease would have a negative impact.

Table 3-11. Relative negative impacts on animal species groups of each alternative.

Animal Category	Variable used to determine impact	Relative negative impact by alternative				
		High Impact ◄——► Low Impact				
Seed Eater[1]	Amount of control	Alt. 3	Alt. 4[6]	Alt. 1	Alt. 2	Alt. 5
Predator[2]	Acres of prairie dog colonies	Alt. 3	Alt. 4[6]	Alt. 1	Alt. 2	Alt. 5
Prefers High Grassland Structure[3]	Acres of prairie dog colonies	Alt. 5	Alt. 2	Alt. 1	Alt. 4[6]	Alt. 3
Prefers Low Grassland Structure[4]	Acres of prairie dog colonies	Alt. 3	Alt. 4[6]	Alt. 1	Alt. 2	Alt. 5
Uses the Prairie Dog Burrows[5]	Acres of prairie dog colonies	Alt. 3	Alt. 4[6]	Alt. 1	Alt. 2	Alt. 5

[1]black-tailed prairie dogs, whooping cranes, greater prairie chickens, chestnut-collared longspurs, McCown's longspurs, Brewer's sparrows, grasshopper sparrows, and trumpeter swans

[2]black-footed ferrets, swift foxes, bald eagles, northern harriers, ferruginous hawks, short-eared owls, and burrowing owls

[3]greater prairie chickens, greater sage grouse, northern harriers, short-eared owls, grasshopper sparrows, and regal fritillary butterflies

[4]mountain plovers, McCown's longspurs, chestnut-collared longspurs, long-billed curlews, and swift foxes

[5]black-footed ferrets, black-tailed prairie dogs, and burrowing owls

[6]This alternative only provides acreages for the Conata Basin area. The ranking is determined by comparing acreages for Conata Basin only.

Species that prefer high grassland structure would avoid prairie dog colonies and an increase in prairie dog acreages could be detrimental to them. Objectives for high structure habitat are set in the Forest Plan. Environmental analysis completed for the 2001 Forest Plan determined that these levels are adequate for the viability of high-structure-dependent species (USDA Forest Service 2001b). By directive in the 2001 Forest Plan, high structure grassland would be provided on each GA (USDA Forest Service 2001c). If the acreages for high structure can be maintained within the stated structure objectives of the 2001 Forest Plan on each GA, it is believed there would be no impact on these species.

Species that prefer low grassland structure would be attracted to prairie dog colonies and an increase in prairie dog acreages could be beneficial to them. Objectives for low structure habitat are set in the 2001 Forest Plan (USDA Forest Service 2001c). Environmental analysis completed for the 2001 Forest Plan determined that these levels are adequate for the viability of low-structure-dependent species. By directive in the 2001 Forest Plan, low structure grassland will be provided on each GA. If the acreages for low structure can be maintained within the stated structure objectives of the 2001 Forest Plan, it is believed that there would be no impact on these species.

The last group of species affected by this decision is comprised of animals that can be found using the burrows for hunting, denning, nesting, or any activity in their life cycle. Some of these species require prairie dog colonies for their existence (black-footed ferret and burrowing owl) and would be impacted by the range of acreages suggested in the alternatives. The impacts to these two species, the ferret and burrowing owl, will be further analyzed in detail under each alternative due to their strong affiliation to prairie dog colonies. An increase in prairie dog acreages would have a positive impact on these species, while a decrease would have a negative impact.

Direct and Indirect Effects by Alternative

Alternative 1

This alternative employs adaptive management in emphasizing a mix of multiple uses while sustaining black-footed ferrets and associated species within Management Area 3.63 (MA 3.63). In the Conata Basin MA 3.63, where ferrets currently exist, this alternative prioritizes ferrets and the associated need for prairie dog colonies over other multiple uses.

In addition to 2001 Forest Plan direction, this alternative provides objectives for maximum and minimum acres of active prairie dog colonies at the geographic area (GA) scale, excluding the acreage within MA 3.63 areas. In MA 3.63 areas, the specific maximum and minimum acreage is designed to provide habitat for viable populations of black-footed ferrets based on prairie dog densities.

Direct Effects: Under Alternative 1, the direct effects are animals being poisoned by the rodenticide. The granivorous species are the group that would be vulnerable to the application of the rodenticide. If any of these species are on a prairie dog colony while the rodenticide is applied, there is the possibility of individuals dying from eating the poison grain. Granivorous species that exist in the project area that are either threatened, endangered or Forest Service sensitive are black-tailed prairie dogs, whooping cranes, greater prairie chickens, chestnut-collared longspurs, McCown's longspurs, Brewer's sparrows, grasshopper sparrows, and trumpeter swans.

Rodenticide application will not start until October 1, which lessens the possibility of impacts on animals that use the area only in the summer or that only pass through the area during migration. These species are the whooping cranes, chestnut-collared longspurs, McCown's longspurs, Brewer's sparrows, and grasshopper sparrows.

Animals that are not attracted to the short grass structure created by the prairie dogs would also be unlikely to be effected by the rodenticide. These species include greater prairie chicken, grasshopper sparrows, and trumpeter swans.

The possibility of secondary poisoning of animals that eat animals that have been poisoned by the rodenticide is also a direct effect that could occur in Alternative 1. This would effect scavengers and to some extent predatory species. The scavengers and predators that exist in the project area that are either threatened, endangered or Forest Service sensitive are black-footed ferrets, bald eagles, swift foxes, northern harriers, ferruginous hawks, short-eared owls, and burrowing owls.

Results of laboratory studies generally indicate that zinc phosphide poses little secondary risk to non-target wildlife. Zinc phosphide breaks down rapidly in the digestive tract of affected animals, so predators and scavengers are generally not exposed to the compound. Zinc phosphide is not stored in the muscle or other tissue of poisoned animals. There is no true secondary poisoning.

Indirect Effects: An indirect effect is the loss of habitat as a result of rodenticide use and reductions in prairie dog populations. Prairie dogs tend to cut down all tall vegetation in the vicinity of the colony, creating low structure grassland. This, in turn, could alter habitat suitability for a variety of wildlife species in the area. The animal species that are either threatened, endangered or Forest Service

sensitive that prefer tall vegetation and may be negatively impacted by an increase in prairie dog colonies acreages are greater prairie chickens, greater sage grouse, northern harriers, short-eared owls, grasshopper sparrows, and regal fritillary butterflies. The animal species that are either threatened, endangered or Forest Service sensitive that prefer short vegetation and may be positively impacted by an increase in prairie dog colonies acreages are burrowing owls, mountain plovers, McCown's longspurs, chestnut-collared longspurs, long-billed curlews, and swift foxes.

The desired mix of grassland structure levels is addressed in Chapter 2 of the 2001 Forest Plan. The 2001 Forest Plan established grassland structure objectives for each NFS unit and GA. The objectives specify the desired amounts of low, moderate, and high structure (USDA Forest Service 2001c). Environmental analysis completed for the 2001 Forest Plan determined that these levels are adequate for the viability of these species (USDA Forest Service 2001b). If maximum prairie dog acreage called for in Alternative 1 were met, the ability to meet the 2001 Forest Plan's objectives for high, moderate and low vegetative structure objectives for each GA would also be possible with proper management (e.g., proper grazing strategies, normal to above-normal precipitation levels, etc.).

A short-term indirect effect is reduction of prey base as a result of rodenticide use in prairie dog colonies. In the long-term, vegetation on inactive prairie dog colonies can shift to a mixed grass prairie, with reduced densities of both small mammals and birds (Agnew 1983). Predatory animals that exist in the project area that are either threatened, endangered or Forest Service sensitive are black-footed ferrets, bald eagles, swift foxes, northern harriers, ferruginous hawks, short-eared owls, and burrowing owls. Prairie dog colonies are not primary habitat for the bald eagle, short-eared owl and northern harrier, thus the ranges of acres called for in this alternative would have little effect.

Black-tailed prairie dog: The obvious sensitive species that will be affected by the rodenticide application is the black-tailed prairie dog. Because there are a maximum number of acres of active prairie dog colonies proposed for each GA and MA under this alternative, there is a possibility of using a rodenticide on all acres during the life of this plan. The current active acres of prairie dogs and the objective for range of active acres of black-tailed prairie dogs within the IMZ are displayed in the following table.

Table 3-12. Acres of active prairie dogs colonies and range of acres under Alternative 1.

Geographic Area	Acres of Active Colonies in the IMZ[1]	Alternative 1 Acre Objectives
Oglala	1,125	1,000 to 2,800
Fall River Northeast GA	1,130	1,000 to 2,800
Fall River West GA	210	1,000 to 3,600
Fall River Southeast GA excluding MA 3.63	42	No acreage objective
Fall River Southeast GA, Smithwick MA 3.63	503	2,100 to 5,000
Wall North GA	454	1,000 to 2,100
Wall Southeast GA	1,414	1,000 to 2,900
Wall Southwest GA excluding MA 3.63	214	No acreage objective
Wall Southwest GA, Conata Basin MA 3.63	26,987	12,500 to 19,000
Fort Pierre GA	1,735	1,000 to 3,500

[1] Active prairie dog acres from most current data 2005 to 2006, rodenticide treatment in BMZ has occurred.

The Fall River West GA, Fall River Southeast GA and Wall North GA currently have less than the minimum acreages required by Alternative 1 (see previous table). Active management (which includes but is not limited to - dusting with insecticides if plague is a problem, prescribed fire, grazing,

and translocation of prairie dogs) will be necessary to increase the prairie dogs in these GAs to reach the minimum acreages required by Alternative 1.

The prairie dog acreages on the Oglala National Grassland, the Fall River Northeast GA, the Wall Southeast GA, and the Fort Pierre National Grassland are currently within the range of acres suggested in Alternative 1 (see previous table). Only periodic monitoring will be required initially for these areas. This periodic monitoring would occur until acreage and vegetation thresholds are approached. At that time monitoring may require more frequent and detailed monitoring actions.

Prior to the plague outbreak that has occurred in the Wall Southwest GA there were approximately 26,698 acres of active prairie dog colonies (214 outside the black-footed ferret reintroduction habitat and 26,484 within the black-footed ferret reintroduction habitat) within the IMZ. The total effect the outbreak of plague will have on the number of acres of prairie dogs in Conata Basin is not known at this time, so the pre-plague acres will have to be used. The 26,698 acres of fully active prairie dog colonies is more than the maximum (19,000) called for in Alternative 1 and prairie dog acreages would be decreased to meet this goal.

The question is whether the range of acres called for in Alternative 1 would be sufficient to sustain a viable population of prairie dogs. The two primary components to maintaining a viable population include: (1) Enough habitat to support a minimum number of reproductive individuals, and (2) The distribution of the habitat so individuals can interact with others (36 CFR 219.19). The definition of a viable population given in Appendix G of the 2001 Forest Plan is "A group of individuals of a particular species that produces enough offspring for long-term persistence and adaptation of the species or population in a given place" (USDA Forest Service 2001c).

The Forest Service defines a prairie dog colony complex as: "A group of at least 10 prairie dog colonies with nearest neighbor intercolony distances not exceeding 6 miles and with a total colony complex acreage of at least 1,000 acres" (USDA 2007c). The *Multi-state Conservation Plan for the Black-tailed Prairie Dog Cynomys ludovicianus in the United States* (MCP) (Luce 2003) defines a conservation focus area (CFA) as "An area greater than 1,000 acres of suitable prairie dog habitat, encompassing either an existing complex of occupied prairie dog colonies or an area where a complex of colonies can be created to sustain a viable population of prairie dogs for long-term management."

Knowles (2000) suggest in his *Black-tailed Prairie Dog Population Viability Assessment for North Dakota*, that for long-term viability (51-100 years) without plague, the larger complexes approaching 1,000 acres appear to contain a suitable population base to survive environmental variables (including drought, extremely cold winters, and flooding). Knowles goes on to say that prairie dog complexes occupying about 1 percent of the landscape and a minimum of 1,000 acres are probably necessary to assure long-term population viability of prairie dogs in the absence of plague. Larger catastrophic events, such as plague, would require a much larger population level (10,000 acre complex) to reduce the likelihood of extinction from an area.

In the 2001 Forest Plan, there are stated objectives to maintain three or more prairie dog complexes in the Wall Southwest GA, one or more prairie dog complexes in the Fort Pierre National Grasslands and one prairie dog complex in each of the Oglala National Grassland and Fall River Southeast GA (USDA Forest Service 2001c). This juxtaposition of prairie dog colonies complexes warranted a "may adversely impact individuals, but not likely to result in a loss of viability in the planning area, nor cause a trend toward federal listing" viability call in the biological evaluation for the 2001 Forest Plan (USDA Forest Service 2001b). Alternative 1 establishes 4 additional areas that would have a minimum of 1,000 acres of active prairie dog colonies and this alternative requires a minimum of 2,100 acres of active prairie dog colonies on the Southeast GA of the Fall River Ranger District and a minimum of 12,500 acres of active prairie dog colonies on the Southwest GA of the Wall Ranger District. Considering that these complexes (a total 10 or more complexes across the planning unit)

and with the Wall Southwest GA having enough prairie dogs to meet the "focal area" definition provided by Proctor et al (2006), are spread throughout the national grasslands administered by the NNF. These national grasslands occur from the Missouri River in Central South Dakota to the South Dakota - Wyoming state line and into extreme northwestern Nebraska. Alternative 1 would provide for an adequate number and distribution of prairie dogs for a viable population.

Under Alternative 1, each GA will meet the minimum requirement – 1,000 acres – for a viable population of prairie dogs as suggested in the 2001 Forest Plan, Knowles (2000), and the multi-state conservation plan. However, when plague is introduced into the equation, the situation is not as simple.

Knowles (2000) suggests that larger catastrophic events, such as plague, would require a much larger population level (10,000 acre complex) to reduce the likelihood of extinction of prairie dogs from an area. Only Conata Basin MA 3.63 will have enough prairie dogs to survive a plague outbreak on its own if Knowles (2000) is correct; it is the only area with at least 10,000 acres of prairie dogs. In the other GAs, a broader area has to be examined to get the true picture.

The Fall River Northeast and Southeast GAs are located very near a large expanse of prairie dogs that exist on the Pine Ridge Indian Reservation. Using a 5-mile intercolony distance, the prairie dogs on these GAs can be linked to the Pine Ridge prairie dog complex and would be considered part of this complex. This entire area more than exceeds the 10,000 acres of prairie dog colonies Knowles (2000) believes is the minimum for a prairie dog complex to survive a plague outbreak. It should be noted that starting in the summer of 2005, plague moved through the Pine Ridge prairie dog complex and the prairie dog colonies located in the Southeast GA. Before the plague struck this complex, there were over 100,000 acres of active prairie dog colonies in the area. If Knowles is correct, the area should survive the plague outbreak. This is also true for the GAs on the Wall Ranger District, which are in proximity to the Badlands National Park and the Conata Basin prairie dog populations.

The Fort Pierre and Oglala National Grasslands are more isolated, and a plague event may be more of an issue. Neither have a history of plague, but monitoring will be imperative.

The Fall River West GA is arguably not a part of a l0,000-acre complex. It already has experienced a suspected plague outbreak. The problem here will be not getting 10,000 acres of prairie dogs to ensure a survival through a plague outbreak but to manage to ensure the survival of prairie dogs in the area. It may be difficult to produce a sustained population of 1,000 acres of prairie dogs if plague persists in the area.

In addition, there is an established minimum acreage under this alternative. Active management measures would be applied when monitoring shows that acres of prairie dogs fall below the minimum levels. This aspect of this alternative further ensures that a viable population of prairie dogs would exist across the planning area.

Black-footed ferret: The only areas that will be analyzed for black-footed ferrets will be the MA 3.63 Black-footed Ferret Reintroduction Habitats located in Conata Basin MA 3.63 in the Wall Southwest GA and Smithwick MA 3.63 in the Fall River Southeast GA.

Under this alternative, Conata Basin MA 3.63 would be managed to maintain between 12,500 and 19,000 acres of active prairie dog colonies. Currently there are approximately 26,000 acres of active prairie dog colonies in the area. Using black-footed ferret home range data from Conata Basin, 12,500 to 19,000 acres of prairie dog colonies would provide habitat to sustain about 90 breeding adult black-footed ferrets. CBSG estimates that at least 120 breeding adults are needed to sustain a black-footed ferret population with >90 percent probability of persistence over 100 years. Using home range data from Conata Basin, 120 breeding adult black-footed ferrets are estimated to require from 16,366 to 29,704 during wet and dry years, respectively.

Eliminating a minimum of 7,000 acres of prairie dog colonies in Conata Basin MA 3.63 would adversely affect black-footed ferrets, decrease long term self sustainability of ferrets in the Basin, reduce ferret translocation opportunities, and negatively impact national black-footed ferret recovery efforts.

There are currently about 500 acres of active prairie dog colonies in Smithwick MA 3.63. Alternative 1 requires a range of between 2,100 and 5,000 acres of active prairie dogs be maintained in the area. Selecting Alternative 1 would require adaptive management strategies that would increase the number of prairie dogs in the area.

Using black-footed ferret home range data, 2,100 and 5,000 acres of prairie dog colonies would provide habitat to sustain between 15 and 36 breeding adult ferrets, assuming high densities of prairie dogs. Prolonged, above-average moisture would be required to maintain these numbers. In dry years when the densities of prairie dogs would be reduced, this range of acres would maintain between 10 and 25 breeding adult ferrets. This population would probably not be self sustaining and would most likely require augmentation to maintain itself over time.

Ferruginous hawk: The ferruginous hawk is not dependent on prairie dogs or prairie dog colonies for their survival. The decision in Alternative 1 would require different actions in different GAs depending on how the current acreages compare to the range of acres suggested in Alternative 1. Any reduction in acreage of prairie dog colonies could negatively affect reproductive output (Cook et al. 2003) and reduce fall and winter habitat (Plumpton and Andersen 1997, Seery and Matiatos 2000, Smith and Lomolino 2004) of the ferruginous hawk. The acreages available for Alternative 1 should be adequate to maintain viability for the species across the planning area. Ferruginous hawks are a soaring raptor, and they are mobile in searching for food. The hawks may be able to adjust their hunting patterns to forage on remaining prairie dog colonies.

Swift fox: Because of abundant prey, swift fox might frequent prairie dog colonies for hunting. The reduction in acreage of prairie dog colonies could be detrimental to swift fox in the area because of the decreased prey base, but this can not be quantified. Swift fox are not dependent on prairie dogs or prairie dog colonies for their survival (Allardyce and Sovada 2003). Swift fox have been found to occupy habitat with or without prairie dogs. The generalist foraging behavior of swift fox makes food an unlikely limiting factor (Allardyce and Sovada 2003). Considering that the avoidance of large predators may be more important to swift fox survival than obtaining food, the increase in predators around a prairie dog colony may actually be a deterrent. It is not known if there are an optimum number of prairie dogs in an area to support swift fox, and without this information, it is impossible to determine which range of prairie dog acreages could either be advantages or detrimental to swift fox populations. More research needs to be done on swift fox-prairie dog relationships.

Burrowing owl: Control of prairie dog colonies within the IMZ with zinc phosphide treated oats can be carried out under Alternative 1 as the thresholds are met. This would have little direct effect on the burrowing owl since that vast majority will have migrated out of the area prior to October 1 – earliest poisoning can occur. However, the reduction in prairie dog density and active burrows would have an indirect effect. It is common for burrowing owls to occupy a prairie dog colony that has recently undergone a major population reduction either through poisoning or plague as long as the burrows haven't collapsed. However, within two to three years the lack of open burrows and prairie dogs makes the colony less desirable. Badger predation of burrowing owl nest sites is common in low density prairie dog colonies and accounted for 48 percent of the nest failures in western Nebraska (Desmond et al. 2000). Badger predation was rare in Buffalo Gap National Grassland and only four nests were lost from 1999-2000 (Griebel 2000, 2007). High density prairie dog colonies decrease the probability of a badger selecting a burrowing owl nest site as opposed to a prairie dog occupied burrow.

Cumulatively, active prairie dog colony acreage would continue to decline on private land. There is no way to predict what the acreage will be like on nearby Tribal lands, currently there are large active prairie dog complexes on tribal lands next to Conata Basin. Additionally, Badlands National Park will be doing some limited prairie dog control in certain areas but encouraging expansion through management (i.e., prescribed fire) in other areas. The threat of plague exists and has the ability to significantly reduce prairie dog populations.

The Fall River West GA, Fall River Southeast GA and Wall North GA currently (Table N-1) have less than the minimum acreages required by Alternative 1. Although not officially documented it is believed that plague has moved through the colonies in the Fall River West GA north of Highway 18 and the Fall River Southeast GA. As a result the numbers of prairie dogs in these colonies have been notably reduced. Active management would be necessary to increase the prairie dogs in these GAs to reach the minimum acreages required by Alternative 1.

The prairie dog acreages on the Oglala National Grassland, the Fall River Northeast GA, the Wall Southeast GA, and the Fort Pierre National Grassland are currently within the range of acres suggested for each GA in Alternative 1 (Table N-1). Only monitoring will be required initially for these areas.

Prior to the plague outbreak that has occurred in the Wall Southwest GA there were approximately 26,698 acres of active prairie dog colonies (214 outside the Black-footed Ferret Reintroduction Habitat and 26,484 within the Black-footed Ferret Reintroduction Habitat) within the IMZ. The total effect the outbreak of plague will have on the number of acres of prairie dogs in Conata Basin is not known at this time, so the pre-plague acres will have to be used. The 26,698 acres of fully active prairie dog colonies is more than the maximum (19,000) called for in Alternative 1 and prairie dog acreages would be decreased to meet this goal. All GAs except Fall River SE and Wall SW (outside of MA 3.63) would maintain a minimum of 1,000 acres of active prairie dog colony habitat except for the Conata Basin and Smithwick MA 3.63 sites, where minimum acres would be 12,500 and 2,100 respectively.

The estimated breeding pair density using the 20.408 acres/pair formula would equate to 49 breeding pairs (i.e., 98 individuals) for the 1,000 acre minimum. Using the minimum acres for each GA (see Table N-2, Appendix N – Biological Evaluation), across the Nebraska National Forest, there could be a minimum breeding pair population of 1,010 pairs (2,020 individuals); using a mean fledge rate of 2.6 young per nesting attempt (i.e., Conata Basin results for 1999 and 2000 combined; Griebel 2000, 2007), then the total fall population theoretically could be 4,646 individuals (i.e., total young + total adults). This is just considering what the bare minimum acreage would be on the Nebraska National Forest and does not include adjacent private, tribal, and other federal lands (i.e., Badlands National Park) that would also be contributing to the local population.

In 1999, there were 9,370 acres of active prairie dog colonies in the Conata Basin (well below the 12,500 minimum suggested for this alternative). The 70 percent prairie dog colony occupation rate, a nesting success rate of 76 percent and fledge rate of 2.6 per nesting attempt indicates that this area very well could be serving as a burrowing owl source population, even back in 1999 when compared to other northern Great Plains prairie dog complexes. Other prairie dog colony occupancy rates have been documented at 16 percent in southwestern Montana (Restani 2002), 21-29 percent in North Dakota (Davies 2005, Restani 2002), 21-26 percent in northeastern Colorado (Pezzolesi 1994) and 59 percent in western Nebraska (Ekstein 1999).

Because there is a minimum acreage that would be applied, in an adaptive management scheme, active management measures will be applied when monitoring shows that acres of prairie dogs fall below the minimum levels. Even in a catastrophic situation where for some reason all prairie dogs are eliminated from a particular GA measures would be taken to restore the populations to the minimum acreages provided in each GA.

Alternative 2

This alternative is the current prairie dog management on the National Forest and Grasslands as defined in the 2001 Forest Plan (USDA Forest Service 2001c) and the *Record of Decision for black-Tailed Prairie Dog Conservation and Management on the Nebraska National Forest and Associated Units, Including Land and Resource Management Plan Amendment 2* (BTPDCM) (USDA Forest Service 2005e). The 2001 Forest Plan did not set specific acreage objectives for prairie dog colonies. The current management objective for prairie dogs located in the IMZ is to manage and regulate populations through non-lethal methods and limited rodenticide use where human health and safety or infrastructure is threatened.

The following table presents the current active prairie dog acres by GA and the predicted acres of prairie dogs if they expanded at the rate of 25 percent per year for 10 years. The 25 percent expansion rate was calculated using actual growth rates documented on the Nebraska National Forest since 1999 (see FEIS Appendix B). These rates include recent years when extended drought conditions have exacerbated the expansion.

Table 3-13. Predicted expansion of prairie dog acres under Alternative 2 and acres of active colonies.

District	Geographic Area	Acres of Active Colonies in the IMZ[1]	25% Annual Expansion 2017 (acres)
Pine Ridge	Oglala	1,125	10,500
Fall River	Fall River Northeast GA	1,130	13,200
	Fall River West GA	210	2,400
	Fall River Southeast GA excluding MA 3.63	42	500
	Fall River Southeast GA, Smithwick MA 3.63	503	5,900
Wall	Wall North GA	454	4,000
	Wall Southeast GA	1,414	13,000
	Wall Southwest GA excluding MA 3.63	214	2,000
	Wall Southwest G.A. Conata Basin MA 3.63	26,484	Maximum acres at 46,400
Fort Pierre	Fort Pierre GA	1,735	16,000
[1] Active prairie dog acres from most current data 2005 to 2006, rodenticide treatment in BMZ has occurred.			

This passive prairie dog management has resulted in increases in prairie dog acreages in all the GAs not affected by plague. Prairie dog acreage is expected to continue to grow under this alternative unless affected by plague. The rates of growth will depend on many factors, the most important of which is precipitation. Should plague occur, it could play a major role in this scenario. Regardless, this No Action Alternative would likely result in a neutral to positive population trend for the black-tailed prairie dog.

Direct Effects: The direct effects of Alternative 2 are animals being poisoned by the rodenticide. Under this alternative, rodenticide use in the IMZ is limited to areas where human health and safety or infrastructure is threatened. This application of rodenticide has already been analyzed in the 2001 Forest Plan, and no additional rodenticide application would be authorized in this alternative. Within the IMZ, the possibilities of a threat to public health and safety are very low, and prairie dog control would be minimal.

Indirect Effects: An indirect effect is the loss of habitat as a result of rodenticide use and reductions in prairie dog populations. Prairie dogs tend to cut down all tall vegetation in the vicinity of the colony, creating low structure grassland. This, in turn, could alter habitat suitability for a variety of

wildlife species in the area. The threatened, endangered or Forest Service sensitive animal species that prefer tall vegetation and may be negatively impacted by an increase in prairie dog colonies acreages are greater prairie chickens, greater sage grouse, northern harriers, short-eared owls, grasshopper sparrows, and regal fritillary butterflies. The threatened, endangered or Forest Service sensitive animal species that prefer short vegetation and may be positively impacted by an increase in prairie dog colonies acreages are burrowing owls, mountain plovers, McCown's longspurs, chestnut-collared longspurs, long-billed curlews, and swift foxes.

Chapter 2 of the 2001 Forest Plan addressed the desired mix of grassland structure levels by establishing grassland structure objectives for each NFS unit and GA. The objectives specify the desired amounts low, moderate, and high structure (USDA Forest Service 2001c). Environmental analysis completed for the Forest Plan determined that these levels are adequate for the viability of these species (USDA Forest Service 2001b). If maximum prairie dog acreage called for in Alternative 2 were met, the ability to meet the 2001 Forest Plan's objectives for high, moderate and low vegetative structure objectives for each GA would also be possible with proper management (i.e. proper grazing strategies, normal to above precipitation levels, etc.). The only exception would be the Wall Southwest GA including the Conata Basin MA 3.63 Black-footed ferret management area. If Alternative 2 maximum acres were met (63 percent of the Conata Basin and 7 percent of the remaining GA), the combined percent of prairie dog acres for the entire Wall Southwest GA would be 48 percent. This would make it difficult to meet 2001 Forest Plan vegetative structure objectives for this GA.

Under Alternative 2, the number of acres of active prairie dog colonies on each GA could have a positive effect on the predatory animals that inhabit the area. In general, the densities of both small mammals and birds are higher on prairie dog colonies than on the adjacent grasslands (Agnew 1983). With the addition of the prairie dogs, this makes the abundant prey on prairie dog colonies attractive to many predators. Predatory animals that exist in the project area that are either threatened, endangered, or Forest Service sensitive are black-footed ferrets, bald eagles, swift foxes, northern harriers, ferruginous hawks, short-eared owls, and burrowing owls. Prairie dog colonies are not primary habitat for the bald eagle, short-eared owl, and northern harrier, and it is doubtful that the acres of prairie dog would have a large effect on the viability of these species.

Black-tailed prairie dog: Alternative 2 does not propose a range of acres of active prairie dog colonies. Prairie dogs would be allowed to expand naturally within the IMZ with few exceptions. The passive management suggested in Alternative 2 would likely result in an increase in prairie dog acreages across the planning area. In the 2001 Forest Plan there are stated objectives to maintain three or more prairie dog complexes in the Wall Southwest GA, one or more prairie dog complexes in the Fort Pierre National Grasslands and one prairie dog complex in each of the Oglala National Grassland and Fall River Southeast GA (USDA Forest Service 2001c). This juxtaposition of prairie dog colonies complexes warranted a "may adversely impact individuals, but not likely to result in a loss of viability in the planning area, nor cause a trend toward federal listing" viability call in the Biological Evaluation for the 2001 Forest Plan (USDA Forest Service 2001b).

Black-footed ferret: The passive management suggested in Alternative 2 would result in an increase in prairie dog habitat acreages across the planning area. Under this alternative, it is predicted that all of the suitable acres (46,400) in Conata Basin MA 3.63 would be occupied by the year 2017. It is estimated that approximately 175 to 200 ferret breeding adults would occur should the predicted acres occur. Prairie dogs would increase on all of the other GAs at some rate depending on many factors.

Alternative 2 meets the criteria for a prairie dog complex (USDA Forest Service 2001c) in each GA and the range of acres in each GA would also meet the criteria for a "focal area" (Proctor et al. 2006) of a minimum of approximately 10,000 acres of active prairie dog colonies.

Ferruginous hawk: The ferruginous hawk is not dependent on prairie dogs or prairie dog colonies for their survival. The passive management suggested in Alternative 2 would result in an increase in prairie dog acreages across the planning area. Any increase in acreage of prairie dog colonies could positively affect reproductive output (Cook et al. 2003) and increase fall and winter habitat (Plumpton and Andersen 1997, Seery and Matiatos 2000, Smith and Lomolino 2004) of the ferruginous hawk. The acreages of active prairie dog colonies that would occur as a result of Alternative 2 should be beneficial to ferruginous hawks.

Swift fox: Because of abundant prey, swift fox might frequent prairie dog colonies for hunting. The increase in acreage of prairie dog colonies could be beneficial to swift fox in the area because of the increase prey base, but this can not be quantified. Uresk and Sharps (1986) found swift fox using the large prairie dog colonies located on the Pine Ridge Indian Reservation in South Dakota in the early 1980s almost exclusively. Swift fox are not dependent on prairie dogs or prairie dog colonies for their survival (Allardyce and Sovada 2003). Swift fox have been found to occupy habitat with or without prairie dogs. The generalist foraging behavior of swift fox makes food an unlikely limiting factor (Allardyce and Sovada 2003). Considering that the avoidance of large predators may be more important to swift fox survival than obtaining food, the increase in predators around a prairie dog colony may actually be a deterrent. It is not known if there are an optimum number of prairie dogs in an area to support swift fox. Without this information, it is impossible to determine which range of prairie dog acreages could either be advantages or detrimental to swift fox populations. More research needs to be done on swift fox-prairie dog relationships.

Burrowing owl: In Alternative 2 (no action), no poisoning would be administered within the IMZ except for public safety and health situations as described in the 2001 Forest Plan (USDA Forest Service 2001c). Rodenticide use would continue in the boundary management zone as described in the 2001 Forest Plan Amendment 2 (USDA Forest Service 2005e). The acreage figures displayed in Table 3-15 represent a 25 percent expansion rate for the next 10 years. The minimum acres are the current acres for each GA. Overall, this alternative could have a beneficial impact on burrowing owls on the interior portions of the geographic areas.

Alternative 3

This alternative focuses on ensuring that there is not a disproportionate share of prairie dog acres in any county containing national grasslands. An objective within this alternative is to maintain a minimum vegetative similarity index of 25 to 50 percent.

In South Dakota, this alternative sets a maximum objective only, providing for acreages not to exceed 3 percent of the aggregate total of national grasslands in each county. No minimum acreages are established in South Dakota for Alternative 3. The minimum numbers are essentially set by the vegetative condition of each prairie dog colony based on a NRCS ecological site similarity index threshold (USDA Natural Resource Conservation Service 2006). If the similarity index falls below 25 percent, prairie dogs would be reduced to 10 percent of the active colony acreage.

On the Oglala GA in Nebraska, the range of acres of active prairie dog colonies is set at 100 to 900 acres.

Table 3-14. Management objectives for maximum acres occupied by prairie dogs under Alternative 3.

District	Geographic Area	Objective for maximum acres occupied by black-tailed prairie dogs
Pine Ridge	Oglala	100 to 900
Fall River	Fall River Northeast GA	2,700
	Fall River West GA	3,600
	Fall River Southeast GA excluding MA 3.63	2,500
	Fall River Southeast GA Smithwick MA 3.63	800[1]
Wall	Wall North GA	2,100
	Wall Southeast GA	2,800
	Wall Southwest GA excluding MA 3.63	830
	Wall Southwest G.A. Conata Basin MA 3.63	2,200[2]
Fort Pierre	Fort Pierre GA	3,470

[1] This number represents 3% of the MA. This alternative would allow all of the acres within Fall River County to be dedicated to the MA representing a total of 6,900 acres.
[2] This number represents 3% of the MA. This alternative would allow all of the acres within Pennington County to be dedicated to the MA representing a total of 5,800 acres.

Direct Effects: The direct effects of Alternative 3 are animals being poisoned by the rodenticide. The species group that would be vulnerable to the application of the rodenticide is the granivorous species. If any of these species are on a prairie dog colony while the rodenticide is applied, there is the possibility of individuals dying from eating the poison grain. Granivorous species that exist in the project area that are either threatened, endangered or Forest Service sensitive are black-tailed prairie dogs, whooping cranes, greater prairie chickens, chestnut-collared longspurs, McCown's longspurs, Brewer's sparrows, grasshopper sparrows, and trumpeter swans.

Rodenticide application will not start until October 1, which lessens the possibility of impacts to animals that use the area only in the summer or that only pass through the area during migration. These species are the whooping cranes, chestnut-collared longspurs, McCown's longspurs, Brewer's sparrows, and grasshopper sparrows.

Animals not attracted to the short grass structure created by the prairie dogs would probably not be affected by the rodenticide. These species include greater prairie chicken, grasshopper sparrows, and trumpeter swans.

The possibility of secondary poisoning of animals that eat animals poisoned by the rodenticide is a direct effect that could occur in Alternative 3. This would affect scavengers and to some extent predatory species. The scavengers and predators that exist in the project area that are either threatened, endangered, or Forest Service sensitive are black-footed ferrets, bald eagles, swift foxes, northern harriers, ferruginous hawks, short-eared owls, and burrowing owls.

Results of laboratory studies generally indicate that zinc phosphide poses little secondary risk to non-target wildlife. Zinc phosphide breaks down rapidly in the digestive tract of affected animals, so predators and scavengers are generally not exposed to the compound. Zinc phosphide is not stored in the muscle or other tissue of poisoned animals. There is no true secondary poisoning.

The obvious sensitive species that would be affected by the rodenticide application is the black-tailed prairie dog. Because there is maximum number of acres of active prairie dog colonies proposed for

each GA and MA under this alternative, there is a possibility of using a rodenticide on all acres during the life of this plan.

Indirect Effects: An indirect effect is the loss of habitat as a result of rodenticide use and reductions in prairie dog populations. Prairie dogs tend to cut down all tall vegetation in the vicinity of the colony, creating low structure grassland. This, in turn, could alter habitat suitability for a variety of wildlife species in the area. The threatened, endangered or Forest Service sensitive animal species that prefer tall vegetation and may be negatively impacted by an increase in prairie dog colonies acreages are greater prairie chickens, greater sage grouse, northern harriers, short-eared owls, grasshopper sparrows, and regal fritillary butterflies. The threatened, endangered, or Forest Service sensitive animal species that prefer short vegetation and may be positively impacted by an increase in prairie dog colonies acreages are burrowing owls, mountain plovers, McCown's longspurs, chestnut-collared longspurs, long-billed curlews, and swift foxes.

The 2001 Forest Plan established grassland structure objectives for each NFS unit and GA. The objectives specify the desired amounts low, moderate, and high structure (USDA Forest Service 2001c). Environmental analysis completed for the 2001 Forest Plan determined that these levels are adequate for the viability of these species (USDA Forest Service 2001b). If maximum prairie dog acreage called for in Alternative 3 were met, the ability to meet the 2001 Forest Plan's objectives for high, moderate and low vegetative structure objectives for each GA would be possible with proper management (e.g., proper grazing strategies, normal to above precipitation levels, etc.).

A short-term indirect effect is reduction of prey base as a result of rodenticide use in prairie dog colonies. In the long-term, vegetation on inactive prairie dog colonies can shift to a mixed grass prairie, with reduced densities of both small mammals and birds (Agnew 1983). In the project area, predatory animals that are either threatened, endangered or Forest Service sensitive are the black-footed ferrets, bald eagles, swift foxes, northern harriers, ferruginous hawks, short-eared owls, and burrowing owls. The bald eagle, short-eared owl and northern harrier's primary habitat is not prairie dog colonies and the ranges of acres called for in this alternative would have little effect on their habitats.

Black-tailed prairie dog: Alternative 3 recommends the maximum acreages be set at 3 percent of the aggregate total public land in each county. No minimum acreage figure is suggested. There is no doubt that if the prairie dog acreages are maintained at or near the maximum levels, that viability of the black-tailed prairie dog would be maintained on the planning area (see rational for Alternative 1). Minimum acreages are not presented (exception is the Oglala NG which has 100 acres), so some assumptions will have to be made.

Under this alternative, prairie dog colonies would be controlled if rangeland analyses of specific prairie dog colonies show the similarity index (SI) to be below 25 percent or trending downward. The prescribed action for this threshold is rodenticide treatment would be applied to 90 percent of the prairie dog holes in the allotment. This threshold could result in 90 percent of the current acres of the project area being controlled. It is difficult to determine if leaving 10 percent of a colony after control would cause the colony to die out or if it would build back to a more viable number. Under normal conditions most prairie dog colonies would survive. With plague, shooting, drought, and the possibility of significant moisture and the ensuing high vegetative production, there is a possibility that the all of the prairie dogs in all or some of the GAs in the project area could die off or be held at very low numbers. Also, the application of rodenticide at that rates that are possible in this alternative could compromise the distribution of prairie dogs across the planning area, further threatening the viability of prairie dogs.

Black-footed ferret: The only areas that will be analyzed for black-footed ferrets will be the MA 3.63 Black-footed Ferret Reintroduction Habitats located in the Conata Basin area of the Wall Southwest GA and the Smithwick area of the Fall River Southeast GA.

Under Alternative 3, Conata Basin MA 3.63 would be managed to maintain between 0 and 5,800 acres of active prairie dog colonies. A reduction of prairie dogs would need to occur over time to meet the acreage objectives for Alternative 3. Depending on the vegetative similarity index, the remaining 5,800 acres of prairie dogs would be subject to control. This would eliminate over 80 to 100 percent of the existing ferret habitat in Conata Basin MA 3.63. Eliminating a minimum of 24,000 acres of prairie dog colonies in the Conata Basin MA 3.63 would adversely affect black-footed ferrets, eliminate long-term self sustainability of ferrets in the basin, reduce ferret translocation opportunities, and negatively impact national black-footed ferret recovery efforts. This alternative maximizes adverse impacts to ferrets and other species that depend on or are beneficially impacted by prairie dogs in Conata Basin MA 3.63.

Using black-footed ferret home range data, 5,800 acres of prairie dog colonies would provide habitat to sustain between 30 and 40 breeding adult black-footed ferret depending on the density of prairie dogs. CBSG estimates that at least 120 breeding adults are needed to sustain a black-footed ferret population with >90 percent probability of persistence over 100 years. Using home range data from Conata Basin, 120 breeding adult black-footed ferrets are estimated to require from 16,366 to 29,704 acres during wet and dry years, respectively.

There are currently about 500 acres of active prairie dog colonies in the Smithwick MA 3.63. Alternative 3 would allow a maximum of 6,900 acres of active prairie dog colonies in the area. Using black-footed ferret home range data, 6,900 acres of prairie dog colonies would provide habitat to sustain between 35 and 50 breeding adult ferrets depending on the density of prairie dogs.

Using a 25 percent expansion rate per year, the active prairie dog colonies within the Smithwick MA 3.63 reintroduction area could increase to approximately 4,700 acres. Selecting Alternative 3 would require adapting management strategies that would increase the number of prairie dogs in the area to a growth rate that would meet the acreage objective.

The U.S. Fish and Wildlife Service recognizes small ferret population of greater than 30 animals as having value toward delisting the black-footed ferret (U.S. Fish and Wildlife Service 1988, 2006a). Using black-footed ferret home range data in low densities of prairie dogs, it would require a minimum of 5,900 acres of active prairie dogs to maintain a population of at least 30 animals.

Ferruginous hawk: The total prairie dog allowable acreage in this alternative is only a fraction of the current condition, with the bulk of that acreage being eliminated from the Conata Basin MA 3.63 site. This alternative calls for a 92 percent reduction in desirable habitat, from 26,484 acres down to 2,200 acres. Additionally, the bulk of the prairie dog colonies located outside of the Conata Basin are generally small and fragmented; ferruginous hawks need a minimum colony size and subsequent prairie dog population. Research suggests that wintering ferruginous hawks utilize prairie dog colonies >14 acres in size and when they fall below that the bird(s) response is to move elsewhere (Seery and Matiatos 2000). Further isolating and fragmenting prairie dog colonies may force the birds to nest farther away from a prairie dog colony than desirable and result in decreased productivity and nesting success (Cook et al. 2003). With a 92 percent reduction in desirable habitat in the Conata Basin alone, the viability and overall population would more than likely be negatively affected.

Swift fox: Because of abundant prey, swift fox might frequent prairie dog colonies for hunting. The reduction in acreage of prairie dog colonies could be detrimental to swift fox in the area because of the decreased prey base, but this can not be quantified. Swift fox are not dependent on prairie dogs or prairie dog colonies for their survival (Allardyce and Sovada 2003). Swift fox have been found to

occupy habitat with or without prairie dogs. The generalist foraging behavior of swift fox makes food an unlikely limiting factor (Allardyce and Sovada 2003). Considering that the avoidance of large predators may be more important to swift fox survival than obtaining food, the increase in predators around a prairie dog colony may actually be a deterrent. It is not known if there is an optimum number of prairie dogs in an area to support swift fox. Without this information, it is impossible to determine which range of prairie dog acreages could either be advantages or detrimental to swift fox populations. More research needs to be done on swift fox-prairie dog relationships.

Burrowing owl: Alternative 3 recommends the maximum acreages be set at 3 percent of the aggregate total public land in each county (Table N-2, FEIS Appendix N). No minimum acreage figure is suggested. If the prairie dog acreages are maintained at or near the maximum levels, viability of the burrowing owl may be maintained on the planning area (see rational for Alternative 1). Minimum acreages are not presented (exception is the Oglala NG with 100 acres), so some assumptions will have to be made.

Under this alternative, prairie dog colonies would be controlled if rangeland analyses of specific prairie dog colonies show the similarity index (SI) to be below 25 percent or trending downward. The prescribed action for this threshold is rodenticide treatment would be applied to 90 percent of the prairie dog holes in the allotment. This threshold could result in 90 percent of the current acres of the project area being controlled. The area may serve as marginal habitat for burrowing owls after year 1, but repeated control and the collapse of the burrows within 2-3 years would result in a prairie dog colony that supports a very small number or no owls at all. There is a possibility that the all of the prairie dogs in all or some of the GAs in the project area could die off or be held at very low numbers. Also, the application of rodenticide at those rates could compromise the distribution of prairie dogs across the planning area further threatening the viability of burrowing owls. This alternative would seriously reduce the amount of available habitat and fragment what is left-over, which is a driving factor in the decline of the species (Desmond et al. 2000, Warnock and James 1997).

Alternative 4

Details and prairie dog recommendations in this alternative are derived from the *South Dakota Black-tailed Prairie Dog Conservation and Management Plan* (SD Plan) (Cooper 2005) and/or other state statutes. The SD Plan was approved by the South Dakota Legislature and is codified in state law. This alternative provides specific objectives only for the Conata Basin MA 3.63 where it sets a range of acres for active prairie dog colonies at 8,000 to12,000. Only Conata Basin MA 3.63 will be considered in the following analysis.

Direct Effects: The direct effects of Alternative 4 are animals being poisoned by the rodenticide. The species group that would be vulnerable to the application of the rodenticide is the granivorous species. If any of these species are on a prairie dog colony while the rodenticide is applied, there is the possibility of individuals dying from eating the poison grain. Granivorous species in the project area that are either threatened, endangered or Forest Service sensitive are black-tailed prairie dogs, whooping cranes, greater prairie chickens, chestnut-collared longspurs, McCown's longspurs, Brewer's sparrows, grasshopper sparrows, and trumpeter swans.

Rodenticide application will not start until October 1, which lessens the possibility of impacts on animals that use the area only in the summer or that only pass through the area during migration. These species are whooping cranes, chestnut-collared longspurs, McCown's longspurs, Brewer's sparrows, and grasshopper sparrows.

Animals that are not attracted to the short grass structure created by the prairie dogs would also be unlikely to be effected by the rodenticide these species include greater prairie chicken, grasshopper sparrows, and trumpeter swans.

The possibility of secondary poisoning of animals that eat animals that have been poisoned by the rodenticide is a direct effect that could occur in Alternative 4. This would effect scavengers and to some extent predatory species. The scavengers and predators that exist in the project area that are either threatened, endangered or Forest Service sensitive are black-footed ferrets, bald eagles, swift foxes, northern harriers, ferruginous hawks, short-eared owls, and burrowing owls.

Results of laboratory studies generally indicate that zinc phosphide poses little secondary risk to non-target wildlife. Zinc phosphide breaks down rapidly in the digestive tract of affected animals, so predators and scavengers are generally not exposed to the compound. Zinc phosphide is not stored in the muscle or other tissue of poisoned animals. There is no true secondary poisoning.

Indirect Effects: An indirect effect is the loss of habitat as a result of rodenticide use and reductions in prairie dog populations. Prairie dogs tend to cut down all tall vegetation in the vicinity of the colony, creating low structure grassland. This, in turn, could alter habitat suitability for a variety of wildlife species in the area. The threatened, endangered or Forest Service sensitive animal species that prefer tall vegetation and may be negatively impacted by an increase in prairie dog colonies acreages are the greater prairie chickens, greater sage grouse, northern harriers, short-eared owls, grasshopper sparrows, and regal fritillary butterflies. The threatened, endangered or Forest Service sensitive animal species that prefer short vegetation and may be positively impacted by an increase in prairie dog colonies acreages are the burrowing owls, mountain plovers, McCown's longspurs, chestnut-collared longspurs, long-billed curlews, and swift foxes.

The 2001 Forest Plan established grassland structure objectives for each NFS unit and GA. The objectives specify the desired amounts low, moderate, and high structure (USDA Forest Service 2001c). Environmental analysis completed for the forest plan determined that these levels are adequate for the viability of these species (USDA Forest Service 2001b). If maximum prairie dog acreage called for in Alternative 4 were met, the ability to meet the 2001 Forest Plan's objectives for high, moderate and low vegetative structure objectives for each GA would also be possible with proper management (e.g., proper grazing strategies, normal to above-normal precipitation levels, etc.).

A short-term indirect effect is reduction of prey base as a result of rodenticide use in prairie dog colonies. In the long-term, vegetation on inactive prairie dog colonies can shift to a mixed grass prairie, with reduced densities of both small mammals and birds (Agnew 1983). Predatory animals that exist in the project area that are either threatened, endangered or Forest Service sensitive are black-footed ferrets, bald eagles, swift foxes, northern harriers, ferruginous hawks, short-eared owls, and burrowing owls. Prairie dog colonies are not primary habitat for the bald eagle, short-eared owl and northern harrier, and the ranges of acres called for in this alternative would have little effect on their habitats.

Black-tailed prairie dog: Plague was confirmed in the Wall Southwest GA in the spring of 2008. Prior to the plague outbreak that has occurred in the Wall Southwest GA, there were approximately 26,698 acres of active prairie dog colonies (214 outside the Black-footed Ferret Reintroduction Habitat and 26,484 within the Black-footed Ferret Reintroduction Habitat) within the IMZ. Pre-plague acres were used because the total effect of the outbreak on the number of acres of prairie dogs in Conata Basin is not known at this time. This exceeds the maximum (12,000) called for in this alternative, and prairie dog acreages could be decreased to meet this goal.

This alternative results in management activities that assure an acreage range of prairie dogs between 8,000 and 12,000 in Conata Basin MA 3.63 (black-footed ferret reintroduction habitat).

Control of prairie dog colonies within the IMZ with zinc phosphide treated oats can be carried out as the various thresholds are met. This would obviously be detrimental to the prairie dogs that are poisoned. The long-term viability of the prairie dog population on the unit is likely if the range of acres of active prairie dog colonies is maintained between 8,000 and 12,000 as required in this

alternative. This meets the criteria for a prairie dog complex (USDA Forest Service 2001c) and also meets the criteria for a "focal area" (Proctor et al. 2006) and long-term viability with plague (Knowles 2000) which is a minimum of 10,000 acres of active prairie dog colonies..

Black-footed ferret: Under Alternative 4, Conata Basin MA 3.63 would be managed to maintain between 8,000 and 12,000 acres of active prairie dog colonies. Currently there are approximately 26,000 acres of active prairie dog colonies in the area.

Using black-footed ferret home range data, 8,000 to 12,000 acres of prairie dog colonies would provide habitat to sustain about 60 breeding adult black-footed ferrets. CBSG estimates that at least 120 breeding adults are needed to sustain a black-footed ferret population with >90 percent probability of persistence over 100 years. Using home range data from Conata Basin, 120 breeding adult black-footed ferrets are estimated to require from 16,366 to 29,704 acres during wet and dry years, respectively. Eliminating a minimum of 14,000 acres of prairie dog colonies in Conata Basin MA 3.63 would adversely affect black-footed ferrets, compromise long term self sustainability of ferrets in Conata Basin MA 3.63, reduce ferret translocation opportunities, and negatively impact national black-footed ferret recovery efforts.

Ferruginous hawk: Alternative 4 does not call for the eradication of prairie dogs; however, the reduction in acreage of prairie dog colonies could negatively affect reproductive output (Cook et al. 2003) and reduce fall and winter habitat (Plumpton and Andersen 1997, Seery and Matiatos 2000, Smith and Lomolino 2004) for the ferruginous hawk. The amount of acreage available for this alternative should be adequate to maintain viability for the species across the planning area. Ferruginous hawks are a soaring raptor, and they are mobile in searching for food. The hawks may be able to adjust their hunting patterns to forage on remaining prairie dog colonies.

Swift fox: Because of abundant prey, swift fox might frequent prairie dog colonies for hunting. The reduction in acreage of prairie dog colonies could be detrimental to swift fox in the area because of the decreased prey base, but this can not be quantified. Swift fox are not dependent on prairie dogs or prairie dog colonies for their survival (Allardyce and Sovada 2003). Swift fox have been found to occupy habitat with or without prairie dogs. The generalist foraging behavior of swift fox makes food an unlikely limiting factor (Allardyce and Sovada 2003). Considering that the avoidance of large predators may be more important to swift fox survival than obtaining food, the increase in predators around a prairie dog colony may actually be a deterrent. It is not known if there is an optimum number of prairie dogs in an area to support swift fox. Without this information, it is impossible to determine which range of prairie dog acreages could either be advantages or detrimental to swift fox populations. More research needs to be done on swift fox / prairie dog relationships.

Burrowing owl: This alternative results in management activities that assure an acreage range of prairie dogs between 8,000 and 12,000 in Conata Basin Area MA 3.63. Before the plague outbreak in Conata Basin MA 3.63, the area had approximately 26,698 acres of active prairie dog colonies within the IMZ. This exceeds the maximum (12,000) called for in this alternative, and prairie dog acreages could be decreased to meet this goal.

Rodenticide control of prairie dogs would have little direct effect on the burrowing owl since that vast majority will have migrated out of the area prior to October 1 – earliest poisoning can occur. However, the reduction in prairie dog density and active burrows would have an indirect effect. It is common for burrowing owls to occupy a prairie dog colony that has recently undergone a major population reduction either through poisoning or plague as long as the burrows haven't collapsed. However, within two to three years the lack of open burrows and prairie dogs makes the colony less desirable. Badger predation of burrowing owl nest sites is common in low density prairie dog colonies and accounted for 48 percent of the nest failures in western Nebraska (Desmond et al. 2000). Badger

predation was rare in Buffalo Gap National Grassland and only four nests were lost from 1999-2000 (Griebel 2000, 2007). High density prairie dog colonies decrease the probability of a badger selecting a burrowing owl nest site as opposed to a prairie dog occupied burrow.

Cumulatively, active prairie dog colony acreage will continue to decline on private land. There is no way to predict what the acreage will be like on nearby tribal lands, currently there are large active prairie dog complexes on tribal lands next to Conata Basin. Additionally, Badlands National Park will be doing some limited prairie dog control in certain areas but encouraging expansion through management (i.e., prescribed fire) in other areas. The threat of plague exists and has the ability to significantly reduce prairie dog populations.

The 8,000-acre minimum for active prairie dog colonies in the Conata Basin should support a viable population of burrowing owls. The estimated breeding pair density using the 20.408 acres/pair formula would equate to 392 breeding pairs (i.e., 784 individuals) for the 8,000 acre minimum. Using a mean fledge rate of 2.6 young per nesting attempt (i.e., Conata Basin results for 1999 and 2000 combined; Griebel 2000, 2007), then the total fall population theoretically could be 1,803 individuals (i.e., total young + total adults). This is just considering what the bare minimum acreage would be in the Conata Basin and does not include adjacent private, tribal, and other federal lands (i.e., Badlands National Park and parts of the national grassland) that would also be contributing to the local population.

Alternative 5

This alternative would emphasize two major objectives within the IMZ: 1) a larger population of black-footed ferrets and associated species and; 2) higher levels of black-tailed prairie dog colony acreages on all GAs and MAs. It would provide priority for ferrets over other multiple uses within both Conata Basin MA 3.63 and Smithwick MA 3.63. It would also provide priority for black-tailed prairie dogs over other multiple uses when minimum acre objectives are not being met.

This alternative would provide sufficient habitat to maintain a well-distributed population of black-tailed prairie dogs and other associated species across the national grasslands. This alternative also designates a maximum range of prairie dog acres so that expansion would not continue indefinitely. This alternative provides objectives for a range of prairie dog acreage at the GA or MA scale. In the Conata Basin MA 3.63, where ferrets currently exist, this alternative prioritizes ferrets and the associated need for prairie dog colonies over other multiple uses.

Table 3-15. Management objectives for range of IMZ acres occupied by prairie dogs under Alternative 5.

District	Geographic Area	Objective for range of acres occupied by black-tailed prairie dogs within the IMZ (minimum to maximum)
Pine Ridge	Oglala	9,500 to 18,700
Fall River	Fall River Northeast GA	9,100 to 18,300
	Fall River West GA	12,000 to 24,000
	Fall River Southeast GA excluding MA 3.63	8,700 to 17,300
	Fall River Southeast GA Smithwick MA 3.63	9,600 to 17,010
Wall	Wall North GA	6,900 to 13,900
	Wall Southeast GA	9,100 to 18,200
	Wall Southwest GA excluding MA 3.63	27,000 to 39,200
	Wall Southwest G.A. Conata Basin MA 3.63	27,000 to 46,400
Fort Pierre	Fort Pierre GA	11,600 to 23,200

Direct Effects: The direct effects of Alternative 5 are animals being poisoned by the rodenticide. The species group that would be vulnerable to the application of the rodenticide is the granivorous species. If any of these species are on a prairie dog colony while the rodenticide is applied, there is the possibility of individuals dying from eating the poison grain. Granivorous species that exist in the project area that are either threatened, endangered or Forest Service sensitive are black-tailed prairie dogs, whooping cranes, greater prairie chickens, chestnut-collared longspurs, McCown's longspurs, Brewer's sparrows, grasshopper sparrows, and trumpeter swans.

When the range of active acres of prairie dog colonies allowed in Alternative 5 is compared to the acres projected if prairie dog colonies expanded at a rate of 25 percent per year for 10 years, none of the projected acres exceed the maximum acres allowed in Alternative 5. In fact, in the Fall River West GA, Fall River Southeast GA (both in and out of Smithwick MA 3.63), Wall North GA and Wall Southwest GA (outside Conata Basin MA 3.63), the 10-year projected acres do not even meet the minimum acres required in this alternative. Thus very little, if any, prairie dog control would occur under this alternative.

Indirect Effects: An indirect effect is the loss of habitat as prairie dog colonies increase in size. Prairie dogs tend to cut all tall vegetation down in the vicinity of the colony, creating low structure grassland. This, in turn, could alter habitat suitability for a variety of wildlife species in the area. The threatened, endangered or Forest Service sensitive animal species that prefer tall vegetation and may be negatively impacted by an increase in prairie dog colonies acreages are the greater prairie chickens, greater sage grouse, northern harriers, short-eared owls, grasshopper sparrows, and regal fritillary butterflies. The threatened, endangered or Forest Service sensitive animal species that prefer short vegetation and may be positively impacted by an increase in prairie dog colonies acreages are the burrowing owls, mountain plovers, McCown's longspurs, chestnut-collared longspurs, long-billed curlews, and swift foxes.

If maximum prairie dog acreage objectives were met under Alternative 5, the ability to meet 2001 Forest Plan high vegetative structure objectives for most GAs would be possible with proper management (e.g., proper grazing strategies, normal to above precipitation levels, etc.).

In the Fall River Southeast GA, if Alternative 5 maximum acres were met, 67 percent of Smithwick MA 3.63 and 20 percent of the remaining Fall River Southeast GA would be inhabited by prairie dogs. This would result in 31 percent of the GA in low structure habitat. The objective in the 2001 Forest Plan for low structure habitat on the Fall River Southeast GA is 15 to 35 percent. The 31 percent is within that range, but it would require the rest of the GA be managed for high and moderate structure which might be difficult to accomplish.

In the Wall Southwest GA, 63 percent of the Conata Basin MA 3.63 and 18 percent of the remaining Wall Southwest GA would be inhabited by prairie dogs. This would result in 51 percent of the GA in low structure habitat. This is outside the low structure objective in the 2001 Forest Plan for the Wall Southwest GA, which is 25 to 35 percent. Having over 50 percent of the Wall Southwest GA in low structure makes it impossible to meet the 2001 Forest Plan objectives for moderate and high structure. This could compromise the analysis completed in the 2001 Forest Plan for some of the sensitive species.

The number of acres of active prairie dog colonies on each GA could have an effect on the predatory animals that inhabit the area. In general, the densities of both small mammals and birds are higher on prairie dog colonies than on the adjacent grasslands (Agnew 1983). With the addition of the prairie dogs, this makes the abundant prey on prairie dog colonies attractive to many predators. Predatory animals that exist in the project area that are either threatened, endangered or Forest Service sensitive are the black-footed ferrets, bald eagles, swift foxes, northern harriers, ferruginous hawks, short-eared

owls, and burrowing owls. The bald eagle, short-eared owl and northern harrier's primary habitat is not prairie dog colonies and it is doubtful that the acres of prairie dog would have a large effect on the viability of these species. The increase in acreage of prairie dog colonies could be beneficial to ferruginous hawks in the area because of the increase prairie dog colonies.

Black-tailed prairie dog: The obvious sensitive species that will be affected by the rodenticide application is the black-tailed prairie dog. Because there are a maximum number of acres of active prairie dog colonies proposed for each GA and MA under this alternative, there is a possibility of using a rodenticide in all of them during the life of this plan. The current active acres of prairie dogs and the objective for range of active acres of black-tailed prairie dogs in the IMZ are displayed in the following table.

Table 3-16. Active prairie dog acres and acreage objectives under Alternative 5.

Geographic Area	Acres of Active Colonies in the IMZ[1]	Alternative 5 Acreage Objectives	25% Annual Expansion 2017 (acres
Oglala	1,124	9,500 to 18,700	10,500
Fall River Northeast GA	1,130	9,100 to 18,300	13,200
Fall River West GA	209	12,000 to 24,000	2,400
Fall River Southeast GA excluding MA 3.63	42	8,700 to 17,300	500
Fall River Southeast GA Smithwick MA 3.63	503	9,600 to 17,010	5,900
Wall North GA	454	6,900 to 13,900	4,000
Wall Southeast GA	1,960	9,100 to 18,200	13,000
Wall Southwest GA excluding MA 3.63	214	27,000 to 39,200	2,000
Wall Southwest G.A. Conata Basin MA 3.63	25,939	27,000 to 46,400	Maximum acres at 46,400
Fort Pierre GA	1,735	11,600 to 23,200	16,000

Alternative 5 does authorize prairie dog control if certain thresholds are met. When the range of active acres of prairie dog colonies allowed in Alternative 5 is compared to the acres projected if prairie dog colonies expanded at a rate of 25 percent per year for 10 years, none of the projected acres exceed the maximum acres allowed in Alternative 5. In fact, in the Fall River West GA, Fall River Southeast GA (both in and out of the Smithwick 3.63 MA), Wall North GA and Wall Southwest GA (outside of the Conata Basin 3.63 MA), the 10-year projected acres do not even meet the minimum acres required in this alternative. Thus very little, if any, prairie dog control would occur under this alternative.

Alternative 5 meets the criteria for a prairie dog complex (USDA Forest Service 2001c) in each GA and the range of acres in each GA would also meet the criteria for a "focal area" (Proctor et al 2006) of a minimum of 10,000 acres of active prairie dog colonies. Each GA also meets the criteria for long-term viability with plague (Knowles 2000) which is a minimum of 10,000 acres of active prairie dog colonies.

Black-footed ferret: Under this alternative, it is predicted that all of the suitable acres (46,400) in Conata Basin MA 3.63 would be occupied by the year 2017. Currently, there are approximately 26,000 acres of active prairie dog colonies in the area. Under the Alternative 5, it is possible for the acreages of active prairie dog colonies in Conata Basin MA 3.63 to increase 20,400 acres within the life of this plan.

Using black-footed ferret home range data, 27,000 to 46,400 acres of prairie dog colonies would provide habitat to sustain between 197 and 339 breeding adult ferrets assuming high densities of

prairie dogs. Prolonged above average moisture would be required to maintain these numbers. In dry years when the densities of prairie dogs would be reduced, this range of acres would maintain between 136 and 243 breeding adult ferrets. CBSG estimates that at least 120 breeding adults are needed to sustain a black-footed ferret population with >90 percent probability of persistence over 100 years. Using home range data from Conata Basin, 120 breeding adult black-footed ferrets are estimated to require from 16,366 to 29,704 acres during wet and dry years, respectively.

There are currently about 500 acres of active prairie dog colonies in the Smithwick MA 3.63. In Alternative 5, Smithwick MA 3.63 will be managed to have 9,600 to 17,010 active prairie dog colonies would provide habitat to sustain between 85 and 124 breeding adult ferrets assuming high densities of prairie dogs. Prolonged above average moisture would be required to maintain these numbers. In dry years when the densities of prairie dogs would be reduced, this range of acres would maintain between 48 and 70 breeding adult ferrets.

The U.S. Fish and Wildlife Service recognizes small ferret population of greater than 30 animals as having value toward delisting the black-footed ferret (U.S. Fish and Wildlife Service 1988, 2006a).

The rest of the Southeast GA would be managed to have an 8,700 to 17,300 acres of prairie dogs. Because of the close proximity of these two if combined they would meet the definition of a prairie dog complex (a minimum of 1,000 acres in 10 or more colonies with inter-colony distances not exceeding 6 miles).

Ferruginous hawk: The ferruginous hawk is not dependent on prairie dogs or prairie dog colonies for their survival. The management suggested in Alternative 5 would result in an increase in prairie dog acreages across the planning area. Any increase in acreage of prairie dog colonies could positively affect reproductive output (Cook et al. 2003) and increase fall and winter habitat (Plumpton and Andersen 1997, Seery and Matiatos 2000, Smith and Lomolino 2004) of the ferruginous hawk. The acreages of active prairie dog colonies that would occur as a result of Alternative 5 should be beneficial to ferruginous hawks.

Swift fox: Because of abundant prey, swift fox might frequent prairie dog colonies for hunting. The increase in acreage of prairie dog colonies could be beneficial to swift fox in the area because of the increase prey base, but this can not be quantified. Uresk and Sharps (1986) found swift fox using the large prairie dog colonies located on the Pine Ridge Indian reservation in South Dakota in the early 1980s almost exclusively. Swift fox are not dependent on prairie dogs or prairie dog colonies for their survival (Allardyce and Sovada 2003). Swift fox have been found to occupy habitat with or without prairie dogs. The generalist foraging behavior of swift fox makes food an unlikely limiting factor (Allardyce and Sovada 2003). Considering that the avoidance of large predators may be more important to swift fox survival than obtaining food, the increase in predators around a prairie dog colony may actually be a deterrent. It is not known if there are an optimum number of prairie dogs in an area to support swift fox. Without this information, it is impossible to determine which range of prairie dog acreages could either be advantageous or detrimental to swift fox populations. More research needs to be done on swift fox / prairie dog relationships.

Burrowing owl: Alternative 5 does authorize prairie dog control if certain thresholds are met. This is the reason for the 'may adversely impact individuals' determination. The only GA that is currently within the desired range of prairie dogs called for in Alternative 5 is the Wall Southwest GA. All of the rest are far below the minimum acreages so the use of any poison would be very limited. This increase in acreages of prairie dog colonies would for the most part be beneficial to the burrowing owl population on the entire Nebraska national Forest.

Summary

This analysis comes down to three main issues when considering species at risk across all alternatives: the amount of habitat provided by prairie dog colonies (acres of prairie dog colonies), the number of prairie dogs (densities) in the system, and the amount of rodenticide that would be used.

Prairie dog colonies are very complex communities and provide different habitat components for many species (food, cover, protection from predators, etc.) It is difficult to quantify the effects of this action on species that are not obligates or receive benefits from prairie dog colonies, especially when these species exist across the entire Great Plains. Only professional estimates can be made on the effects of the alternatives on species survival. Impacts to cover have, for the most part, been mitigated in the 2001 Forest Plan. Forest plan direction provides for a mosaic of different grassland structure applied across the landscape.

The amount of prairie dog colonies in the study area would not have a substantial effect on predatory species that are not directly tied to prairie dog colonies. Predators are attracted to prairie dog colonies because of the abundant prey. With the exception of the black-footed ferret and the burrowing owl, the predators considered in this analysis are not prairie dog obligates. Ferruginous hawks and possibly the swift fox may be more closely tied to prairie dog colonies. Bald eagles are primarily scavengers and prefer areas near water. Northern harriers and short-eared owls prefer high structure grasslands and their primary pray items are small mammals with an emphasis on voles.

There is little doubt that if an animal eats enough poisoned grain, it will die. The rodenticide issue (non target poisoning and secondary poisoning) can be mitigated by the selection of rodenticide (zinc phosphide) and the application (timing and methodology) so the effects become minimal for all species except the black-tailed prairie dog.

In conclusion, when comparing alternatives, the two species that are found almost exclusively on prairie dog colonies become the focus of the analysis. They are the black-footed ferret and the burrowing owl. Large acreages of prairie dogs in the Conata Basin are needed for the black-footed ferret existence.

Alternative 1 would maintain or increase prairie dog acreages across the project area with the exception of Conata Basin MA 3.63. It falls short of the CBSG (2004) requirement needed to sustain a black-footed ferret population with >90 percent probability of persistence over 100 years in Conata Basin MA 3.63. The prairie dog acreage objectives allowed with this alternative would provide for stable to increasing populations of burrowing owls in the project area.

Alternatives 2 and 5 would allow prairie dog acreage to fluctuate based upon climatic and grazing conditions, with the difference being Alternative 5 presents a minimum and maximum range of active prairie dog acres and would require active management to meet these objectives. Alternative 2 is a more passive approach but it does not provide a maximum acreage for prairie dog colonies for each GA and the minimum acreages are debatable. Both alternatives meet CBSG (2004) requirement needed to sustain a black-footed ferret population with >90 percent probability of persistence over 100 years in Conata Basin MA 3.63 if acreage objectives are met. The large acreages of prairie dogs allowed with these alternatives would also be beneficial to the burrowing owl populations.

Alternative 3 may maintain prairie dog acreages across the project area with the exception of Conata Basin MA 3.63 where reduction of 78 percent to 100 percent of the prairie dog acreage would be expected. Distribution of colonies within Fall River and Pennington Counties would decrease prairie dog acreages due to the concentration of acreage in the Smithwick MA 3.63 and Conata Basin MA 3.63. This alternative would have significant adverse affects on the black-footed ferret population and fall short of the CBSG (2004) requirement needed to sustain a black-footed ferret population with >90 percent probability of persistence over 100 years in Conata Basin MA 3.63. Of the five alternatives,

Alternative 3 would have the most severe negative impact of all the alternatives on prairie dogs, black-footed ferrets, ferruginous hawks, and burrowing owls. The prairie dog acreage objectives allowed with this alternative would provide for the stable to declining populations of burrowing owls in the project area.

Alternative 4 pertains to the Conata Basin MA 3.63 only and would result in a 54 percent to 69 percent reduction in prairie dog acreage. This alternative would have significant adverse affects on the black-footed ferret population and fall short of the CBSG (2004) requirement needed to sustain a black-footed ferret population with >90 percent probability of persistence over 100 years in Conata Basin MA 3.63. The prairie dog acreage objectives allowed with this alternative would provide for the stable to declining populations of burrowing owls in Conata Basin MA 3.63.

Management Indicator Species (MIS)

Affected Environment

Management indicator species (MIS) in the 2001 Forest Plan are selected to aid in the planning process and to monitor the consequences of plan implementation. The criteria used for selection of MIS are listed and described in the Forest Plan FEIS Appendix B (USDA Forest Service 2001b). Those species selected under these criteria as MIS for the Nebraska National Forest Units are listed in the *Final Environmental Impact Statement for the Northern Great Plains Management Plans Revision*(2001 Forest Plan FEIS) (USDA Forest Service 2001b) and the following table. The table lists the MIS and GA where these species will be used for monitoring purposes as MIS.

Table 3-17. MIS list and rationale for analysis.

Management Indicator Species	Geographic Area (GAs)	Analyzed in Further Detail	Rationale	Biological Community
Plains sharp-tailed grouse	Fall River Northeast Fall River Southeast Wall North Wall Southeast Fort Pierre Oglala	Yes	Species and habitat occur in the GA.	Diverse high structure grasslands.
	Bessey & McKelvie Pine Ridge	No	Proposed project does not occur in GA.	
Black-tailed prairie dog	Fall River Southeast Fall River West Wall Southwest Fort Pierre Oglala	Yes	Species and habitat occur in the GA.	Prairie dog colonies and low structure grasslands.
Greater sage-grouse	Fall River West	Yes	Species and habitat occur in the GA.	Sagebrush with tall, dense and diverse understories.
Greater prairie chicken	Fort Pierre	Yes	Species and habitat occur in the GA.	Diverse high structure grasslands.
	Bessey & McKelvie	No	Proposed project does not occur in GA.	
Pygmy nuthatch	Pine Ridge	No	Proposed project does not occur in GA.	Open mature & late successional ponderosa pine forest.

Potential habitat for each management indicator species was assessed and mapped for each national grassland and forest as part of the 2001 forest plan revision process. The potential habitat information is summarized and presented in Tables 3-129, 130, 131, and 132 in the 2001 Forest Plan FEIS (USDA Forest Service 2001b) and addendum. Some modifications and refinements to the geographic information system model used to predict potential black-tailed prairie dog habitat in the 2001 Forest Plan FEIS were recently applied, but the changes in model outputs were minor. Also, a cooperative sagebrush aerial survey and mapping project with the South Dakota Department of Game, Fish, and Parks was recently completed in the Fall River West GA. This project provided more accurate information than previous mapping projects on the distribution and amounts of sagebrush and potential sage-grouse habitat. Approximately 15,800 acres of sagebrush habitat were listed in Table 3-131 of the 2001 Forest Plan FEIS, and the new survey indicates that the more accurate figure is approximately 14,500 acres.

Habitat relationships for each indicator species are discussed in Appendix H of the 2001 Forest Plan (USDA Forest Service 2001b). Prairie dogs prefer and maintain low structure grassland habitat while the others select for diverse high structure grassland habitats on mixed grass and sandhills prairie. Where prairie dogs expand uniformly over extensive grassland areas, habitat suitability for the other management indicator species decreases because they are more dependent on higher vegetative structure and/or later seral conditions than typically exist within active prairie dog areas. The desired mix of grassland structure levels and resulting habitat conditions for management indicator species was addressed in Chapter 2 of the 2001 Forest Plan by establishing grassland structure objectives for each NFS unit and GA (USDA Forest Service 2001c). The objectives specify the desired amounts of low, moderate, and high grassland structure, recognizing low structure grasslands would extend beyond just prairie dog colonies. In general, objectives for MIS in each GA support stable to increasing populations promoting the viability of the species. Specific objectives for each MIS under each GA are stated and discussed below in the "Forest Plan Objectives for MIS" section.

There are a large number of wildlife species, in addition to "at risk" and management indicator species, which commonly use prairie dog colonies. This list includes, but is not limited to, pronghorn, coyote, badger, cottontail, golden eagle, numerous small mammals, raptors and other bird species, and several reptile and amphibian species (Agnew et al. 1986, Sharps and Uresk 1990). Other wildlife species that prefer taller grassland vegetation patches would be negatively affected if prairie dog colonies expand to occupy major portions of individual landscapes. These species include, but are not limited to, bobolink, dickcissel, and prairie vole.

Environmental Consequences

The following discussion will analyze and provide rationale for the predicted positive or negative effects to MIS or their habitats. Analysis on how the effects of each alternative will contribute to achieving 2001 Forest Plan objectives for each MIS will be discussed. The "best available science" has been used in this MIS analysis by referencing recent Forest monitoring data for all MIS, recent applicable research, and recent Forestwide and Regionwide species assessments. References throughout this section demonstrate that the best available science has been used, and these references can be found in the appendices.

Direct and Indirect Effects

This project focuses on the effects of managing prairie dog colonies in the interior (as opposed to the boundary management zones areas) of the forest. Direct and indirect effects on management indicator species of implementing Alternatives 1, 3, 4, and 5 are evaluated based on the likelihood of achieving the objectives for long-term population trends and habitats. The effects of implementing Alternative 2 have already been evaluated as part of the recent forest plan revision process but are included and presented in this analysis for comparative purposes.

Rodenticide ingestion and primary poisoning would be direct negative effects on the plains sharp-tailed grouse, greater prairie chicken, and greater sage-grouse. The indirect effects are the result of changes in habitat suitability (grassland vegetation structure) following increases or decreases in prairie dog populations. Species that prefer high grassland structure would avoid prairie dog colonies, and an increase in prairie dog acreages would negatively impact their habitat quality or availability. We recognize that prairie grouse will many times utilize low structure areas such as prairie dog colonies for displaying and courtship rituals.

Under all alternatives, it is believed that there will be minimal to no impacts on species that prefer high grassland structure if 2001 Forest Plan high structure objectives can be maintained on each GA. Environmental analysis completed for the 2001 Forest Plan determined that these levels are adequate supporting stable to increasing MIS populations.

Direct effects on the black-tailed prairie dog as a management indicator species are the result of the use of prairie dog rodenticide. The indirect effects generally relate to the prairie dog colony acreages allowed on the GAs. In general, reducing or limiting prairie dog acres would have a negative impact, while increasing prairie dog acres would have a positive impact on the black-tailed prairie dog.

Black-tailed prairie dog: Current black-tailed prairie dog colony acreages (survey information collected in the summer of 2006) in the GAs are presented in the following table. The base years used for comparison purposes in the table are 1996-97 (the survey information used in the Forest Plan FEIS analyses) and 2004 (the survey information used in the BTPDCM FEIS). The numbers presented for 1996-97 represent all active acres that occurred within the entire GA (both the IMZ and BMZ). The annual Forest Monitoring and Evaluation Reports were referenced for recent prairie dog acreage amounts. The 2004 and 2006 figures only include prairie dog colonies located within the IMZ assuming all of the BMZ colonies are without prairie dogs.

Also presented in the table are the three sets of predicted acres of prairie dogs that could occur by 2017. The 2001 Forest Plan FEIS used a predictive model and projected between 24,400 and 39,800 acres of prairie dogs on the Nebraska National Forest by 2012 to 2017. The 2005 BTPDCM FEIS (Chapter 3, Table 3-13) used the same model and updated the predicted acres between approximately 29,600 and 41,400. There are currently (2006 data) 33,311 acres of occupied prairie dog colonies in the interior management zones; an indication that the 2001 Forest Plan and 2005 FEIS Amendment 2 (USDA Forest Service 2005e) projections are still applicable. The predicted acres from the 2002 Forest Plan and the 2005 FEIS Amendment 2 displays a range of predicted acres. The lower number of each range is calculated assuming the precipitation patterns will be normal to above normal over the next several years with an approximate 5 percent expansion rate, while the upper end of the range assumes extended dry periods with an approximate 15 percent expansion rate. A third prediction used current 2006 prairie dog acres and calculated predicted prairie dog acres using an expansion rate ranging from 5 percent to 25 percent. Actual growth rates documented on the national grasslands indicated that many smaller prairie dog acres were expanding at a rate averaging approximately 25 percent. These rates include recent years when extended drought conditions have exacerbated the expansion and no rodenticide applications occurred

Discussion of population trend will reference those GAs where black-tailed prairie dogs are designated MIS. Other GAs supporting prairie dogs but where the species is not designated MIS are included in the following table to provide forestwide trend comparisons. Forestwide prairie dog acreages increased from 1996-97 (14,740 acres) to 2004 (24,397 acres) to 2006 (33,311 acres). This indicates a positive trend in prairie dog populations during this period. In the Fall River West and Fall River Southeast GAs, the number of acres of active prairie dogs has fallen off in 2006 when compared to 2004. It is believed that sylvatic plague has occurred in these areas and together with toxicant use in the boundary management zone are the main causes of the decline of prairie dogs. In the Wall Southwest GA (Conata Basin), the acreages of prairie dogs have steadily increased from 1996 to the

present (despite rodenticide use in the BMZ in 2004, 2005 and 2006), and the current acreages are within the predicted ranges for 2012.

Plague was discovered in the Conata Basin MA 3.63 prairie dog colonies in the spring of 2008 (U.S. Fish and Wildlife Service 2008). The effect this outbreak on the number of prairie dogs in Conata Basin MA 3.63 is not known at this time.

Table 3-18. Active acres of prairie dogs in selected years from 1996 to the present compared to predicted acreages.

Geographic Areas with Black-tailed Prairie Dog as MIS	Past and Current Prairie Dog Acres			Expansion Model Predicting Expected Prairie Dog Acres		
	Forest Plan FEIS (1996-1997)	2005 BTPDCM FEIS (2004)	Acres of Active Colonies[1] (2006)	Forest Plan Expansion Model (expected 2012-2017)[3]	2005 BTPDCM Expansion Model (expected 2012)[2]	5% to 25% Annual Expansion 2017 (10 years) from Current Acres
Fall River West G.A.	n/a	470	210	---	600 to 800	359 to 2,445
Fall River Southeast G.A.	n/a	98	42	---	144 to 200	72 to 489
Fall River Southeast G.A. Smithwick MA 3.63	300	1,072	503	---	1,656 to 2,300	860 to 5,856
Wall Southwest G.A.	n/a	157	214	---	227 to 320	366 to 2,491
Wall Southwest G.A. Conata Basin MA 3.63	10,890	18,903	26,484	---	22,473 to 31,680	45,297 to 46,400
Fort Pierre G.A.	720	870	1,735	1,200 to 1,900	1,100 to 1,400	2,967 to 20,198
Oglala G.A.	740	1,170	1,125	1,200 to 1,900	1,400 to 1,800	1,924 to 13,097
Total	**14,740**	**22,740**	**30,313**	**2,400 to 3,800**	**27,600 to 38,500**	**51,845 to 90,976**
Other Geographic Areas (non-MIS GAs)						
Fall River Northeast G.A.	n/a	822	1,130	---	1,000 to 1,400	1,933 to 13,155
Wall North G.A.	n/a	138	454	---	200 to 300	776 to 5,285
Wall Southeast G.A.	n/a	697	1,414	---	800 to 1,200	2,418 to 16,461
Total Buffalo Gap	---	---	---	22,000 to 36,000	---	---
NNF Total	**14,740**	**24,397**	**33,311**	**24,400 to 39,800**	**29,600 to 41,400**	**56,972 to 125,877**

1 Active prairie dog acres from most current data 2005 to 2006, rodenticide treatment in BMZ has occurred.

2 Expansion model acres from 2005 Black-tailed Prairie Dog Conservation & Management FEIS, Tables 3-2 & 3-13.

3 Predicted colony acreage in 10 years from expansion model, Forest Plan FEIS Appendix H.

Black-tailed prairie dog objectives: The 2001 Forest Plan does not list prairie dogs as an MIS in the Fall River Northeast, Wall North, and Wall Southeast GAs so no specific objectives are given relating to prairie dogs. The objectives for prairie dog management in the Fall River West and Southeast GAs are to increase prairie dogs over the next 10 to 15 years. In the Oglala and Fort Pierre GAs, an objective is to develop a prairie dog complex, which by definition is a minimum of 1,000 acres in 10 or more colonies with intercolony distances not exceeding 6 miles (Hanski 1997, Knowles 1985, Luce 2001, and Samson 2000). In the Wall Southwest GA, the 2001 Forest Plan direction is to develop 3 prairie dog complexes.

Viability of the species should be reviewed when population trends are addressed. As stated in the previous section on species at risk and in Appendix N – Biological Evaluation, in determining prairie dog species viability, many factors need to be considered including the number of individuals, number of colonies, and their juxtaposition on the landscape.

The authors of the 2001 Forest Plan proposed that large prairie dog complexes are the best approach to ensure prairie dog population viability (USDA Forest Service 2001c). They based their definition of a colony complex on several sources of viability information, including the *Northern Great Plains Terrestrial Assessment* NGPTA (USDA Forest Service 2000) and literature by Hanski (1997) and Lande (1995) (USDA Forest Service 2001b). Elements considered in defining a prairie dog colony complex included genetics, metapopulation principles, dispersion distances, effective population size and average adult animals per acre. The definition for a prairie dog colony complex in Appendix G of the 2001 Forest Plan is:

> "A group of at least 10 prairie dog colonies with nearest-neighbor intercolony distances not exceeding 6 miles and with a total colony complex acreage of at least 1,000 acres."

In the *Northern Great Plains Terrestrial Assessment* (NGPTA), a conservation strategy for maximizing the contribution that the Forest Service and national grasslands add to the long-term viability of black-tailed prairie dogs is to establish 2 or more prairie dog colony complexes on each national grassland within the range of the black-tailed prairie dog (USDA Forest Service 2000). The assessment does not state an optimum size of a prairie dog complex but does state there should be at least 10, preferably 15 colonies in a complex and the complexes should be identified and managed on the basis of maximum effective dispersal distance of prairie dogs which was 10 km (6.21 miles). The only reference to the size of prairie dog colonies in the NGPTA is:

> "Although not specific to long term viability of black-tailed prairie dog populations, complexes should be or have the potential of growing to a size capable of supporting future reintroductions of black-footed ferrets." (USDA Forest Service 2000)

The authors of the *Multi-state Conservation Plan for the Black-tailed Prairie Dog in the United States – Addendum 2003* (MCP) (Luce 2003) bolster the credibility of the 1,000 acre minimum in their definition of conservation focus areas (CFA):

> "An area greater than 1,000 acres of suitable prairie dog habitat, encompassing either an existing complex of occupied prairie dog colonies or an area where a complex of colonies can be created to sustain a viable population of prairie dogs for long-term management."

The 2001 Forest Plan FEIS also discusses viability related to this direction (USDA Forest Service 2001b). Recommendations from the NGPTA (USDA Forest Service 2000) for maintaining viable prairie dog populations on the national grasslands in the planning area were incorporated into 2001 Forest Plan direction. This increased the probability of maintaining viable populations of the prairie dog across the planning unit. These additional conservation measures for the species increase the probability of sustaining viable populations in the future if plague epizootics become problematic (USDA Forest Service 2001b).

It should be noted also that Wind Cave National Park identified in their prairie dog management plan direction to manage prairie dogs within a range of 1,000 to 3,000 acres (National Park Service 2006b). The plan states the proposed colony acreage range promotes a prairie dog population that would be sustainable in the face of a severe potential extirpation event, while incorporating management actions that would contain the prairie dogs' geographical expansion, which accommodates adjacent land uses to the extent possible. It should be noted that 33 black-footed ferrets were introduced into Wind Cave National Park starting in 2007. It is understood that this is not an optimum range of acres to manage for black-footed ferrets but the fact remains that managing for a minimum of 1,000 acres of prairie dogs does not preclude an area for black-footed ferret reintroduction.

Alternative 1: The current active acreages of prairie dogs in the Fall River West and Fall River Southeast GAs (including Smithwick MA 3.63) are below the minimum target set in Alternative 1 of the following table. As a result, management activities will likely increase the extent of prairie dog towns in these GAs to meet objectives for Alternative 1. The current condition for Fort Pierre and Oglala GAs fall within the acreage objective targeted for prairie dogs in Alternative 1. In this GA, management activities should be implemented to maintain the extent of prairie dog colonies. Prior to the 2008 outbreak of plague in the Wall Southwest GA, the current condition was above the acreage objective called for in Alternative 1. As a result, management should be assessed for future actions needed to meet the proposed target for prairie dogs in this GA.

Prairie dogs currently occupy 30,313 acres (2006 survey) within GAs where they are designated MIS which is within the Alternative 1 range of acre objective (17,600 to 33,900 acres). Forestwide, prairie dogs occupy 33,311 acres (2006 survey) and are within the Alternative 1 range of acre objective (20,600 to 41,700) indicating that Alternative 1 would continue to support a neutral to positive population trend for the black-tailed prairie dog and therefore support a viable population. Implementation of management would continue to meet 2001 Forest Plan objectives; however a 2001 Forest Plan amendment to establish a desired range of acres for the black-tailed prairie dog would likely be needed for each applicable GA. This amendment would increase the number of prairie dog colony complexes across the planning unit from six to 11 or more complexes. This proposal would support a continual neutral to positive population trend.

Alternative 2 (No Action): This alternative represents the 2001 Forest Plan prairie dog management direction. In Alternative 2, no poisoning will be administered within the IMZ except for public safety and health situations as described in the 2001 Forest Plan. Rodenticide use will continue in the BMZ, as described in the forest plan Amendment 2. The minimum acres are the current acres for each GA while the maximum acres are the predicted acres in 2017 (using an expansion rate of 25 percent per year from the current prairie dog acres). This passive prairie dog management has resulted in increases in prairie dog acreages in all the GAs not affected by plague (see preceding table). The expansion of prairie dog acreages has been accelerated in the last few years due to drought conditions.

Prairie dogs currently occupy 30,313 acres (2006 survey) within GAs where they are designated MIS which represents the current prairie dog acres. Alternative 2 sets a range of acre objective of 29,766 to 90,976 acres for these MIS geographic areas. The maximum acres predicted (90,976) in 10 years (2017) uses a 25 percent expansion rate.

Forestwide, prairie dogs occupy 33,311 acres (2006 survey) and are within the Alternative 2 range of acre objective (33,311 to 125,877). It can be expected that prairie dog acreage will continue to grow under this alternative unless affected by plague. The predicted forestwide acreages in 2017 ranges from 56,972 to 125,877 acres depending on which predictive scenario is used (see above table). The rates of growth will be dependent on many factors, the most important of which is precipitation. Should plague occur, the extent of prairie dog colonies would decline substantially until the epizootic was over and prairie dogs begin to recover. Excluding plague conditions, this No Action Alternative

would likely result in a neutral to positive population trend for the black-tailed prairie dog and therefore support a viable population. 2001 Forest Plan objectives for prairie dogs would be met.

Alternative 3: This alternative sets a maximum but not a minimum acreage for the extent of prairie dog colonies (see the following table). In this alternative, one of the thresholds for initiation of rodenticide use is using vegetative parameters (see FEIS Chapter 2 - Alternatives). It is difficult to predict the extent of grassland occupied by prairie dogs under this alternative because of the interaction of several variables during implementation. In drought conditions, livestock and prairie dog herbivory will stress the vegetation; prairie dog distribution is likely to expand triggering the control of prairie dogs. In years of high precipitation, vegetation conditions should improve which will likely result in less control of prairie dogs under this alternative. Because a minimum distribution of prairie dogs is not set and the most limiting scenario has to be analyzed, it must be assumed that prairie dogs will be controlled while implementing this alternative, and prairie dog populations will be held at low numbers. Although unlikely due to the prairie dog's persistence to colonize, there is a possibility of extirpation of prairie dogs from individual GAs under this alternative.

Prairie dogs currently occupy 30,313 acres (2006 survey) within GAs where they are designated MIS which exceed the Alternative 3 range of acre objective (13,500 to 14,300 acres). Forestwide, current prairie dogs occupy 33,311 acres (2006 survey) and exceed the Alternative 3 range of acre objective (21,100 to 21,900) indicating that Alternative 3 would result in a negative population trend for the black-tailed prairie dog and therefore not likely support a viable population. Unless the objective for this MIS is changed, implementation would lead to failure to meet the 2001 Forest Plan objective for prairie dogs.

Alternative 4: Alternative 4 sets an acreage objective for prairie dogs in Wall Southwest GA - Conata Basin MA 3.63 only. This acreage is much lower than the present acres in this area and will result in a large number of prairie dog acres being reduced.

Prior to the 2008 plague outbreak in the Wall Southwest GA (Conata Basin MA 3.63 Black-footed ferret management area), prairie dogs occupied 26,484 acres (2006 survey) within the GA, which exceeds the Alternative 4 range of acre objective (8,000 to 12,000 acres). Pre-plague acres were used because the total effect of the outbreak on the number of acres of prairie dogs in Conata Basin MA 3.63 is not known at this time.

This alternative only addresses the Wall Southwest GA (Conata Basin MA 3.63 Black-footed ferret management area) so forestwide analysis is difficult. The Alternative 4 objective of 8,000 to 12,000 acres would result in a negative population trend for the black-tailed prairie dog in this GA alone. Unless the objective for this MIS is changed, implementation would lead to failure to meet the objective for prairie dogs established in the 2001 Forest Plan.

Alternative 5: This alternative sets the objective for the extent of prairie dogs at a level believed to be a historical distribution for the GAs. Only in the Wall Southwest GA (Conata Basin MA 3.63) are the current acres close to the objective acres proposed in this alternative. Under this alternative, prairie dog colonies would be encouraged to expand from their current distribution in order meet the objectives of Alternative 5.

Prairie dogs currently occupy 30,313 acres (2006 survey) within GAs where they are designated MIS; this is within the Alternative 5 range of acres objective (81,000 to 151,900 acres). Forestwide, prairie dogs occupy 33,311 acres (2006 survey) and are well below the Alternative 5 range of acres objective (106,100 to 202,300) indicating that Alternative 5 would support positive population trend for the black-tailed prairie dog and therefore support a viable population. Implementation of management would continue to meet 2001 Forest Plan objectives; however a 2001 Forest Plan amendment to establish a desired range of acres for the black-tailed prairie dog would likely be needed for each applicable GA.

Table 3-19. Current active acreages of prairie dog colonies and the desired acreage objectives of prairie dog colonies for each alternative by geographic area.

Geographic Areas with Black-tailed Prairie Dog as MIS	2006 Acres of Active Colonies	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
		Acreage Objectives of Black-tailed Prairie Dogs within the IMZ by Alternative (minimum to maximum)				
Fall River West G.A.	210	1,000 to 3,600	210 to 2,445	3,600	n/a	12,000 to 24,000
Fall River Southeast G.A.	42	0	42 to 489	2,500	n/a	8,700 to 17,300
Fall River Southeast G.A. Smithwick MA 3.63	503	2,100 to 5,000	503 to 5,856	800	n/a	9,600 to 17,010
Wall Southwest G.A.	214	0	214 to 2,491	830	n/a	2,600 to 5,100
Wall Southwest G.A. Conata Basin MA 3.63	26,484	12,500 to 19,000	26,484 to 46,400	2,200	8,000 to 12,000	27,000 to 46,400
Fort Pierre G.A.	1,735	1,000 to 3,500	1,735 to 20,198	3,470	n/a	11,600 to 23,200
Oglala G.A.	1,125	1,000 to 2,800	1,125 to 13,097	100 to 900	n/a	9,500 to 18,900
Total	**30,313**	**17,600 to 33,900**	**29,766 to 90,976**	**13,500 to 14,300**	**8,000 to 12,000**	**81,000 to 151,900**
Other Geographic Areas						
Fall River Northeast GA	1,130	1,000 to 2,800	1,130 to 13,155	2,700	n/a	9,100 to 18,300
Wall North GA	454	1,000 to 2,100	454 to 5,285	2,100	n/a	6,900 to 13,900
Wall Southeast GA	1,414	1,000 to 2,900	1,414 to 16,461	2,800	n/a	9,100 to 18,200
NNF Total	**33,311**	**20,600 to 41,700**	**33,311 to 125,877**	**21,100 to 21,900**	**8,000 to 12,000**	**106,100 to 202,300**

Plains sharp-tailed grouse and greater prairie chicken: Greater prairie chicken and plains sharp-tailed grouse are identified as management indicator species in the Fall River Northeast, Fall River Southeast, Wall North, Wall Southeast, Fort Pierre, and Oglala GAs.

The plains sharp-tailed grouse and greater prairie chicken (Fort Pierre GA only) were selected as management indicator species because of their association with grasslands with diverse structural stages and areas of high-structure grasslands. Life requisites that potentially limit greater prairie chicken populations are the lack of tall and dense grass nesting cover or the lack of winter food (Prose 1985). Life requisites are very similar with sharp-tailed grouse. By direction in the 2001 Forest Plan, high structure grassland will be provided on each GA, most often outside areas occupied by prairie dogs (USDA Forest Service 2001c). Environmental analysis completed for the 2001 Forest Plan determined that the grassland structure objectives are adequate to support stable to increasing sharp-tailed grouse, greater prairie chicken, and associated species populations (USDA Forest Service 2001b).

The recent 2005 species assessment for the greater prairie chicken indicates that populations in South Dakota are projected to fluctuate, with increases in some areas and declines in others. The Fort Pierre National Grassland is a key area for greater prairie-chickens in the state, and populations there have

reportedly increased in recent years coincident with a reduction in grazing pressure and implementation of rest-rotation grazing practices (Robb and Schroeder 2005). The annual forest monitoring and evaluation reports discuss long-term population trends for both the greater prairie chicken and sharp-tailed grouse and suggest that these trends generally have been upward. Grouse wings collected from harvested grouse during the hunting season showed that these species both had successful nesting/brooding-rearing seasons.

A high percent of the Fort Pierre GA has moderate to highly productive soils with the capability to provide quality prairie chicken habitat (FPNG District files). The number of displaying male prairie chickens on courtship grounds are counted and used as an index to annual population levels. On the Fort Pierre GA, the birds are counted in the spring on an 18,250-acre monitoring unit in the southeast central section of the grassland. Over a period of years, the number of courting males can be used to determine trend in the prairie chicken population. Data shows that on the monitoring unit the numbers of prairie chicken males in 1989 were 12 males and in 2000 were 303 males. This equates to an annual increase of about 34 percent (FPNG District files). But since the weather and precipitation have become less reliable in the last 4 to 6 years, the prairie chicken population has fluctuated from 175 males in 2001, 94 males in 2003, 240 males in 2005, and 226 males in 2006. However, the prairie chicken population has remained much higher today than it was during the late 1980s and early 1990s.

The annual forest monitoring and evaluation reports discuss long-term population trends for the plains sharp-tailed grouse. This prairie grouse is found in suitable habitat across all national grasslands administered by the Nebraska National Forest. This management indicator species is monitored on the GAs by counting the number of male grouse displaying on spring courtship grounds. This serves as an index of population levels and can indicate population trend when monitored over a number of years.

Sharp-tailed grouse populations represent less than a quarter of the grouse on Ft. Pierre National Grassland, being distributed through the same habitat as the more common greater prairie chicken. Data shows that on the monitoring unit the numbers of sharp-tailed grouse males in 1991 were 19 males and in 2000 were 95 males. This equates to an annual increase of about 20 percent (FPNG District Files). But since the weather and precipitation have become less reliable in the last 4 to 6 years, the sharp-tailed grouse population has fluctuated from 44 males in 2001, 17 males in 2003, 51 males in 2005, and 19 males in 2006. The sharp-tailed grouse population has remained relatively stable to increasing with the exception of 2006, where the number of males is equal to that of 1991.

On the Southeast GA of the Fall River Ranger District, the number of displaying male grouse ranged from 119 males in 1993 to 213 males in 2002, with a low of 104 males in 1999 and a high of 237 males in 1994. This indicates that numbers remained relatively stable from the mid-1990s through 2002, varying within 40 percent of its 10-year mean of 172 males. With less favorable weather and habitat, the number dropped approximately 75 percent in 2003 to 54 male grouse from what it had been the preceding 2002 spring. This equates to a decrease of nearly 70 percent from the 10-year mean.

Sharp-tailed grouse inhabit the Wall Ranger District, and 28 courtship display grounds have been found after surveying over 156,000 acres from 2000 to 2004. Sharp-tailed grouse are also found across the Oglala GA. Displaying sharp-tailed grouse males have been documented on 9 courtship display ground sights. In 2004, 2005 and 2006, males observed equaled 40, 32, and 32, respectively. Population trend data continues to be collected and more monitoring is needed to display reliable population trends for these two areas.

As prairie dogs expand, increases in low grassland structure and corresponding decreases in moderate and high structure would be expected, thus reducing overall habitat suitability for the greater prairie chicken and sharp-tailed grouse in these prairie dog expansion areas. However, there is direction in the 2001 Forest Plan for low structure grassland on each GA (USDA Forest Service 2001c), and even

with some prairie dog expansion, the high structure grassland component would not be compromised by prairie dogs. Objectives listed in the 2001 Forest Plan for high grassland structure for each GA are presented in the following table, along with the proposed percentage of active prairie dog colonies for each alternative in each GA. For analysis purposes, the assumption will be made that all of the prairie dog colonies are in low structure and the prairie dog colonies reach the maximum acreages for each alternative.

In the following table, prairie dog acreage objectives in all alternatives allow management of the GAs to meet 2001 Forest Plan objectives for high structure.

Table 3-20. Forest Plan objectives (%) for high structure grasslands in each GA compared to the objectives for the percentages of active prairie dog colonies for each alternative.

Geographic Area	High Vegetative Structure Objective (% of the total area)	Total Acres in G.A.	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
			Percent of Active Prairie Dog Colonies (% of the total area)				
Fall River Northeast G.A.	25 to 45	91,298	1 to 3	1 to 14	0 to 3		10 to 20
Fall River Southeast G.A.	15 to 35	86,666	0 to 0	0 to 1	0 to 3		10 to 20
Fall River Southeast G.A. Smithwick MA 3.63	15 to 35	25,307	8 to 20	2 to 23	0 to 3		38 to 67
Wall Southwest G.A.	25 to 35	28,580	0 to 0	1 to 9	0 to 3		9 to 18
Wall Southwest G.A. Conata Basin MA 3.63[1]	25 to 35	77,155[1]	17 to 25	34 to 60	0 to 3	10 to 16	35 to 60
Wall North G.A.	15 to 45	69,437	1 to 3	1 to 8	0 to 3		10 to 20
Wall Southeast G.A.	30 to 40	90,840[2]	1 to 3	2 to 18	0 to 3		10 to 20
Fort Pierre G.A.	30 to 50	116,053	1 to 3	2 to 17	0 to 3		10 to 20
Oglala G.A.	10 to 30	94,484	1 to 3	1 to 14	<1 to 1		10 to 20
Fall River West G.A.	10 to 30	119,951	1 to 3	<1 to 2	0 to 3		10 to 20
Total	**20 to 38**	**799,771**	**3 to 5**	**4 to 16**	**0 to 3**	**1 to 2**	**13 to 25**

[1] This acreage includes 3,289 acres of suitable habitat from the Wall Southeast GA - MA 3.63.

[2] This acreage excludes 3,289 acres of suitable habitat from the Wall Southeast GA - MA 3.63. These suitable acres were included with Wall Southwest GA – MA 3.63.

Alternative 1: The 2001 Forest Plan gives direction for high vegetative structure ranging from 10 to 45 percent across GAs (USDA Forest Service 2001c). If maximum prairie dog acreage objectives were met under Alternative 1, the ability to meet 2001 Forest Plan high vegetative structure objectives for each GA would be possible with proper management (e.g., proper grazing strategies, normal to above precipitation levels, etc.). Overall, the total percent of prairie dog acreages forestwide would be 3 to 5 percent. This low structure acreage leaves 95 to 97 percent of the GAs to be managed to meet the Forest Plan moderate and high vegetative objectives, thus providing adequate quality habitat for greater prairie chicken and sharp-tailed grouse. Management under this alternative for prairie dogs is unlikely to contribute directly to declines in prairie chickens or sharp-tailed grouse. This alternative would support a neutral to positive population trend for the greater prairie chicken (Fort Pierre GA only) and sharp-tailed grouse on the GAs and therefore support a viable population. Implementation of management would meet current 2001 Forest Plan objectives.

Alternative 2 (No Action): This alternative represents the 2001 Forest Plan prairie dog management direction. The 2001 Forest Plan gives direction for high vegetative structure ranging from 10 to 45 percent across GAs (USDA Forest Service 2001c). If maximum prairie dog acreage objectives were met under Alternative 2, the ability to meet 2001 Forest Plan high vegetative structure objectives for each GA would also be possible with proper management (e.g., proper grazing strategies, normal to above precipitation levels, etc.). The only exception would be the Wall Southwest GA including the Conata Basin MA 3.63. If Alternative 2 maximum acres were met (60 percent of the Conata Basin MA 3.63 and 9 percent of the remaining GA), the combined percent of prairie dog acres for the entire Wall Southwest GA would be 46 percent. Implementation of management could meet current 2001 Forest Plan objectives.

The forestwide total percent of prairie dog acreages would be 4 to 14 percent. This low structure acreage leaves 86 to 96 percent of the GAs to be managed to meet the 2001 Forest Plan moderate and high vegetative objectives, thus providing adequate quality habitat for prairie chicken and sharp-tailed grouse. Continued management under this alternative for prairie dogs is unlikely to contribute directly to declines in prairie chickens or sharp-tailed grouse. This alternative would support a neutral to positive population trend for the greater prairie chicken (Fort Pierre GA only) and sharp-tailed grouse on the GAs and therefore support a viable population. Implementation of management would meet 2001 Forest Plan objectives.

Alternative 3: This alternative sets a maximum acreage but not a minimum. In this alternative, one of the thresholds for initiation of rodenticide use is using vegetative parameters (see Chapter 2 - Alternatives). In this alternative, the percent of prairie dog acres (low vegetative structure) ranges from 0 to 3 percent of the total GAs. The 2001 Forest Plan gives direction for high vegetative structure ranging from 10 to 45 percent across GAs (USDA Forest Service 2001c). If maximum prairie dog acreage objectives were met under Alternative 3, the ability to meet 2001 Forest Plan high vegetative structure objectives for each GA would also be possible with proper management (e.g., proper grazing strategies, normal to above precipitation levels, etc.).

Overall, the total percent of prairie dog acreages forestwide would be 0 to 3 percent. This low structure acreage leaves 97 to 100 percent of the GAs to be managed to meet the Forest Plan moderate and high vegetative objectives, thus providing adequate quality habitat for prairie chicken and sharp-tailed grouse. Management under this alternative for prairie dogs is unlikely to contribute directly to declines in prairie chickens or sharp-tailed grouse. This alternative would support a neutral to positive population trend for the greater prairie chicken (Fort Pierre GA only) and sharp-tailed grouse on the GAs and therefore support a viable population. Implementation of management would meet current 2001 Forest Plan objectives.

Alternative 4: Alternative 4 only sets an acreage objective for prairie dogs in Wall Southwest GA (Conata Basin MA 3.63, black-footed ferret management area). In this alternative, the percent of prairie dog acres (low vegetative structure) ranges from 10 to 16 percent of the total GA. The Forest Plan gives direction for high vegetative structure ranging from 25 to 35 percent in this single GA. If maximum prairie dog acreage objectives were met under Alternative 4, the ability to meet Forest Plan high vegetative structure objectives for this GA would also be possible with proper management (e.g., proper grazing strategies, normal to above precipitation levels, etc.).

Overall, the total percent of prairie dog acreages forestwide would be 1 to 2 percent. This low structure acreage leaves 98 to 99 percent of the GA to be managed to meet the Forest Plan moderate and high vegetative objectives, thus providing adequate quality habitat for sharp-tailed grouse. Management under this alternative for prairie dogs is unlikely to contribute directly to declines in prairie chickens or sharp-tailed grouse. This alternative would support a neutral to positive population trend for the greater prairie chicken (Fort Pierre GA only) and sharp-tailed grouse on the GAs and

therefore support a viable population. Implementation of management would meet current Forest Plan objectives for this GA.

Alternative 5: This alternative sets the objective for prairie dog acreages what is believed to be a historical rate of occupancy for the GAs. The 2001 Forest Plan gives direction for high vegetative structure ranging from 10 to 45 percent across GAs (USDA Forest Service 2001c). If maximum prairie dog acreage objectives were met under Alternative 5, the ability to meet 2001 Forest Plan high vegetative structure objectives for each GA would also be possible with proper management (e.g., proper grazing strategies, normal to above precipitation levels, etc.). The only exception would be the Fall River Southeast GA including Smithwick MA 3.63 and the Wall Southwest GA including the Conata Basin MA 3.63. If Alternative 5 maximum acres were met (67 percent of Smithwick MA 3.63 and 20 percent of the remaining Fall River Southeast GA; and 60 percent of the Conata Basin MA 3.63 and 18 percent of the remaining Wall Southwest GA), the combined percent of prairie dog acres for the entire Fall River Southeast GA would be 31 percent; and Wall Southwest GA would be 49 percent. Meeting 2001 Forest Plan vegetative structure objectives would still be possible for the Fall River Southeast GA with proper management. However, this alternative would make it difficult to meet 2001 Forest Plan vegetative structure objectives for the Wall Southwest GA.

Overall, the forestwide total percent of prairie dog acreages would be 13 to 25 percent. This low structure acreage leaves 75 to 87 percent of the GAs to be managed to meet the 2001 Forest Plan moderate and high vegetative objectives, thus providing adequate quality habitat for prairie chicken and sharp-tailed grouse. Management under this alternative for prairie dogs is unlikely to contribute directly to declines in prairie chickens or sharp-tailed grouse. This alternative would support a neutral to positive population trend for the greater prairie chicken (Fort Pierre GA only) and sharp-tailed grouse on the GAs and therefore support a viable population. Implementation of management would likely meet current 2001 Forest Plan objectives.

Greater Sage-grouse were selected as management indicator species because of their association with sagebrush communities with tall, dense, and diverse understories. Annual habitat requirements for sage grouse have been partitioned into 3 categories:

- Breeding habitat which includes lek attendance, nesting, and early brood rearing. These areas are sagebrush-dominated rangelands with a healthy herbaceous understory.
- Summer habitats are characterized by relatively moist conditions with succulent forbs in or adjacent to sagebrush cover. These habitats are used by the sage grouse after the forbs begin to dry up in the upland sagebrush community.
- Winter habitat which is sagebrush (Connelly et al. 2000).

Throughout the western states, populations of sage grouse have been declining since the early 1990s prompting the eventual development of the Greater Sage-Grouse Comprehensive Conservation Strategy (National Sage-Grouse Conservation Planning Framework Team 2006).

Year	# of birds
1991	17
1992	8
1993	4
1994	4
1995	6
1996	10

Year	# of birds
1997	10
1998	11
1999	14
2000	11
2001	4
2002	4

Year	# of birds
2003	0
2004	0
2005	0
2006	0
2007	0
2008	0

The Fall River West GA of the Buffalo Gap National Grassland identifies the greater sage-grouse as a management indicator species. This GA lies in the eastern most boundary of one of seven management zones (the Great Plains Management Zone) identified in the Greater Sage-Grouse Comprehensive Conservation Strategy (National Sage-Grouse Conservation Planning Framework Team 2006). The only suitable habitat large enough to support a population of sage-grouse occurs in this GA, and the 2001 Forest Plan identifies a 45,760 acre area as 3.64 Special Plant and Wildlife Habitat: Sage-Grouse (USDA Forest Service 2001c). The annual forest monitoring and evaluation reports indicate that one known sage-grouse display ground has been monitored in the area since 1991, and the maximum number of birds observed on this display ground each year is listed below. No birds have been seen on the display ground since 2002. The abandonment of this display ground coincided with arrival of West Nile virus in this area. The factors leading to the loss of the population are unknown but the population may have been a victim of small population processes or most likely been lost to West Nile virus. Sage-grouse are known to be highly susceptible to the virus (National Sage-Grouse Conservation Planning Framework Team 2006, Naugle et. al. 2004).

In the spring of 2005, one male sage-grouse was observed displaying on a different site in the northwest portion of the sage-grouse area. On subsequent visits to that area later in 2005 and in the spring of 2006, no birds were seen, indicating that this was likely a wandering male. In 2006, on another site within the GA, five males and three females were observed exhibiting courtship behavior. When the site was visited later that spring, no birds were observed. The 2007 and 2008 sage-grouse monitoring has recorded no sage-grouse observations (R. Hodorff, personal communication 2008).

Black-tailed prairie dogs occur in the Fall River West GA where the greater sage-grouse is identified as MIS. There is one colony located close to the traditional sage grouse display ground, but it has not grown appreciably in the last 15 or more years (Fall River Ranger District files). This colony is bordered by sagebrush and has not been treated with rodenticide, but it is thought to have been hit by plague in the summer of 2005. Although black-tailed prairie dogs have been observed and reported to gradually remove sagebrush from the periphery of colonies, this has not occurred to a noticeable degree at this site. Sage-grouse display grounds have 'low cover' and therefore the presence of prairie dogs does not necessarily result in a decline in habitat quality (as long as sufficient nesting, brood rearing, and wintering habitat is present). Recent monitoring suggests that approximately 14,500 acres of sagebrush habitat in this GA, approximately 19 percent consists of moderate to high density sagebrush that provides high levels of suitability for nesting, brooding and wintering (Hodorff and Peterson 2004).

It is highly unlikely that implementation of any of the alternatives will have any significant effects on sagebrush habitats in this area over the next 10 years, or on sage-grouse populations and their viability that could eventually re-establish in the area. The sage grouse management objectives for the Fall River West GA would be met for habitat conditions; however, given the decline in sage grouse numbers, meeting population objectives under any alternative would seem unlikely. Management under these alternatives for prairie dogs is unlikely to contribute directly to declines in sage grouse numbers. This alternative would not inhibit quality sagebrush habitat and would lend to positive habitat conditions for sage-grouse populations.

Forest Plan Objectives for MIS

Habitat and population trend objectives for each management indicator species are provided in Chapter 2 of the 2001 Forest Plan and are summarized by MIS below. The following discusses how the alternatives contribute to meeting the 2001 Forest Plan objectives for each MIS.

Black-tailed Prairie Dog: Objectives for black-tailed prairie dogs vary between national grasslands and GAs. The objectives for black-tailed prairie dogs for Fort Pierre and Oglala GAs are to increase

prairie dog populations and habitat and to establish a colony complex on each area. The colony complexes are to meet specified criteria to help ensure long-term persistence of prairie dog populations in those areas. The criteria call for a minimum of 1,000 acres in 10 or more colonies with intercolony distances not exceeding 6 miles and are based on information from Hanski (1997), Knowles (1985), Luce (2001), and Samson (2000). It is important to point out that the 2001 Forest Plan specifies that colonies on adjoining lands protected under conservation agreements or easements can be counted as part of each complex. Alternatives 1, 2, and 5 would achieve the 2001 Forest Plan objectives for the Fort Pierre and Oglala GAs. Alternative 3 would not achieve these objectives since acreages would be below the minimum 1,000 acres required for a complex. Alternative 4 for does not provide direction for these two GAs, and therefore it is assumed that objectives would be met under management specified in the 2001 Forest Plan.

In Conata Basin MA 3.63 (Wall Southwest GA), the objective is to increase, enhance, or maintain three or more prairie dog colony complexes in the GA. Alternatives 1, 2, 4, and 5 would achieve the 2001 Forest Plan objectives for the Wall Southwest GA. Alternative 3 would not achieve these objectives since acreages would be below the minimum 1,000 acres required for each complex.

The objectives for black-tailed prairie dogs for the Fall River Southeast and Fall River West GAs are to increase black-tailed prairie dog populations over the next 10 to 15 years. The Fall River Southeast (Smithwick MA 3.63) objective is to develop a prairie dog colony complex over the next 10 to 15 years. Alternatives 1, 2, 3, and 5 would achieve the 2001 Forest Plan objectives for both GAs (including Smithwick MA 3.63) because of increased acreages. Alternative 3 would not achieve the objectives for the Fall River Southeast (Smithwick MA 3.63) since acreages would be reduced below 1,000 acre colony complex requirement. Alternative 4 for does not provide direction for these two GAs and therefore it is assumed that objectives would be met under management specified in the 2001 Forest Plan.

Plains sharp-tailed grouse and greater prairie chicken: Management objectives on the Fall River Northeast and Southeast GAs, Wall North and Southeast GAs, Oglala GA and Fort Pierre GA for plains sharp-tailed grouse and greater prairie chicken (Fort Pierre GA only) are to provide diverse and quality habitats to help support stable to increasing populations. The objectives further specify that this would be accomplished by meeting, in a timely manner, the objectives for high grassland structure prescribed in the 2001 Forest Plan.

Under all alternatives for each of the above GAs, 2001 Forest Plan objectives could be met for these MIS. Management under these alternatives for prairie dogs is unlikely to contribute directly to declines in prairie chickens or sharp-tailed grouse. This alternative would support a neutral to positive population trend for the greater prairie chicken (Fort Pierre GA only) and sharp-tailed grouse on the GAs.

Greater sage-grouse: Management objectives for greater sage-grouse in the Fall River West GA are similar to those for sharp-tailed grouse and greater prairie chicken. Objectives are to provide habitat conditions that help support stable to increasing sage-grouse populations (long-term trends) in the western part of this GA. Current habitat suitability for each management indicator species, except greater sage-grouse, is presented in Tables 3-129, 130, and 132 in the Forest Plan FEIS (USDA Forest Service 2001b) and addendum. Recent monitoring suggests that these levels of habitat suitability have not appreciably changed (Hodorff and Peterson 2004). The recent cooperative sagebrush and sage-grouse habitat project in the Fall River West GA provided information to further assess habitat suitability for greater sage-grouse. Of the approximate 14,500 acres of sagebrush habitat, approximately 19 percent consists of moderate to high density sagebrush that provides high levels of suitability for nesting, brooding and wintering.

Implementation of any of the alternatives would likely not have any significant effects on sagebrush habitats in this area over the next 10 years, or on potential sage-grouse populations that could eventually re-establish in the area. Management under these alternatives for prairie dogs is unlikely to contribute directly to declines sage-grouse. The sage grouse management objectives for the Fall River West GA would be met for habitat conditions; however, given the decline in sage-grouse, meeting population objectives under any alternative would seem unlikely. However, management that goes beyond habitat management may be necessary and the proposed management for prairie dogs does not forgo any options for such management.

Effects to Other Wildlife Species

Direct effects could include direct loss of graniverous birds and small mammals (APHIS 1994, Deisch et al. 1990, Apa et al. 1991, Uresk et al. 1988) from consumption of zinc phosphide grain bait. Primary poisoning risks to native ungulates like pronghorn are likely insignificant and discountable due to low application rates specified by the pesticide label. Adherence to pesticide label requirements also reduces primary poisoning risks. Forest Service also defers rodenticide applications until October 1 or later, and this further reduces risks to migratory birds that typically leave the area prior to this date. A risk assessment on chemical methods of animal damage control prepared by APHIS (1994) provided an excellent review of primary and secondary nontarget risks to wildlife from use of 2 percent zinc phosphide rodenticide bait.

Indirect effects include both secondary poisoning risks and altered habitat structure following prairie dog removal or colony expansion. Because zinc phosphide breaks down rapidly in the digestive tract of the target species, secondary poisoning risks to predators and scavengers appear to be discountable (APHIS 1994). Also, ferruginous hawks and golden eagles have been repeatedly observed feeding on prairie dog carcasses and stripping and setting the gastro-intestinal tract to the side, without consuming any of the guts or their contents. Other buteos probably consume their prey in a similar manner, and this behavior undoubtedly reduces the risks of secondary non-target poisoning.

Indirect effects on grassland birds from altered habitat structure resulting from prairie dog removal or colony expansion have already been analyzed and discussed earlier in this section for management indicator species and for other grassland birds in Chapter 3 of the Forest Plan FEIS.

Recreation Resources

Affected Environment

Currently, there is tremendous interest in prairie dog shooting opportunities on the Buffalo Gap and Fort Pierre National Grasslands in South Dakota. When taking into account all inquiries districts receive relating to various recreational opportunities on the grasslands, the majority are related to prairie dog shooting. The Wall Ranger District receives the most prairie dog shooting inquiries on the Forest. Recreationists are referred to the Forest website and the South Dakota Game, Fish, and Parks website for general prairie dog shooting information and a map showing colony locations. A majority of inquiries into grassland recreation opportunities on the Fall River Ranger District are related to prairie dog shooting. Similarly, approximately 50 percent of the inquiries on the Fort Pierre National Grassland are about prairie dog shooting opportunities. Fort Pierre and Fall River districts give shooters photocopied maps showing colony locations. Questions include where is the best town for shooting, where to stay while in the area, what are the shooting regulations, and how much does a license cost. Prairie dog shooting is closed in South Dakota from March 1 through June 14. There is a dramatic increase in visitors to the national grasslands during the first two weeks of the open season, June 15-30. Inquiries are

nationwide and year-round. The high interest in shooting prairie dogs on the Buffalo Gap and Fort Pierre National Grasslands can be attributed to the relatively large size and contiguous nature of the towns. Many colonies in South Dakota are very visible and more easily accessible than surrounding states (Charon Geigle, Raquel Stanton, Tom Geiser, personal communication 2007).

The Bessey Ranger District in Nebraska receives the fewest calls about prairie dog shooting opportunities on the Forest. There are very few, small colonies on the District. The Pine Ridge Ranger District in Nebraska receives more inquiries related to prairie dog shooting than the Bessey Ranger District but fewer than the South Dakota districts. Photocopies of maps showing colony locations are available to shooters on both districts (Mary Thomas, Mike Watts, personal communication 2007).

Very few inquiries related to viewing wildlife on prairie dog colonies are received by any District on the Forest.

Environmental Consequences

Direct and Indirect Effects Under All Alternatives

Direct Effects: The application of rodenticide to interior prairie dog colonies will not result in an immediate increase or decrease in total acreage of active prairie dog colonies. Therefore, there will be no direct effect to recreational opportunities related to wildlife viewing or recreational shooting of prairie dogs on the forest.

Indirect Effects: The application of rodenticide to interior prairie dog colonies under all alternatives will eventually result in the following generalized outcome: 1) consumption of rodenticide by an unspecified number of prairie dogs living in the treated colonies, 2) death of an unspecified number of poisoned prairie dogs, 3) reduction in total acres of active prairie dog colonies on the forest. The degree of change to total acres of active prairie dog colonies will vary by alternative (see following table).

Table 3-21. Relative degree of impact to recreation.

Activity	Positive	Relative degree of impact to recreation			Negative
	More	Acres of active prairie dog colonies			Less
Shooting	Alternative 2	Alternative 5	Alternative 1	Alternative 4	Alternative 3
Viewing	Alternative 2	Alternative 5	Alternative 1	Alternative 4	Alternative 3

Alternative 1

Alternative 1 will potentially result in the lowest fluctuation of total acres of active prairie dog colonies as a result of the application of rodenticide to interior prairie dog colonies. It will therefore have an insignificant effect on recreational opportunities related to wildlife viewing or recreational shooting of prairie dogs on the forest.

Alternative 2

Alternative 2 will potentially result in the largest increase in total acres of active prairie dog colonies as a result of the application of rodenticide to interior prairie dog colonies only in the case of a threat to human health and safety or infrastructure. It will therefore result in the highest increase of recreational opportunities related to wildlife viewing or recreational shooting of prairie dogs on the forest.

Alternative 3

Alternative 3 will potentially result in the largest decrease in total acres of active prairie dog colonies as a result of the application of rodenticide to interior prairie dog colonies. It will therefore result in the highest decrease of recreational opportunities related to wildlife viewing or recreational shooting of prairie dogs on the forest.

Alternative 4

Alternative 4 will potentially result in a slight decrease in total acres of active prairie dog colonies as a result of the application of rodenticide to interior prairie dog colonies. It will therefore result in a slight decrease of recreational opportunities related to wildlife viewing or recreational shooting of prairie dogs on the forest.

Alternative 5

Alternative 5 will potentially result in a slight increase in total acres of active prairie dog colonies as a result of the application of rodenticide to interior prairie dog colonies. It will therefore result in a slight increase of recreational opportunities related to wildlife viewing or recreational shooting of prairie dogs on the forest.

Cumulative Effects

All the past, present, and reasonably foreseeable actions/natural occurrences listed in the following table were considered in the cumulative effects analysis. The spatial boundary for the analysis is the state boundaries of South Dakota and Nebraska. For this analysis, it was assumed that recreational opportunities for viewing and shooting on prairie dog colonies are directly proportional to predicted increases and decreases in the total acreage of active prairie dog colonies. It was also assumed that people seeking opportunities related to wildlife viewing or recreational shooting of prairie dogs would choose to do so on the forest if opportunities on private, state, or tribal lands were no longer available.

Table 3-22. Past, present, and reasonably foreseeable activities/natural occurrences affecting the recreation resource.

Activity	Acres of Active Prairie Dog Colonies
Rodenticide Use	Decrease
Plague	Decrease
Drought	Increase
Habitat Manipulation	Increase or Decrease
Travel Management Rule	Will depend on pending unit decision

Rodenticide use and plague have the potential to result in a decrease of total acres of active prairie dog colonies. In general, prairie dog populations affected by plague can recover to near pre-plague population levels within a few years.

The continuing drought has resulted in expansion of prairie dog colonies. If drought continues or recurs, as would be expected based on historical drought patterns, it is reasonable to expect a cyclic increase of total acres of active prairie dog colonies, as well as increased efforts to control that expansion on state, tribal, and private lands. Based on an initial survey of prairie dog control efforts from 2003-2004, South Dakota Game, Fish, and Parks (SDGFP) expects that prairie dog acres in 2007 will again exceed the levels necessary for the most liberal control guidelines (Smith 2007). Based on

SDGFP's prairie dog control surveys, it was assumed that the present control efforts in South Dakota are maintaining or slightly reducing prairie dog acres.

Habitat manipulation, including livestock grazing, prescribed fire, the use of visual and physical barriers, and strategies to maximize the distance between colonies, has equal potential to result in the expansion or contraction of prairie dog colonies as livestock and prairie dogs compete for limited available forage.

Implementation of the 2005 travel management rule will designate a motorized travel system on the forest. Depending on the final system designated on each forest unit, access to prairie dog colonies for viewing or recreational shooting purposes may stay the same, increase, or decrease. All decisions on the implementation of the travel management rule for the entire forest are expected by the end of August 2009.

Alternative 1

When effects from Alternative 1 are added to the overall balance of prairie dog colony size decreases from rodenticide use, possible plague outbreaks, and habitat manipulation, and increases from drought and habitat manipulation, total acres of active prairie dog colonies would remain approximately the same, thus not affecting recreational opportunities related to wildlife viewing or recreational shooting of prairie dogs on the forest.

Alternative 2

When effects from Alternative 2 are added to the overall balance of prairie dog colony size decreases from rodenticide use, possible plague outbreaks, and habitat manipulation, and increases from drought and habitat manipulation, total acres of active prairie dog colonies would increase, thus increasing recreational opportunities related to wildlife viewing or recreational shooting of prairie dogs on the forest.

Alternative 3

When effects from Alternative 3 are added to the overall balance of prairie dog colony size decreases from rodenticide use, possible plague outbreaks, and habitat manipulation, and increases from drought and habitat manipulation, total acres of active prairie dog colonies would decrease, thus decreasing recreational opportunities related to wildlife viewing or recreational shooting of prairie dogs on the forest.

Alternative 4

When effects from Alternative 4 are added to the overall balance of prairie dog colony size decreases from rodenticide use, possible plague outbreaks, and habitat manipulation, and increases from drought and habitat manipulation, total acres of active prairie dog colonies would slightly decrease, thus slightly decreasing recreational opportunities related to wildlife viewing or recreational shooting of prairie dogs on the forest.

Alternative 5

When effects from Alternative 5 are added to the overall balance of prairie dog colony size decreases from rodenticide use, possible plague outbreaks, and habitat manipulation, and increases from drought and habitat manipulation, total acres of active prairie dog colonies would slightly increase, thus slightly increasing recreational opportunities related to wildlife viewing or recreational shooting of prairie dogs on the forest.

Summary

The following table summarizes the impacts of the alternatives on recreational prairie dog shooting and wildlife viewing opportunities.

Table 3-23. Recreational shooting and wildlife viewing opportunities by alternative.

Greatest increase in opportunities	←	Insignificant change in opportunities	→	Fewest opportunities
Alternative 2	Alternative 5	Alternative 1	Alternative 4	Alternative 3

Social and Economic Factors

Affected Environment

It is a policy in Region 2 of the Forest Service to conduct and consider financial and cost efficiency information for projects where an environmental analysis (EA) or EIS is prepared or where the total costs over the life of a project is expected to equal or exceed $50,000. This proposed action meets both of the above criteria. Except where noted, the data presented in this section came from several sources: U.S. Census Bureau - American FactFinder and QuickFacts; USDA National Agriculture Statistical Service - Census of Agriculture; U.S. Department of Commerce, Bureau of Economic Analysis - Regional Economic Information System; and USDA Economic Research Service - State Fact Sheets

The social and economic implications of grassland resource management are of interest to local residents surrounding the national grasslands, users of the grasslands, and people throughout the United States. The project area includes portions of the South Dakota Counties of Fall River, Custer, Pennington, Jackson, Jones, Lyman, and Stanley. The project area also includes portions of Sioux and Dawes Counties in Nebraska.

Some residents of these communities depend upon ranching-based activities and livestock use for their economic livelihoods and are most likely to experience the social and economic impacts of this analysis. The national grasslands play an important role in the economy and cultural and recreational values of these small, predominately rural counties. Many of the considerations associated with a project of this type, most specifically benefits, are difficult to quantify economically. This analysis will use both quantified information, where available, and qualitative information to project and characterize the potential effects of implementation.

Some residents in the area surrounding public lands may also consider the grassland resources an important part of their quality of life. Visitors, both local and non-local, use the area for a wide range of recreation activities including; driving for pleasure, hunting, rock hounding, dispersed camping, wildlife viewing, all-terrain vehicle use, and other dispersed forms of recreation including hiking, bird watching and snow-machining. These activities have varying effects on each county's economy.

The project area provides a viable and important national resource offering diverse wildlife habitat, recreation, solitude, cultural and historic ties, as well as providing for livestock grazing opportunities. These are discussed in other sections of the FEIS. National interest in the ecological and biological aspects of these national grasslands has increased and visitors may also be affected while recreating in the project area. Current and future grasslands management issues will be of interest to people both locally and nationally.

Social/Economic Indices and Setting

Lands administered by the Forest Service in the project area have a great deal of value to people who live in and adjacent to them. Commodity and amenity benefits derived from public lands can perpetuate or disrupt local economies and lifestyles. General discussions or scoping input from constituents, the interested public, local government, and the affected grassland commodity users have indicated that economic and social values are most effectively analyzed using the following indices:

- How does the agency action affect economic efficiency?
- What are the economic and social effects of the agency action?

Social Attitudes

The conservation and management of any species is facilitated by widespread public support and political determination. The passage of federal legislation such as the ESA and state legislation does suggest a fundamental desire to conserve species. However, social or public attitudes and political support may vary by location and species. The most important factors used by the public in valuing species for conservation are apparent ecological importance and rarity (Czech and Krausman 2001). However, not all species are equally valued in the eyes of the public. In a survey of Montana residents, Reading et al. (1999) demonstrated a wide variation in response based on individual preference for percentage of public lands that should be inhabited by prairie dogs. The survey indicated that while the percentage (29 percent) of respondents who wanted no prairie dogs on public lands and the percentage (22 percent) who favored occupations on more than 5 percent of public lands were fairly equal, the largest number of respondents (49 percent) were favorable to occupations that were 5 percent or less.

Lamb et al. (2006) also called for programs that reward landowners for adopting practices that maintain prairie dog colonies and promote positive values about prairie dogs. Because changing attitudes that have evolved over many generations will be a slow process, even well-designed programs may require years before significant changes in attitudes can occur.

Population Demographics

Between 2000 and 2006, South Dakota (SD) ranked 46th out of 50 states in total population while Nebraska (NE) ranked 38th out of the 50 states. Between 2000 and 2006, SD's population increased by 3.6 percent and NE's population increased by 4.7 percent compared to the national population growth of 6.4 percent. Population can be classified into three settings; urban, rural non-farm, and farm. The project area is primarily an urban and rural non-farm (64 percent and 32 percent respectively) population. Although four communities classified as urban in the 2000 Census are in close proximity, the project area involves primarily small communities of less than 4,000. The four counties with community populations large enough to be classified as being urban in the 2000 census are Dawes County, NE – 5,423, Fall River County, SD – 4,129, Pennington County, SD – 67,898 and, Stanley County, SD – 1,765. Outside these urban areas, counties are sparsely populated. Population densities (people/square mile) range from 0.6 to 6.5 in NE (22.3 statewide) and 1.2 to 31.9 in SD (9.9 statewide). These compare to a national density of 79.6.

Farm populations make up 8 percent of the population in SD and 5 percent in NE while rural non-farm populations comprise 40 percent and 25 percent respectively. This compares to the United States where 1 percent of populations are farm and 21 percent are rural non-farm. The population demographics for the counties in the project area are quite varied ranging from 44 percent farm and 56 percent rural non-farm in Sioux County, NE to 2 percent farm and 22 percent rural non-farm in Pennington County, SD.

Median age statistics are fairly consistent across the project area. While the statewide median age for South Dakota and Nebraska are essentially identical to that of the United States, the median age in the four counties of Custer, Jones, and Fall River in South Dakota and Sioux in Nebraska is higher. The median age in Jackson and Lyman Counties in South Dakota and Dawes County in Nebraska is lower than the U.S. median age.

Income and Earnings

Some residents of these communities depend upon ranching-based activities and livestock use for their economic livelihoods. The project area income and earnings can be characterized by: 1) total personal income (TPI); 2) components of personal income; and, 3) earnings by industry (EBI).

Total personal income for each county is a measure that characterizes overall economic standing. Total personal income ranges from a low of $32,366,000 in Jones County, SD to a high of $2,789,526,000 in Pennington County, SD. This reflects, to some degree, the variance of urbanization within the counties. The percentage of TPI attributed to earnings ranged from a low of 44.7 percent in Sioux County, NE to a high of 66.5 percent statewide in Nebraska. The following graphically display personal income by county in the project area.

Diverse economies are generally more resilient to external impacts than less diverse economies. A relatively diverse economy would not be dependent on just one or a few industries. Earnings by industry can also provide an indication of the scope of impact from the effects of this project when considered in the context of county-wide economics. The Bureau of Economic Analysis (BEA) summation of personal income by major source and earnings by industry provides a way to examine those impacts. The BEA estimates of earnings are for 2001-2004 based on the 2002 North American industry classification system (NAICS). Their estimated earnings are summarized in 20 major industry endeavors. The estimates did not include NAICS industries where less than $50,000 in county earnings was reported. There were three NAICS industries that all counties reported earnings in: farm, retail trade, and government/government enterprises. There were 5 more NAICS industries where reported earnings came from eight of the nine counties in the project area. The range of values for the project area is from Sioux County, NE at 40 percent (8 of the NAICS industries) to Pennington County, SD at 100 percent (all 20 NAICS industries with reported earnings).

Four counties, Dawes (-9 percent), Custer (-6 percent), Jackson (-25 percent), and Stanley (-2 percent) all reported losses in farm earnings. The remaining counties, Sioux (49 percent), Fall River (3 percent), Jones (28 percent), Lyman (12 percent) and Pennington (<1 percent) all reported positive farm earnings.

Environmental Consequences

Each alternative has been analyzed against the economic and social issues identified and documented in this section. Each alternative will have resultant social and economic effects at some scale whether that impact can be quantified or evaluated in a qualitative fashion. Qualitative analysis can include surrogate units of measures in characterizing effects.

The quantified effects most useful in this regard are estimates of forage loss to livestock by alternative, expressed as AUMs; beef herd production costs, and costs/acre for prairie dog control and administrative costs for monitoring. Additionally, each alternative has both social and economic effects on amenity values such as projected loss or gain in recreational use of prairie dog colonies and costs associated with maintaining black footed ferret population objectives.

Exact values are dependent upon several variables, but these assumptions allow analysis of effects on a consistent basis. For all alternatives, the assumptions used for analyzing effects are listed below.

- Social attitudes regarding this analysis are similar to those identified in survey work done on off-site locations.
- Changes in AUM availability have both a positive and negative effect on livestock permittees.
- National Agricultural Statistics Service listed the 2006 private land lease rates for a cow/calf pair in South Dakota at $24.00 and in Nebraska at $28.50. Additional costs of production are based on the cost of private land grazing minus the 2006 federal grazing fee. Individual operators may choose to buy additional feeds rather than to search for and utilize available private land pasture, but for this analysis, the assumption was used that private pasture would be utilized.
- In all cases, the change is based on deviation from the existing levels of AUMs available for domestic livestock grazing.
- Changes in prairie dog acreage have both a positive and negative effect on recreational use (consumptive and non-consumptive) of prairie dogs and obligate species.
- Augmentation of black-footed ferrets from off site locations (either wild areas or pen raised populations) is a potential cost associated with the alternative.
- Costs associated with prairie dog control include contract, bait, and Forest Service administration. The cost of $13.50/acre was estimated from the Nebraska National Forest 2006/2007 boundary management zone program. These costs may be incurred over the life of this analysis assuming that thresholds could drive treatment on all potential acres within that time span.
- In all cases, actual costs are dependent upon expansion of prairie dog towns and/or range condition objectives. The variability in those objectives makes predicting total costs over the long-term difficult.
- To facilitate analysis of effects, the potential high and low ranges of alternative objectives have been used.
- To facilitate analysis of effects, the potential high and low ranges of alternative objectives have been used.

Although a definitive assessment is not possible for this analysis, it is recognized that any reductions to federal grazing, whether in terms of AUM reductions or cost increases to permittees, can have consequences to individual ranch operations as well as implications to families, social structure, lifestyle, and local economies.

Social Effects

No known social group would be made vulnerable by the actions prescribed in the alternatives. Individual permittees and others in the ranching business within the project area are expected to continue their involvement in community, charitable, social, church, and school groups. Although individual operators could be impacted, social associations among operators would be expected to remain in place.

All of the alternatives will have a degree of social acceptance with respect to the range of acre objectives for prairie dog colonies. None of the alternatives identifies a total loss of prairie dog acres preferred by a segment of the public and only Alternative 2 without acre objectives would allow unabated growth preferred by another segment of the public. Although there would be segments of the public with social preference for the range of acre objectives in Alternatives 3, 4 and 5, Alternative 1 provides a range of acres that would be socially acceptable across a fairly broad segment of the public.

Economic Effects

All of the action alternatives (Alternatives 1, 3, 4, and 5) have effects on forage lost to livestock grazing and ultimately potential impact to economics. The range of those effects is dependent on Geographic and Management Area minimum and maximum acre objectives for prairie dog colonies. Alternatives 3 and 4 did not include minimum acre objectives and Alternative 4 focused only one area, Conata Basin MA 3.63. It is important to note that the effect of alternatives on both individual operator and subsequently county economics is dependent upon multiple factors including range condition, black-footed ferret numbers, acreage objectives and the volatility of market influences. Additionally, third party solutions could provide a way for willing individual ranchers remain viable operators.

Livestock grazing within the project area is a common component to all of the local and county economies. The variability and continual cycle of national and global markets has had large impacts on the livestock economy. Much of the volatility in agriculture stems from external sources such as changes in consumer desires/needs, fossil fuels, and fluctuating market conditions. Cyclic conditions are common, but long-term changes in demographics, drought, competition for land, and loss of livestock grazing on national grasslands within the project area may erode capacity of individual livestock operators to respond to future environmental and market challenges. Effects from all alternatives could factor into the cyclic conditions to influence future individual livestock permittee decisions.

In all cases, effects are influenced by individual ranch operation dependence upon several factors; federal grazing, the magnitude by which forage losses affects individual ranchers, the financial solvency of the ranch, the availability of alternative sources of forage, and the desire of the individual ranch operator to remain in ranching. The following is an analysis of potential economic effects by alternative:

- Alternative 1 – This alternative has low potential to cause loss in individual ranch viability and very low potential to adversely affect county economics.
- Alternative 2 – This alternative has a moderate to high potential to cause loss in individual ranch viability and, dependent upon the where loss of ranch viability occurs, has a low to moderate potential to impact County economics.
- Alternative 3 – This alternative has very low potential to cause loss in individual ranch viability and will not adversely affect county economics.
- Alternative 4 – This alternative has very low potential to cause loss in individual ranch viability in the Conata Basin and little to no potential to adversely affect county economics.
- Alternative 5 – This alternative would have the same potential as Alternative 2 for affecting individual ranch viability and a subsequent potential for adversely affecting county economics.

Financial and Economic Efficiency

The analysis in this section examines the monetary expression of quantifiable benefits and costs, while recognizing that other benefits and costs are best expressed in terms other than monetary.

Economic efficiency (benefit/cost) for ranching operations is dependent upon the variability in production costs and ranch earnings. Production costs along with prices received are highly volatile over time. This volatility is illustrated in the South Dakota Farm Business Management Program's 2006 Annual Report (covering the years of 2000 through 2006). Over this time period, the total cost/cow steadily increased between 2000 and 2006 with the low of $346.33 at the beginning (2000) and the high of $435.75 at the end (2006). Unlike production costs, prices received per hundred-weight was far more variable with a low of $87.93 in 2002 to a high of $122.83 in 2005. The data also

indicates that weaning weights and the percent of calves weaned was fairly consistent over the reporting period. In consideration with the above, combined with unknown personal business and financial information, examination of how benefits attributable to individual ranch operations would be impacted under any of the alternatives is difficult. It is quite possible that individual ranches could sustain forage losses on public land under some alternatives that they cannot economically choose to replace elsewhere.

Potential increases in operational costs are difficult to quantify for this analysis. The effects of increased operational costs on specific ranch operators would be identified and analyzed during the rangeland allotment management plan (RAMP) process which would incorporate the decision from this project. Additional operational costs could include implementation of improved grazing systems designed to minimize the direct loss of forage to prairie dog use which could serve to lessen the impact to livestock grazing. In those cases the RAMP NEPA process would display the specific benefits and costs of implementation for individual ranch operations.

Potential total forage loss by alternative and by geographic area represents a loss of livestock grazing capacity (expressed as animal unit months, AUMs). The cumulative monetary impacts to all ranch operations from each alternative can be estimated using the potential AUM loss by alternative. The largest impact is represented by the maximum acre objective by alternative. Although Alternative 2 may be a much larger impact in the long term, it is based on passive expansion facilitated by natural conditions such as drought and or domestic livestock use patterns. Alternative 5 shows the largest potential because it is based on actively managing for acreage objectives over the 10 year life of this analysis.

The following table provides an estimate of total costs from AUMs lost by alternative and geographic area. Where estimated effects of the alternative projected net increases in forage available to livestock grazing, the impact is listed as net gain from the existing AUM levels or N/A where alternatives did not identify specific objectives. The total additional AUM Cost for all GAs and MAs represents an offset of total loss due to increases in the appropriate GA/MA. As noted in the assumptions, potential cost is assumed to be replacement of federal forage with private forage reflected as the difference between private lease rates and federal grazing fees.

Table 3-24. Potential additional AUM cost (thousands of $s) from maximum acreage objectives.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Oglala	$14.2	$76.9	No Loss	N/A	$143.6
Fall River Northeast GA	$10.4	$57.6	$10.4	N/A	$105.4
Fall River West GA	$21.6	$11.1	$21.6	N/A	$151.7
Fall River Southeast GA	Net Gain ($22.3)	$0.3	Net Gain ($22.3)	N/A	$14.0
MA 3.63 Smithwick	$28.4	$26.5	$28.4	N/A	$104.2
Wall North GA	$8.7	$19.7	$8.7	N/A	$70.2
Wall Southeast GA	$5.5	$88.4	$5.5	N/A	$88.2
Wall Southwest GA	Net Gain ($1.4)	$13.1	Net Gain ($1.4)	N/A	$35.6
MA 3.63 Conata Basin	Net Gain ($36.2)	$117.7	Net Gain ($36.2)	Net Gain ($75.5)	$117.7
Fort Pierre GA	$12.0	$92.7	$12.0	N/A	$136.2
Total Additional AUM Cost All GAs and MAs	$63.3	$504	$49.1	$0	$966.7

The above data indicate that several factors are important in determining economic efficiency and not just the potential increase in cost due to loss of forage on national grassland for livestock consumption. The estimated additional AUM cost from the above table represents the cumulative totals by alternative. As with potential increased operational costs, the quantification of impact to specific ranchers would be disclosed within the RAMP process.

Other sources of economic benefit and cost affected by this project are represented by amenity values such as potential for wildlife viewing and the potential for recreational pursuits such as prairie dog shooting. These activities are not easily quantified but it's highly likely the demand will increase as the public becomes more aware of their existence. The economic benefit from these activities comes primarily from the monies spent in support such as food, lodging, gas, and other local goods and services. The demand for recreational shooting has increased in the recent past as more and more of the public has become aware of its existence.

Black-footed ferret kits have value when considering the costs to produce them in captivity at the Black-footed Ferret Conservation Center. The Center has an annual operating cost, including 30-year amortized facility cost, of $760,000. Captive-breeding has been successful (Howard et al. 2006), and the facility produces ferret kits at a current cost of $5,714 per kit. The survival rate of translocated wild-born kits is more than double the survival rate of captive-born kits. A wild-born kit could then be estimated to have a value of $11,428. The use of wild-born kits by agencies and organizations responsible for black-footed ferret recovery could result in substantial savings versus using captive-born kits for black-footed ferret recovery endeavors.

Implementation and monitoring of management actions that deal with objectives and thresholds all have direct costs over the projected 10-year life of this analysis. Specifically, those costs are by alternative and associated with the following: monitoring prairie dog density, prairie dog colony acreage, and similarity index; initial control of prairie dogs for acreage threshold and maintenance in subsequent years; control of prairie dogs in the BMZ; and, ferret survey, relocation, and supplementation. It is expected that these costs will be greatest in the MA 3.63 areas, specifically the Conata Basin area. The following charts illustrate estimates of the total cost by alternative and the total costs associated specifically with the Conata Basin area. The first chart showing total cost by alternative does not include Alternative 4. This alternative sets objectives only for the Conata Basin area MA 3.63. Those costs are represented in the second table which is specific to the Conata Basin area.

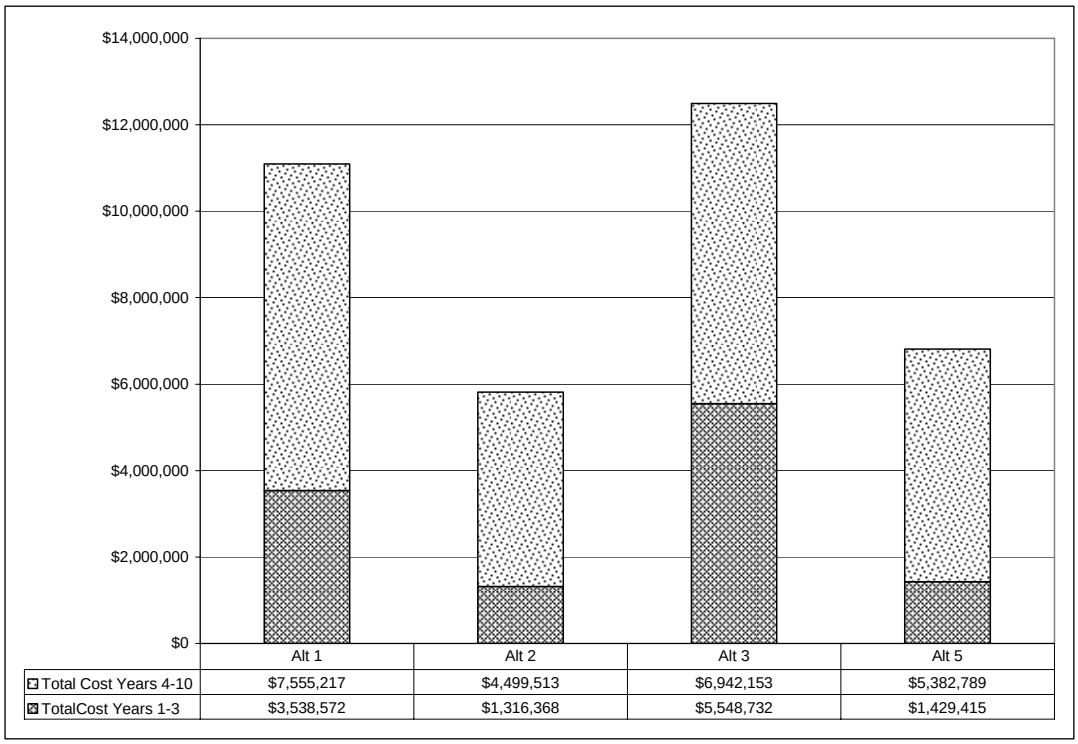
As with economic effects, economic efficiency is influenced by individual ranch operation dependence upon several factors; federal grazing, the magnitude by which forage losses affects individual ranchers, the financial solvency of the ranch, the availability of alternative sources of forage, and the desire of the individual ranch operator to remain in ranching. All alternatives (except Alternative 4) are projected to have less monies going to the Treasury due to lost grazing fees. The following provides a sense of economic efficiency by alternative:

- Alternative 1 – This alternative could affect the economic efficiency of a few individuals but the potential for causing negative change in net value is very low. This alternative would provide a moderate level of opportunity for amenity values and a subsequent positive affect on economic efficiency for local community businesses. This alternative has the second highest estimated cost for prairie dog management outside of MA 3.63 Conata Basin and the highest cost for these activities in Conata Basin. This alternative may require supplementation of the black-footed ferret population and the additional costs related to that effort. It is expected that the need would be less than Alternatives 3 and 4 which also may have ferret supplementation costs.
- Alternative 2 – This alternative could affect the economic efficiency of a larger group of individuals and has the potential to cause negative change in net value to individual ranch operations. This alternative would provide a high level of opportunity for amenity values and a

subsequent higher positive affect on economic efficiency for local community businesses. This alternative has the lowest estimated prairie dog management costs of all alternatives. It is not expected that this alternative would have ferret supplementation costs although passive management may lead to acreage losses that could require supplementation.

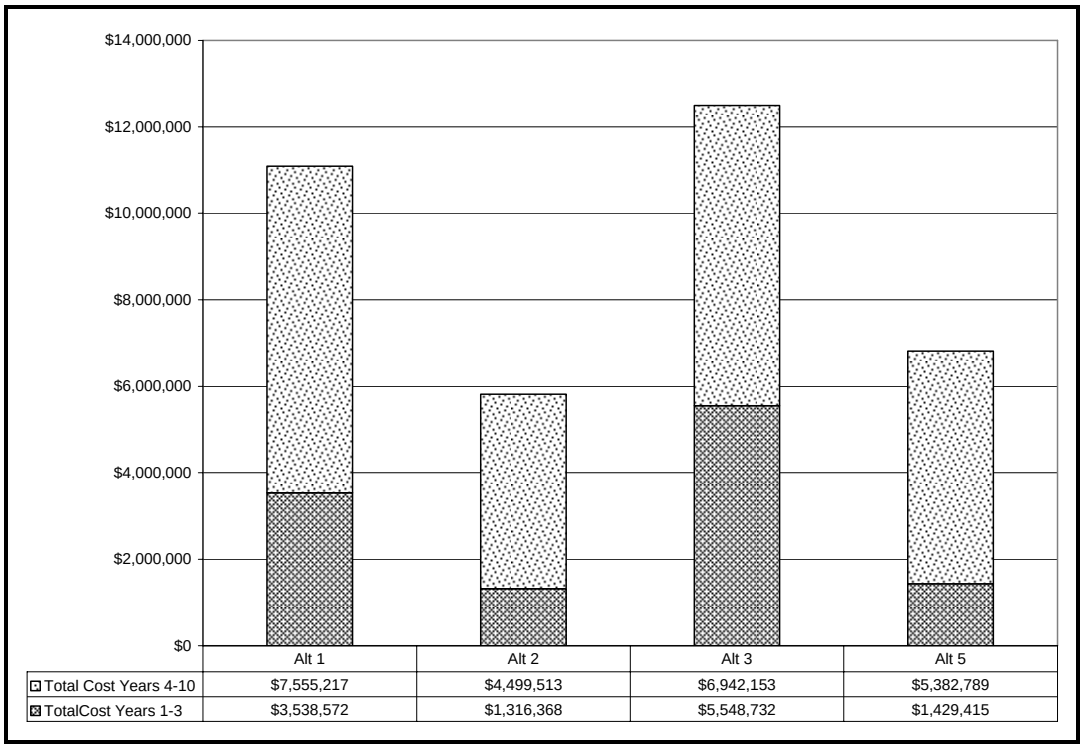
- Alternative 3 – This alternative would have effects very similar to those under Alternative 1 except that the potential to cause negative change in net values for individual ranch operators would be lower. This alternative has the highest cost for estimated prairie dog management outside of Conata Basin MA 3.63 and the second highest cost for these activities in Conata Basin. It is expected that this alternative would have the highest potential for supplementation of the black-footed ferret population and the additional associated costs.
- Alternative 4 – This alternative is difficult to compare because it sets objectives only for the Conata Basin MA3.63 area only. In that regard, it only affects a very small percentage of the ranch operations in the project area. This alternative projects no costs for areas outside of Conata Basin MA 3.63 and has the third highest estimated prairie dog management cost in Conata Basin. As with Alternative 1 and 3, it is expected that this alternative would have potential for supplementation of the black-footed ferret population and additional associated costs. It is expected that the potential of this alternative is higher that Alternative 1, but less than Alternative 4.
- Alternative 5 – This alternative could affect the economic efficiency of a large group of individuals and has the potential to cause negative change in net value for individual ranch operations. This alternative would provide a high level of opportunity for amenity values and a subsequent higher positive affect on economic efficiency for local community businesses. This alternative has the third highest estimated prairie dog management costs for areas outside of Conata Basin MA 3.63 and the fourth highest cost for these activities in Conata Basin. This alternative has little to no potential for additional costs from supplementation of the black-footed ferret population.

Figure 3-1. Total cost of prairie dog management by alternative.



	Alt 1	Alt 2	Alt 3	Alt 5
Total Cost Years 4-10	$7,555,217	$4,499,513	$6,942,153	$5,382,789
TotalCost Years 1-3	$3,538,572	$1,316,368	$5,548,732	$1,429,415

Figure 3-2. Total cost of prairie dog management by alternative (Conata Basin only).



	Alt 1	Alt 2	Alt 3	Alt 5
Total Cost Years 4-10	$7,555,217	$4,499,513	$6,942,153	$5,382,789
TotalCost Years 1-3	$3,538,572	$1,316,368	$5,548,732	$1,429,415

Effects Summary

Social attitudes of prairie dogs on public lands are highly variable and suggestions for increasing social tolerance include rewarding landowners for adopting practices that maintain prairie dog colonies and promote positive values about prairie dogs.

The project area is more racially homogenous than the rest of the United States with the exception of Jackson and Lyman Counties, which have a higher percentage of native people. With the exception of a few urban areas primarily in Pennington County, the project area is a sparsely populated region. As a region, it has a somewhat diversified economy with the government economic sectors contributing the largest portion of personal earnings.

Farm industry earnings as a percentage of total county earnings were highly variable between the counties representing the project area. Four counties reported negative earnings from the farm industry while three of the remaining five listed it as one of the top three industries ranging from 12 percent to 49 percent of the total industry earnings. Government and government enterprises was the top industry in all but two of the counties where it was the second highest ranging from 17 percent -67 percent of the total earnings.

Livestock grazing within the project area is a common component to all of the local and county economies. The variability and continual cycle of national and global markets has had large impacts on the livestock economy. Much of the volatility in agriculture stems from external sources such as changes in consumer desires/needs, fossil fuels, and fluctuating market conditions. Data in a 2006 annual report (South Dakota Department Farm Business Management Program) does suggest that the profitability factor that may have influenced net earnings/cow from 2000-2006 most was the revenue received from calf sales.

Cyclic conditions are common, but long-term changes in demographics, drought, competition for land, and loss of livestock grazing on national grasslands within the project area may erode capacity of individual livestock operators to respond to future environmental and market challenges. Effects from all alternatives could factor into the cyclic conditions to influence future individual livestock permittee decisions.

Environmental Justice

The following analysis only addresses indicators to determine the presence or absence of minority and/or low-income communities in the study area. The goal of environmental justice analysis is not to shift risks among populations but to identify potential disproportionately high and adverse effects and to identify alternatives that may mitigate these impacts. Concern for environmental justice stems from Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," signed February 11, 1994 by President Clinton. The order (Section 1-101) states:

> "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States."

The primary ethnic background in the analysis area is the white population. Their percentage in Lyman County, SD is very close to the national percentage (69 percent vs. 64 percent). The white population percentage in Jackson and Lyman Counties, SD is lower than the national percentage (50 percent and 64 percent vs. 69 percent). The white population in all other counties is higher than the national percentage (85 percent - 96 percent vs. 69 percent). Native American populations in Jackson and Lyman, SD Counties are higher than the national percentage (47 percent and 33 percent vs. 15 percent) while the percentages in all other counties in the project area are lower. In all areas, the Hispanic and other ethnic populations are lower than the national percentages. Other ethnicity populations are primarily African American but include Asian, Native Hawaiian, and other races.

With the exception of American Indians in Jackson and Lyman Counties, SD, recognized ethnic groups are under-represented in the states and the counties. Although the possibility could exist in the future, currently no persons with recognized ethnic backgrounds hold livestock permits. Any agency action undertaken within the context of this analysis would have little to no potential to impact these groups

Short-term Use Versus Long-term Productivity

As prairie dog colonies increase in size, herbage production will decrease over time. As a result, selection of any of the action alternatives could provide the need for annual adjustments in permitted livestock grazing on the national grasslands. This would be especially true during periods of drought to help regulate prairie dog populations and to limit dispersal through vegetation management. Also, public use of affected areas may be disrupted during rodenticide applications. All areas where rodenticides are applied would be posted with restricted use pesticide advisory signs, and although public access is not prohibited, the signing may discourage some recreation use during a 1 to 2 week period when the areas are posted.

Irreversible and Irretrievable Commitments of Resources

There are no irreversible and irretrievable commitments of resources as a result of implementation of the alternatives. All alternatives propose rodenticide use which would have effects on several species. These effects were discussed previously in the species at risk and management indicator species sections of this chapter. Special consideration is given in all alternatives to meeting and exceeding minimum black-footed ferret habitat thresholds on the Buffalo Gap National Grassland in Conata Basin MA 3.63. This would help ensure a high level of probability for long-term persistence of the nonessential experimental ferret population.

Other Required Disclosures

National Environmental Policy Act regulations (40 CFR 1502.25a) direct "to the fullest extent possible, agencies shall prepare environmental impact statements concurrently with and integrated with …other environmental review laws and executive orders." The Forest Service has consulted with the following agencies to ensure compliance with other laws:

- Nebraska and South Dakota state historical officers, in accordance with the National Historic Preservation Act (E.O. 11593) for ground disturbing actions in historical places;
- U.S. Fish and Wildlife Service in accordance with ESA implementing regulations for projects with threatened or endangered species;
- Environmental Protection Agency in accordance with the National Environmental Policy Act , 42 U.S.C. 4231, Council on Environmental Quality (CEQ) regulations 40 C.F.R. Parts 1500-1508, and Section 309 of the Clean Air Act (CAA).

The following executive orders and plans have been reviewed for compliance:

- **Executive Order 12898, Environmental Justice,** directs each federal agency to make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.

  There is no evidence that the effects attributable to prairie dog management on federal lands, or the actions outlined in these alternatives, are disproportionately high or adverse on minority populations and low-income populations when compared with the effects upon non-minority or non-low-income populations.
- **Executive Order 11990, Protection of Wetlands,** directs agencies to avoid to the extent possible the long and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. Known major wetland areas (as defined in Sec 6., (c)), have been protected or managed specifically for the protection of wetland resources in past management strategies. There is no evidence that the effects attributable to prairie dog management on national grasslands or the actions outlined in any alternative, would impact wetlands.
- **Executive Order 11988, Floodplain Management,** directs agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. This proposed action or the activities prescribed in any alternative do not modify or develop floodplains.

- **South Dakota Black-Tailed Prairie Dog Conservation and Management Plan:** The Forest Service has reviewed the state plan in response to the direction stated in the *Final Environmental Impact Statement and Land and Resource Management Plan Record of Decision* (USDA Forest Service 2002).

  The South Dakota state plan is organized by objectives and strategies. These items were reviewed by and responded to by the Forest Service and can be found in Supplement 6 to the Record of Decision (ROD). The Forest Service's response gives concurrence or non-concurrence and rational and/or discussion (where needed) to each of these items either directly or through this FEIS and/or associated ROD.