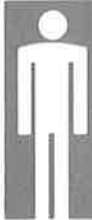


Nat Mgmt Spec

natural resources management plan
and environmental assessment
july 1984

THEODORE ROOSEVELT



NATIONAL PARK / NORTH DAKOTA

NATURAL RESOURCES MANAGEMENT PLAN

AND

ENVIRONMENTAL ASSESSMENT

Theodore Roosevelt National Park
North Dakota

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I. INTRODUCTION

In 1883 Theodore Roosevelt came to the Little Missouri Badlands to hunt buffalo, at a time when, unbeknown to most, the buffalo was rapidly being exterminated. At the conclusion of his hunting trip, Roosevelt invested in a cattle ranch. During the next 15 years Roosevelt owned interests in two Badlands ranches and witnessed the decline of the open range cattle industry, which had been brought about by overstocking and overgrazing. The lessons Roosevelt learned here about the abuses of the environment carried over into his actions both as 26th President of the United States and as an ardent conservationist.

In Roosevelt's time little of the Badlands was held in private ownership; instead, the ranchers used unsurveyed government and railroad lands. During the late 1890's and very early 1900's, much of western North Dakota was surveyed. Following this, the area was heavily homesteaded. Although the homesteading era experienced initial prosperity, in the 1920's drought and crop failures, together with the collapse of farm prices after World War I, foreshadowed the drought and depression of the 1930's. The Badlands had been too thickly settled for every farmer to make a go of it; the land use pattern had to be changed.

In 1934, a submarginal relief program was initiated to purchase lands from farmers wanting to sell out; in the Badlands these submarginal lands were put into government grazing pastures and made available for park development in the form of Roosevelt Regional Park, which was later to be designated a Recreational Demonstration Area, administered by the National Park Service. However, on April 25, 1947, Public Law 38 was signed, establishing Theodore Roosevelt National Memorial Park, "...as a public park for the benefit and enjoyment of the people...". Park lands included those previously administered as a wildlife refuge and prior to that the RDA. This enactment was the product of an effort begun as early as 1917-1919 with the intention of establishing a national park in or near the Little Missouri Badlands. The culmination of this effort, however, was the passage in November 1978 of Public Law 95-625, which changed the park name to Theodore Roosevelt National Park.

In reporting on the bill to establish Theodore Roosevelt National Memorial Park in 1947, the Committee on Public Lands recognized the threefold value of the North Dakota Badlands, that is, the natural features of scenic and scientific interests, the historical value, and the recreational potential. It was deemed fitting to dedicate the park to Theodore Roosevelt.

The park is also subject to the provision of the Act of August 25, 1916 (39 Stat. 535), entitled an Act to Establish the National Park Service "...which purpose is to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of future generations."

A Master Plan of September 1970 outlines the general management and development strategies of the park. This plan is scheduled for updating by 1985. A Statement for Management dated July 6, 1978 provides an overview of the park's general management program.

The purpose of this Natural Resources Management Plan is to provide in documented form a flexible, amendable action/working plan for the identification, restoration, protection, nurturance and use of the park's natural resources. The Plan identifies resources and their components and indicates measures to be taken and methods to be used in their management. It also identifies alternatives considered in developing courses of actions. The Plan places the resources in perspective to the park's legislated purpose and considers the NPS's missions and goals in protecting the area and serving the visiting public.

The basic goal of resource management in Theodore Roosevelt National Park shall be to restore and/or maintain, to the extent feasible, the physical and biological resources and processes which interact to form the park's ecosystems.

The term "natural" as used in this plan refers to the preservation, maintenance, and where necessary the reintroduction, of native flora and fauna, the landscape that supports them, and the abiotic and biotic processes that support and influence their existence. This definition is constrained by social, political, and economic values, but also by the realization that man constitutes a part of the natural environment by his mere presence regardless of what, if any, measures he takes to control or affect that environment.

The Park consists of three units. The North Unit (24,070.32 acres); South Unit (46,346.07 acres); and Elkhorn Unit; (218 acres). The total acreage of these units is 70,634.39 acres.

There are 9 historic features totaling 245 acres, or about 0.34 percent of the total park area designated as Historic Zones within the three park units. This includes the Elkhorn Ranch, the Maltese Cross Cabin, Long X Cattle Trail, Peaceful Valley Ranch and five CCC vintage structures. A separate Resources Management Plan is scheduled for cultural resources.

About 600 acres of the park are classified within a development zone. The remaining acres are classified as natural environment zones.

To preserve some of the wilderness values that Roosevelt himself cherished, approximately 29,920 acres of the park's total acreage was set aside as Theodore Roosevelt Wilderness, P.L. 95-625 (November 10, 1978). Of this, 19,410 acres of wilderness were established in the North Unit and 10,510 in the South Unit.

The park is an outstanding representation of the Missouri Plateau and the North Dakota Badlands sections of the Great Plains physiographic province. The Badlands begin near the

headwaters of the Little Missouri River in northeastern Wyoming and extend for 140 miles along its course, becoming more pronounced in the immediate area around the three units of the park and terminating where the river enters the Garrison Reservoir. The Badlands consist of a maze of canyons and coulees eroded by the river and its tributaries. This erosion has produced an infinite variety of land formations interspersed by flat-topped, grass-covered buttes and ridges which are vestiges of the upland prairie. Moderately rolling prairies typical of the Great Plains extend eastward from the rim of the Badlands. Draws contain a mosaic of shrubs and small trees. Riparian woodlands consisting primarily of cottonwood occur along the Little Missouri River which traverses all three units of the park.

The park has a continental climate characterized by cold winters and hot summers with high variations from day to day. Annual precipitation is about 14 inches, most of which falls during the spring and summer, usually with thunderstorms. The average precipitation for the month of June - the wettest month - is 3.51 inches.

The average annual snowfall is 31.4 inches, with snow cover as early as October and as late as May.

The average maximum daytime temperature during July and August - the months of heaviest visitation - is 86.5oF. The average minimum nighttime temperature for the same months is 52.3oF. However, extremes of over 100oF may be expected in July, August and September. Sub-zero temperatures occur as early as October and as late as April. A winter minimum of -49oF was recorded January 26, 1950.

Lands adjacent to the park are about equally divided between private and public ownership. The U.S. Forest Service administers most of the public lands as the Little Missouri National Grasslands. Historically the land use here has been livestock grazing in the Badlands and grain farming on the upland plains. However, oil production has recently become the dominant industry with a number of wells being established immediately adjacent to the park.

Visitor use is high in June, July and August with lowest levels in the winter. Peak annual visitation occurred in 1972 when 1,001,957 visitors were recorded, of which sixty percent were from out-of-state.

The natural resource project statements included in this plan identify significant resource problems and threats to these resources. Proposals to solve these problems are outlined in each statement. The project statements are listed in descending order of priority in the third portion of this plan.

Legislated and Administrative Constraints, Mandates and Agreements

There is one inholding within the South Unit involving 172.89 acres of both surface and mineral rights, and one parcel of 160 acres where the National Park Service owns one-half interest in minerals. There are three inholdings within the North Unit comprising a total of 564.21 acres and involving both surface and mineral rights.

Reconstruction of the Elkhorn Ranch Site is authorized provided "cost of such land and buildings shall not exceed \$40,000.00", Section 4 (April 25, 1947).

The Amendatory Public Law 621 (Section 2) dated June 12, 1948, reserved to stockmen of the surrounding area of the North and South Units, a perpetual right-of-way through the park for the trailing of livestock to and from the railroad, along and adjacent to the Little Missouri River. This route is the same trail that has been used by the stockmen for this purpose since the beginning of the livestock industry in this area.

A concession permit between the National Park Service and Peaceful Valley Trail Rides, Inc. for saddle horse, buckboard rides, and vending machines costs for a period from January 1, 1983 to December 31, 1987 (#CP1540-83-0002).

The Little Missouri River is a navigable stream; its water and its submerged land to the normal high-water mark are under the jurisdiction of the State of North Dakota. This river is considered State property. The river is also designated a State Scenic River which has no effect upon management of the park.

A Memorandum of Understanding between the National Park Service and the State of North Dakota under a Clearinghouse Program dated February 1975.

An agreement between the National Park Service and the North Dakota State Highway Department for the development and maintenance of the Painted Canyon Overlook dated October 2, 1964.

A Cooperative Agreement for Structural Fire Protection between the National Park Service, the State Historical Society of North Dakota, and the City of Medora dated July 1973 lapsed, and was reinstituted and updated in 1983.

A Cooperative Agreement between the National Park Service, U.S. Forest Service, and the North Dakota Game and Fish Department for proper wildlife management and continuing wildlife studies and exchange of information.

A Cooperative Fire Control Protection Agreement between the Little Missouri River Grasslands, U.S. Forest Service and Theodore Roosevelt National Park, National Park Service concerning suppression of fires occurring in or threatening National Park Service and U.S. Forest Service lands, dated July

1973.

State law requires land owners to control all noxious weeds.

The Park Service is required to maintain and clear the East River road in the South Unit to the north boundary of the South Unit for use by ranchers living adjacent to the park.

A Special Use Permit granted to Midstate Telephone Company from November 1973 to June 2003 for underground telephone line through the South Unit.

A Special Use Permit to the McKenzie Electric Cooperative for service to North Unit.

A Special Use Permit to West Plains Electric Cooperative for service to South Unit.

Protective Oil and Gas Lease issued by Department of the Interior, Bureau of Land Management/National Park Service and Amerada Hess Corporation to slant drill under Theodore Roosevelt National Park to nine parcels with five wells, dated 1975.

An agreement for the use of park property, between the National Park Service and the State Department of Health for an air monitoring station and all related equipment dated August 20, 1975.

The road from Squaw Creek to the west boundary of the North Unit is closed during snow periods in the winter months. The South Unit scenic loop road is closed to vehicular traffic most of the winter.

The North, South, and Elkhorn Ranch Units of the park have been identified as National Park Service areas to be protected under the Class 1, Prevention of Significant Deterioration (PSD) Standards established by the 1977 Clean Air Act Amendment,.

The Amendatory Public Law 87-193 (Section 3-4) dated August 31, 1961, authorized the Secretary of the Interior to provide and modernize the water and sewage facilities of the City of Medora adjoining the park on a reimbursable basis. Construction not to exceed \$100,000.00.

A Contract for Emergency Water Service dated June 21, 1967, between the National Park Service and the City of Medora.

A Sewer Service Agreement dated November 1975, between the National Park Service and the City of Medora.

A Special Use Permit issued to allow the use of a farm road as a secondary road allowing area ranchers and Billings County crews through the Elkhorn Ranch site.

In 1980 the State of North Dakota ceded and the National Park Service accepted concurrent jurisdiction over all National Park

Service land in North Dakota. The park consequently has the authority to enforce state law under the Assimilated Crimes Act.

Thirty-eight of the park's 65 miles of exterior boundary adjoins public land.

II. NATURAL RESOURCES MANAGEMENT PROGRAM

A. Overview and Needs

Executive Summary:

The goal of natural resource management in the park is to manage on a total ecosystem strategy. That is, to manage all resources together, considering the natural processes that are at work and the interactions of biotic and abiotic systems.

The number one natural resource management problem relates to air quality. It is the most important, yet the most difficult to manage. The park has been classified as a Class I Air Quality Area. Oil and gas development has been extensive over the last seven years, as approximately 1500 producing oil and gas wells have been drilled within the two counties encompassing the park. This development causes periodic visual disruption and increasing incidences of H_2S and SO_2 acceptable level violations. There is a risk that this problem, if continued, would degrade the biotic communities of the park and the quality of the visitor's experience. There is a need, therefore, to monitor air quality and mitigate the impacts of threats to the park's air quality.

There exists a need to develop a Water Resources Plan for the park. Some park facilities lie within the Little Missouri River floodplain. Wildlife watering devices need to be maintained to permit adequate distribution of grazing pressure. Oil, gas, and chemical spills from energy development facilities and transportation routes cross the river, and pose a threat to park water resources.

All wildland fires are totally suppressed within the park. This has resulted in increases of woody species and dense, rank herbaceous cover, thereby increasing the risk of catastrophic fire. The application of fire suppression has interfered with nutrient cycling and other ecological processes. The natural fire regime needs to be reestablished in the park. A Wildland Fire Management Plan, considering prescribed burning and natural fires is needed.

Rainfall and dry material deposition within the park has been found to be acidic. An acid deposition monitoring program was initiated in 1981, and needs to continue in order to measure and evaluate any changes in acidity or amounts of acid deposition. A program to assess the impacts of acid rain on the park's vegetative resources is needed.

Control of exotic plants, especially leafy spurge, is a priority need. Exotic plants tend to form homogenous stands, excluding other plants, thereby decreasing vegetation diversity and eliminating native plants. Present efforts of control have not prevented increases in exotic plant species, especially the quantity and dispersion of leafy spurge. A more intense control program is needed, applying state-of-the-art treatments and

control techniques.

Management of minerals and geological resources focuses on mineral development surrounding the park and natural erosion threatening developed park areas. Continued monitoring of energy development and repair to park developments affected by erosion need to be continued.

As discussed previously, the vegetation of the park has become rank, and in areas, infested by exotic plants. Vegetation and soil management needs to be oriented toward providing natural habitats for native plants and animals as an integral component of the ecosystem.

External aesthetic threats again are associated with energy development. The presence of oil wells near the park degrades the scenic values of the park and are disrupting the quiet of a backcountry experience. Smoke and gases from burning reserve pits, and flaring of wells degrades the scenic values of the park and is repulsive to olfactory senses. Efforts to minimize these impacts through negotiations with adjacent land managers and with regulatory authorities need to be vigorously pursued.

Bison management is the most active of the wildlife management programs. These animals require careful management to insure proper range use, visitor safety and to minimize escape to surrounding lands. Annual counts, periodic roundups, and brucellosis testing need to be continued. Relocation of the corral in the South Unit is needed to facilitate easier capture and handling. Current studies of bison carrying capacity and range use, and future studies of the bison's role in the park ecosystem are needed to direct management actions.

The park's wild horses are considered a historical demonstration, but they require population management to minimize affects on natural resources. From periodic roundup, and subsequent sale at auction, proceeds are returned to the park to offset costs of their management. A determination is needed regarding the best method to manage the horse population. Since horses are an exotic species, research is needed to assess the role of these animals in the ecosystem and impacts, if any.

Audubon Bighorn Sheep, once common in the badlands, are now extinct. They were replaced in the park by California Bighorn Sheep in 1956. This population has never really established itself, and has declined to a total population of six animals, from an observed population of 32 animals previously. A need, therefore, exists to formulate a restoration plan based on subsequent increases or decreases of the existing population.

Deer and pronghorn management in the park consists of monitoring the population in sampling areas of the park by aerial survey. These census data are then expanded to represent populations throughout the park. As boundary fencing with woven wire continues, passes to allow ingress and egress of these animals will be an important accomplishment.

Historically, elk were common in the North Dakota badlands, but were extirpated in the late 1800's because of unrestricted harvesting and competition with domestic livestock. Because of the historic role of elk as a major wild herbivore in the badlands ecosystem, a need exists to develop a feasibility plan for their reintroduction to the park.

A herd of approximately 20 longhorn steers is maintained as a historical display in the North Unit of the park. Even with careful management to disperse grazing pressure, there may be significant environmental impacts attributable to this exotic species. These impacts need to be evaluated.

Both porcupine and beaver populations are informally monitored to determine their impact on groves of cottonwood, willows and green ash that are associated with the rivers, streams, and wooded draws in areas of high visitor use. Because of girdling of stems, branches, and felling of trees by these animals, hazardous and undesirable aesthetic conditions may be created in high visitor use areas. Periodic removal of animals from these areas to assure public safety and guarantee aesthetic quality will be necessary.

Additionally, the population regulating mechanisms of porcupine and beaver in the park are not understood. A lack of native predators may be resulting in abnormally high population levels of these two rodents, and investigation may be warranted.

The park comprises potential range for a number of endangered and threatened species. Additional efforts are needed to survey for the presence of these species. If discovered, habitats for these species must be protected, and population supplementation considered. Reintroduction into suitable habitat needs to be considered also.

Boundary control, in the form of seven foot high woven wire fencing is needed to keep bison within the park, and at the same time, to exclude cattle. This has been an important need, as only a portion of the park is fenced with woven wire, and the remainder of the fence is subject to bison breakage and escape. These escapes result in costs to herd the bison back into the park, and pay for damaged fencing and crops of adjacent landowners.

Backcountry rangers in each unit patrol the backcountry to provide visitor and resource protection, as well as trail maintenance. In some areas, and at certain times of year, backcountry use may cause significant disturbances of wildlife mating or breeding activity. A Backcountry Plan is needed to assess impacts to wildlife activities by backcountry users, and to establish a method to estimate day use.

Presently, no funding is allocated toward management of the exotic ring-necked pheasant and wild turkey. A program is necessary to survey for population size and fluctuation, and to

measure the degree of competition with native gallinaceous species.

Although sharptail grouse seem to be plentiful within the park, no baseline data concerning approximate numbers, habitat preference, or effects of grazing herbivores upon mating grounds is available. Surveys and research are needed to gather these data.

Currently, no specific management is directed toward the species of mammalian carnivores inhabiting the park. Continued maintenance of as nearly a natural habitat as possible through management actions for other plants and animals, is used to maintain carnivore habitat. Collection and review of applicable literature is needed to assess impacts of other management actions and to discover methods for carnivore population estimation, followed by actions to rectify any deficiencies in carnivore management.

Small mammals, amphibians, and reptiles receive little management attention. Because of the difficulty in censusing some of these populations, no counts have been made. It is apparent that some of these species could be eliminated if areas of critical habitat, which are generally small in size, are destroyed or disturbed. There is, therefore, a need to identify critical habitats and to protect these habitats, and obtain baseline data for these species.

The badlands and adjacent grasslands provide a widely varying habitat for bird life. Some formal monitoring of the presence and size of bird populations is carried on. A need exists to manage for these species by habitat protection through assessment of disturbances to these habitats by human activity.

Throughout this overview, the need for baseline inventories of the park's natural resources has surfaced. Many of the resources require initial or updated surveys and field verification. These inventories then can be used as indices from which resources can be monitored in the future, and comparison of the results of management practices made. This is a priority need if we are to manage the park's natural resources under a total ecosystem concept.

B. Proposed Accomplishments

1. Air Quality Management: Degradation of the air quality over the park is the most significant threat to park resources. Particulate matter from smoke and dust associated with energy development near the park, and distant point sources, at times reduces visibility within the park, spoiling scenic vistas. Teleradiometers are instruments used to measure particulate matter in the air, by measuring reflectance of light by the particulates. Presently, a teleradiometer is operated in the South Unit, and though the North Unit has a teleradiometer, it is not operated because no funds are available.

A determination is needed from the NPS Air and Water Quality Division explaining whether or not data recorded from the South Unit teleradiometer is applicable to visibility conditions at the North Unit on a daily basis. If the data recorded in the South Unit is not applicable to a wide area, including the North Unit, efforts will continue to obtain funding to operate the teleradiometer at the North Unit.

FIVE YEAR FUNDING PLAN

FY 84 - Set up monitoring program and calibration for North Unit teleradiometer and begin its operation.

Funding/Staff Required (beyond normal funding levels):

1. Program Set - Up and Instrument Calibration	\$ 2,000
2. Evaluation and Analysis of Data Collected	\$ 1,500
3. Support Costs	
Administrative	\$ 500
4. Personnel Services (contract to operate)	\$ 7,000
TOTAL	<u>\$11,000</u>

FY 85-88 - Funding Required (beyond normal funding levels)

1. Evaluation and Analysis of Data Collected	\$ 4,500
2. Support Costs	
Administrative	\$ 1,500
3. Personnel Services (contract)	<u>\$21,000</u>
TOTAL	<u>\$27,000</u>

2. Exotic Plant Management: Leafy spurge is the one exotic plant with the greatest potential for damage to natural plant communities. It is estimated that over 400 acres of the park are spurge infested, and this estimation is likely conservative. North Dakota estimates some 600,000 infested acres in the state. Current funding allows for only about 40 acres in the park to be treated each year.

FIVE YEAR FUNDING PLAN

FY 84 - Purchase additional equipment, herbicide, and supplies, and add additional personnel to treat a greater area of spurge infestation.

Funding/Staff Required (beyond normal funding levels):

1. Chemicals (Tordon)	\$ 9,000
2. Equipment	\$ 2,000
3. Personnel Services	
WG-5	\$ 4,000
WG-1	<u>\$10,000</u>
TOTAL	<u>\$25,000</u>

FY 85-88 - Funding/Staff Required (beyond normal funding levels):

1. Chemicals (Tordon)	\$27,000
2. Equipment	\$ 6,000
3. Personnel Services	
WG-5	\$12,600
WG-1	\$30,900
TOTAL	<u>\$76,500</u>

3. Bison Corral Construction and Maintenance: Location of the bison corral and holding pens in the South Unit has been deemed inappropriate, and a need to relocate the structure to the unit's northeast corner was identified as a significant resource problem in 1981. Presently another corral, designed to handle wild horses, is located in the northeast corner. In order to handle the heavy impacts incurred when working confined bison during a roundup, this corral would require some additional construction to strengthen it.

However, funding has not been available to start the project. In addition, corrals in both units of the park require periodic maintenance to insure an efficient and safe reduction. They must be periodically and regularly repaired in order to safely handle and sort the bison.

FIVE YEAR FUNDING PLAN

FY 84 - Purchase of heavy materials (rough-cut lumber, steel, hardware and fencing materials) to reconstruct the South Unit horse corral system.

Funding/Staffing Required (beyond normal funding levels):

1. Lumber	\$ 4,000
2. Steel	\$ 1,000
3. Hardware	\$ 2,000
4. Fencing Materials	\$ 3,000
5. Personnel Services (GS-9)	\$ 3,000
WG-5	\$ 3,000
WG-1	\$ 3,000
TOTAL	<u>\$19,000</u>

FY 85-88 - Additional Funding/Staff Required (beyond normal funding levels) for continuing repair and maintenance:

1. Lumber	\$ 3,000
2. Steel	\$ 1,500
3. Hardware	\$ 1,500
4. Fencing Material	\$ 1,500
5. Personnel Services	
WG-5	\$ 1,200

WG-1
TOTAL

\$ 300
\$ 9,600

4. Elk Restoration Proposal: The elk is endemic to the North Dakota badlands, but was extirpated from the area by the turn of the century. In order to manage for a natural badlands ecosystem, reestablishment of this native herbivore is necessary. In order to accomplish a reintroduction, a proposal, planning, and consultation program is first needed. This would involve environmental assessment and consultation with federal, state, and local agencies, as well as public meetings to outline the proposal for the general public.

FY 84 - Consultation with state and federal wildlife agencies to determine feasibility, obtain recommendations, and gain support for the program. Initial drafting of the proposal.

Funding/Staffing Required (beyond normal funding levels):

1. Travel	\$ 2,000
TOTAL	\$ 2,000

FY 85, 86 - Funding/Staffing Required (beyond normal funding levels):

1. Travel	\$ 4,000
2. Supplemental Costs (meetings, public hearings, etc)	\$ 2,000
TOTAL	\$ 6,000

5. Fire Management Planning: All fires, both natural and man-caused are immediately controlled under present management plans. In order to conform with natural area policy, and to accommodate natural ecological processes, a Fire Management Plan is necessary for the park. This plan will include procedures for natural and prescribed burning, which will be used to simulate historical natural burning patterns.

Burning is a natural process of the northern prairies, essential to vegetational succession and nutrient cycling. With the presence of man-made developments, and in order to guarantee human safety, a comprehensive plan is essential.

FY 84 - The historic frequency and pattern of natural fires needs to be investigated in order for the park staff to try to duplicate the importance of natural fire in the ecological processes of the badlands environment.

Funding/Staff Required (beyond normal funding levels):

1. Fire History Investigation (contract or research project)	\$10,000
2. Travel for Consultation	\$ 2,000
TOTAL	\$12,000

FY 85, 86 - Funding/Staffing Required (beyond normal funding levels):

1. Planning and Consultation	\$ 4,000
2. Travel	\$ 2,000
TOTAL	<u>\$ 6,000</u>

Other project statement priorities are shown in detail in the Resources Programming Sheets (pages 87 - 96).

**III. NATURAL RESOURCES MANAGEMENT
PROJECT STATEMENTS SECTION**

1. THRO-N-0001 AIR QUALITY MANAGEMENT

2. Statement of Problem: The air quality within the park is being threatened by increasing energy development outside. Until the mid 1970's, the quality of the air over the park was relatively uncompromised and unthreatened. At that time, however, some oil and gas production already existed around the park and a few large coal fired generating plants were on-line well to the east of the park along the Missouri River. With the demand for electricity and fossil fuels increasing and the potential for production of both in the Williston Basin, in which the park is located, it soon became apparent that the Basin would shortly become a major energy production area. As far as it can be determined, the historical quality of the air flowing over the park had been excellent. No doubt in historical times such things as wildfires, blowing dust and burning coal veins polluted the air, but such impacts were natural in origin and transient in nature and did not permanently degrade the quality of the air. In all, the ambient air quality in the park was unblemished.

The park, early on, had been complying with the 1966 Executive Order for Prevention, Control and Abatement of Air Pollution by Federal Activities. The only effect the order had on this park was to curtail the burning of refuse. When the 1970 Clean Air Act came into being the park was already meeting the standards. The first air pollution monitoring equipment was installed in the park in 1974. PEDCO, under contract to the Environmental Protection Agency (EPA), installed a total suspended particulates (TSP) collecting device at the South Unit mixpit. In 1975, the State of North Dakota took over operations at that site.

In 1977, the park prepared its first documentation of air quality and related values, documenting historical quality and preliminarily identifying significant vistas. Also in 1977, the park was identified as a Class I air quality area as defined in the Clean Air Act Amendments of that year.

In the meantime energy development began to increase dramatically. Construction on the Antelope and Coyote coal fired generating plants, 120 miles northeast of the park, had begun and oil exploration with subsequent developments on lands surrounding the park accelerated.

In 1979, the State installed a sulfur dioxide (SO_2), hydrogen sulfide (H_2S) and TSP monitoring unit at the North Unit. Also in 1979, the University of California at Davis installed a fine particulate sampler at the mixpit under a contract to the EPA. Samples from the associated high volume samplers, located in each unit, are also laboratory tested for suspended sulfate (SO_4) and nitrite (NO_3).

The park became directly involved in the monitoring process in 1979 when it was issued a teleradiometer to measure the

reduction in visual range on a daily basis, from the South Unit to fixed targets outside the park. From the same point, photos are taken to provide a visual record of visibility to the distant targets.

In 1980, the park prepared its final documentation of Significant Vistas which were subsequently approved by the Rocky Mountain Regional Office (RMR) and the Washington D.C. Office (WASO). In January of 1981, these Vistas were presented to the State for inclusion in the State Implementation Plan (SIP) for Prevention of Significant Deterioration (PSD).

To date (1983) approximately 1500 producing oil and gas wells have been drilled within the 2 counties which contain the three units of the park. Sources of air pollution from the wells include H_2S and SO_2 from flaring, escaping natural gas with associated H_2S , and escaping smoke and particulates from the burning of reserve pits. H_2S accumulates in low spots because it is heavier than air. H_2S odors are frequently detected in the park by visitors and the park staff. It has been estimated, using State Department of Health data (1983. Sulfur dioxide emissions for sources near the Theodore Roosevelt National Park. N.D. State Dept. Health, Bismarck, N.D. unpublished draft document 22pp.) that approximately 14 lbs/acre/yr of SO_2 are emitted for each of the 7500 square miles in the western North Dakota badlands. This assumes that SO_2 gas is equally distributed throughout the area. However, it is apparent that most of the emitted gas will be concentrated near the source. Four of the highest SO_2 producing well fields are within 20 miles of the park, and 2 of these are within 9 miles.

Likewise, smoke and particulate matter is frequently observed, and reduces visibility from scenic overlooks located in the park. Incidents where pollutants or suspected pollutants, such as H_2S and smoke, enter the park are documented and reported to the State, as part of the routine air quality monitoring program. The park has no direct authority to regulate emissions originating outside the park or to prosecute violators of State or Federal Standards should emissions enter the park. In October 1982, 87 violations of state standards for H_2S were recorded in the park.

In 1982, the Department of the Interior issued a Finding of No Unacceptable Adverse Impact upon air quality values of the state's Class I areas, related to the construction of two coal-fired generating stations, three natural gas processing plants, and a coal to methanol conversion plant. These facilities are situated within a 125 mile radius northeast of the park, in the park's airshed. However, computer modeling of emissions predicted exceedance of some pollution levels, which necessitated the above Interior Department action.

Present activities include: monitoring and documentation of the background or air quality base. For the most part, we must utilize the year of 1979 and thereafter for any data that can be considered "baseline", even though the park's air quality was suffering the effects of energy production. It was not until this time that a comprehensive monitoring program was in effect.

Perhaps at some future time efforts can be made using accumulated data to ascertain what might have been a true baseline.

The park is also coordinating air quality monitoring with the North Dakota State Health Department in documenting and reporting incidents of visual and olfactory pollution.

Coordination of the park's air quality issues also involves the National Park Service (NPS) Air and Water Quality Division in Denver. This coordination includes the Division's evaluation of National Environmental Planning Act (NEPA) documents and impact assessments. The Air and Water Quality Division takes the lead in expressing NPS concerns to the State regarding the effect of proposed developments and activities that may affect the park's Class I standards. The park also responds to inquiries and concerns expressed by the news media and public, thereby making its existence as a Class I area known to the public and industry.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

A. Discontinue Monitoring and Coordination: Obviously the pursuit of such a policy is neither desired nor possible under present law. The park is required, as a Class I area, by the Clean Air Act to prevent significant deterioration of the air quality in the park. This is most effectively accomplished by continued monitoring and documentation of air quality related values.

B. No Action - Maintain Monitoring and Coordination: This alternative would continue our present efforts to monitor chemical and visual indicators of air pollution. Data gathered will hopefully form a basis from which the State Department of Health can form programs and policies to regulate industrial sources of air pollution and to take enforcement action when violations are encountered. This alternative measures only the effect on air resources, while the effect on flora and fauna can only be guessed at. Research is needed to document the effects of air pollution on plants and animals. Presently, smoke plumes and chemical odors can be commonly observed. Such air quality discordants can decrease the enjoyment of the park for visitors.

C. Additional Research and Monitoring Option: A lichen flora, completed in 1983, has been developed in cooperation with the University of Minnesota. Some lichen species show promise as indicators of unacceptable levels of air pollution. Presently, a chemical element baseline study is being conducted in conjunction with the Air and Water Quality Division and the U.S. Geological Survey to analyze soil and plant tissues for various element content. These data can then be used for future comparisons of element contents to evaluate the effects of element deposition from energy production on the park soil and vegetation.

In addition, our present system of monitoring and coordination would be continued in order to tie the responses of indicator species to increases and decreases in levels of various

pollutants. This evidence would give the park a more firm case when involved in air quality controversies.

Hopefully, the result of such efforts would be the enactment of legislation which would decrease the amounts and effects of air pollution over the park. The entire park ecosystem would most likely benefit from the decrease in unnaturally high levels of pollutants, and the visitor would enjoy a more pristine environment and more enjoyable park experience.

4. RECOMMENDED COURSE OF ACTION:

The last alternative, relating to research, monitoring and coordination, would be most effective in managing the area for Class I air quality. This air quality problem has been identified as a major threat to the park. Competent scientific research combined with consistent monitoring provides the evidence and programs which can be used to change policies and legislation. Our goal has to be oriented toward gaining more stringent regulations and policies from air quality enforcement agencies. These tougher rules are needed to protect park air quality resources and ensure a quality visitor experience.

A. Resource Management Actions:

THRO-N-0001-01 Maintain coordination and cooperation with NPS Air and Water Quality Division and North Dakota Department of Health.

THRO-N-0001-02 Keep the public informed of park air quality values and conditions, and its existence as a Class I area.

THRO-N-0001-03 Establish air quality trend data base maps, showing point sources of pollution in relation to the park.

B. Monitoring Actions:

THRO-N-0001-04 Continue air quality monitoring program.

THRO-N-0001-05 Establish an ongoing monitoring program based on recommendations and results of present research projects, for sensitive indicator species (flora and fauna) relating to air quality values.

C. Research Actions:

THRO-N-0001-06 Present research efforts are directed toward establishing a contemporary "baseline" of sensitive indicator species (flora and fauna), relating to their present quantity, physiological condition, reproductive rates, chemical composition, and other aspects of their life history that might be pertinent in determining their response to air pollution. Future research must address the effects of pollutants on sensitive species of flora and fauna.

1. THRO-N-0002 EXOTIC PLANT MANAGEMENT

2. Statement of Problem: The most important exotic plant species in the park include leafy spurge (Euphorbia esula), Canada thistle (Cirsium arvense), Japanese brome (Bromus japonica), and yellow sweetclover (Melilotus officinalis). These species generally invade only disturbed sites and do not become established in indigenous plant communities, excepting leafy spurge which also invades high condition range. Other than occasional mowing of roadsides, Japanese brome and sweetclover receive little treatment, and Canada thistle is spot treated during spurge control efforts.

Sweetclover is the most widespread exotic plant found in the park, but may be less of a problem than others because it's biennial habit requires successive years of above average precipitation to reach its flowering stage. At its flowering stage, the second year of its biennial life cycle, the plant produces tall, closely growing flowering stalks which impose above the native prairie plants, thereby masking the prairie communities and reducing the community vigor. Elimination or reduction of sweetclover is consistent with our attempts to restore and rehabilitate native prairie within the park. Methods to accomplish this are being investigated.

Leafy spurge is the most harmful exotic plant in the park with the greatest potential for damage to native plant communities. Although it can be found on both sides of the Little Missouri River, the heaviest concentration is west of the river in the South Unit, where spread has been very rapid. At the end of the summer of 1970 it was estimated that only 32 acres were spurge infested, divided into 103 separate patches ranging from a few square feet to three acres. At the present time, an estimation of 400 acres is likely conservative. Heaviest concentrations are found along streambeds, drainages, and wooded draws.

Spurge forms dense patches which crowd out other plants by shading and competition for available nutrients and moisture. This plant has the capacity to quickly spread to other areas, as it reproduces by seed and root sprouts (an average stand produces between 200 and 400 pounds of standing vegetation per acre). Its early, rapid and rank growth gives it a competitive advantage over spring seeded crops and range plants.

Current management action is unacceptable for leafy spurge control within the park. Since 1975 an annual program in the amount of \$15,000 has been conducted in an effort to chemically control spurge. A program of this size only allows for treatment of about 40 of the 400 infested acres. As a result, control is attempted on small, isolated patches east of the river, and, as time and budget allow, larger patches on the west side are treated. This program allows for continued increase of leafy spurge west of the river, with no possible hope for eradication.

Treatment has been restricted to this limited program because of cost, but more importantly, because of the unknown effects of

the applied chemicals. Both liquid spray and pellet application of Tordon have been used. Secondary kill of non-target plant species has been observed when either form of the chemical is used. Additionally, the effects on soil organisms, wildlife, and regeneration of native plants have not adequately been documented.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

A. Discontinue exotic plant management program: This policy, though money saving, would result in an increased rate of encroachment of the exotic leafy spurge throughout the south unit of the park. Native plants, especially those found in riparian areas and upland draws would be eliminated over large areas covered by the spurge patches. Although these patches may provide cover for small mammals and some birds, spurge is not a known food source for any species of native wildlife. Indeed, in infested areas it would eliminate a number of native wildlife food plants.

In addition, this alternative does not consider the North Dakota Noxious Weeds Law which requires landowners to control the spread of noxious weeds on lands under their control. The encroachment of leafy spurge would be obvious to the visitor. To date, the park has received letters from concerned citizens, who expressed dismay at the spread of spurge in the park.

This option does not provide for the eradication of small patches as they are discovered in the North Unit. Presently the North Unit is believed to be free of spurge infestation, and this alternative would allow spurge to gain a foothold there, as a result.

B. Current Action: Action under this alternative which only tends to slow expansion of spurge patches and attempts to eliminate new patches east of the river. Eventually, at some point, seed density will be such, that the present control will be ineffective. At that point, the result and impacts will be the same as discussed, for the South Unit, in the previous alternative.

In the North Unit, this option will yield nearly complete control of leafy spurge. With spurge nearly nonexistent there, small patches which develop in the North Unit can be immediately eradicated, preventing spurge from gaining a foothold. This is presently accomplished by park personnel as they go about their other duties. Effectiveness of this program will be increased by developing a regular system of survey, monitoring, and treatment of spurge patches found.

C. Study and Research: Such a program would need to be used in conjunction with a control program. A number of alternatives could be studied using treated versus untreated plots, using a variety of treatments. Although of great interest, this alternative would simply be a duplication of effort, as many state, federal and university researchers are presently engaged in numerous leafy spurge studies in the northern plains states,

thus this alternative is generally unacceptable to park management in terms of repetition and cost.

D. Expanded Control Program: This alternative would require additional funds to increase the number of crews, and the supporting equipment and supplies, to be fielded each summer. A memorandum from the Superintendent to the Regional Director, in 1975, outlines an expanded plan.

This plan would provide three teams of three people in the field for two and a half months during the summer. It was estimated that each team could cover two acres of spurge per day and thus all three teams could treat approximately 300 acres over the course of the summer. The following year, depending upon the success of the previous treatment, two, 3 person teams should be able to control the regrowth and new infestations. If all went as planned, one, 3 person team would be sufficient to control any new infestations. From this point, a team would be needed only to hold and control new outbreaks.

It is apparent that in order to make a realistic decrease in spurge infestation an accelerated program is needed. Such a program would provide an opportunity for native plants to reinhabit areas invaded by spurge, thereby establishing a range closer to a native condition, and providing more useable forage for wildlife. This alternative does not consider the unknown effects of the herbicide. Increased herbicide use, as called for in this option, could have significant environmental impacts.

4. RECOMMENDED COURSE OF ACTION:

Continuation of alternative B and initiation of alternative D as funds permit is recommended. Since extensive research is being carried on by other agencies, our limited program enables us to maintain some control on spurge expansion, while minimizing possible environmental damage. Once research results become available, a more definitive plan such as alternative D, to control leafy spurge can be addressed. Hopefully a more intensive program which would benefit the native flora and fauna, and impart a more pristine environment for the enjoyment of the visitor, can be developed at that time.

The control of leafy spurge is of concern to all landowners in the area. Presently on most adjacent land, both federal and private, an active spurge control program has been underway for at least six years. For the park, main drainages flowing from the west, into the Little Missouri River have been the main sources of infestation from the outside. In order to combat spurge, a program involving local ranchers, the County Weed Control Board, the U.S. Forest Service, and the National Park Service needs to be devised to coordinate efforts and locate areas and points to work from. We hope to initiate such a program as part of our recommended course of action.

All herbicides are applied in adherence to both state and

federal laws, and all persons applying such chemicals in the park will be certified to do so.

A. Resource Management Actions:

THRO-N-0002-01 Continue leafy spurge management program and expand as funds permit.

THRO-N-0002-02 Continue mowing of Japanese brome and yellow sweetclover along the roads, and spot treatment of Canada thistle.

B. Monitoring Actions:

THRO-N-0002-03 Monitor park for the presence, distribution and invasion of exotic species, and investigate new methods for their control.

THRO-N-0002-04 Monitor the effectiveness of leafy spurge management program.

1. THRO-N-0003 GEOLOGICAL RESOURCES and MINERAL MANAGEMENT
2. Statement of Problem: Erosion has been forming these deep canyons and high buttes since Pliocene times, about 1,000,000 years ago. The exposed strata are primarily of the Sentinel Butte and Bullion Creek formations, parts of the Fort Union Group. Materials making up this formation were deposited during the Paleocene Epoch of the Tertiary Period in the Cenozoic Era.

The beds of these formations have been described as non-marine or continental in origin. They were deposited on an alluvial plain when the present area was at a much lower elevation, probably somewhere near sea level. There were many rivers winding back and forth over the surface of the plain depositing sediments that owed their origin to the newly-formed Rocky Mountains several hundred miles to the west. Also, a vast amount of fine volcanic ash was carried from the mountains by prevailing winds and deposited in thick layers that later became the bluish type clays called bentonite. The combined thickness of the Sentinel Butte and Bullion Creek strata is over 1,000 feet, of which only the near-basal part is exposed in the park. The strata consists of fine-grained shales, clays, sandstones, silts, sands and lignite. In general, the shales and clays are gray to brown, the sandstones light yellowish-orange to buff and tan, and the lignite dark brown to black.

Within the Sentinel Butte and Bullion Creek strata evidences of life that lived during the period of deposition can be found in the remains of plant fossils, gastropod and pelecypod shells and a few remains of aquatic reptiles such as turtles and crocodiles. Some fossils are exposed, and there has been some illegal collection in the park. Some lignite beds have caught fire and burned, baking the overlying clays into a red bricklike material locally called scoria. The scoria tops many of the buttes, thus lending the name "Burning Hills" to the area. Petrified wood is found in various spots throughout the park, the most significant located in the Petrified Forest Plateau area. The wood is mostly found upright, and one expert (Dr. Harold Coffin, Geoscience Research Institute) considers the stand third in quality and abundance to the deposits in Yellowstone National Park and Petrified Forest National Park.

Sinkholes are common in the badlands and cause problems with roads. Rapid erosion of barren slopes of the soft geological formations affects roads and trails also. Some of the slopes are steep, and small rock slides occasionally occur, especially during periods of wet weather. The park has large deposits of bentonite which cracks and swells, sometimes causing damage to structures. Slumping of large blocks of soil occurs naturally and can result in damage to some park developments. One especially perplexing problem is river bank erosion where the meandering Little Missouri River is threatening Squaw Creek Campground in the North Unit, and lands adjacent to the Elkhorn Ranch site. All National Park Service developed areas exist on

a flood plain and are subject to flooding.

In the late 1970's, with the energy industries' quest to locate and produce more oil and gas, an escalation of development in the Williston Basin began. Since the park lies within this basin, there is no doubt that oil underlies most of the Theodore Roosevelt National Park lands. To date, about 1,500 wells have been drilled in the vicinity of the park. The 218 acre Elkhorn Ranch Site is surrounded by wells and land underlying this site must contain oil. The same holds true for the eastern two-thirds of the south unit. Oil is being produced all around the North Unit but not as close, nor in the concentration that it is being produced around the South Unit. It must also be assumed that considerable oil exists under this portion of the park. There is one inholding within the South Unit involving 172.89 acres of both surface and mineral rights, and one parcel of 160 acres where the National Park Service owns one-half interest in minerals. There are three inholdings within the North Unit comprising a total of 564.21 acres and involving both surface and mineral rights. National Park Service regulations do not permit the granting of access to these inholdings.

Concerning wells located close to park boundaries, the matter of trespass mineral drainage comes into play. In 1975 the USGS determined that minerals were being drained from under the South Unit of the park by wells outside the park owned by the Amerada Hess Company. These wells were in the Fryburg field south of the southeast corner of the unit. To protect the public's interest, protective leases were issued under competitive bid on 1200 acres within the park. Amerada Hess purchased the right to extract this oil by methods other than surface occupancy. Amerada successfully drilled 5 directional wells into the lease from wells outside the park and has been producing oil from them ever since.

The Bureau of Land Management estimates that some 1.6 billion tons of recoverable coal underly an area in east central Montana and west central North Dakota. The BLM's preliminary tract selection and mining feasibility studies indicate that recovery of these deposits could take place within a few miles of the park. The coal mined would, in some instances, be shipped out of the area to fire generating plants and provide fuel for other processes. Indications are that most would remain in the area to fuel existing and planned generating plants and coal conversion plants. The extent of coal deposits underlying the park is unknown. There are some coal seams exposed along the river course and on buttes and banks in the badlands terrain. Most of these seams are not over a few feet thick. There is no possibility of coal mining within the park, but just 25 miles to the southwest, the South Wibaux Planning Area coal seams are 27 feet in thickness with a 150-200 foot overburden. To the east of the south unit is the Zenith tract where coal seams are 6-16 feet thick with an overburden from less than 150 feet in thickness to 200 feet in thickness. Site specific analysis of both tracts documented by the BLM indicates that development of these areas would adversely effect air quality, water quality

and wildlife habitat.

All minerals development is closely monitored outside the park, and cooperation is maintained with public and private landowners adjacent to the park in regard to mineral activity.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

A. No Action - Maintain Status Quo: Geologic activity which affects developed areas, or threatens visitor safety will continue to be monitored, and reconstruction or other measures required for safety reasons will be initiated.

In regard to mineral activity, the park staff monitors development in the area surrounding the park. A discussion of the impacts of mineral activity can be found in the project statement dealing with air quality and external aesthetic threats.

Although fossil material is exposed in some areas of the park, there have been few problems with illegal collecting. Illegal collecting is monitored through normal patrol activities.

B. Reduced Monitoring and Management: Operation under this option would discontinue monitoring of erosion and slump areas. Threatening situations could not be anticipated, and so preventive action would not be initiated. Thus destruction to park developments would be expected, and visitor safety may be compromised.

This alternative would reduce our efforts at monitoring outside mineral development and, it may compromise visitor experience and park resources, by causing disruption of scenic vistas and possibly adding to problems of air quality (see impacts addressed in Air Quality and External Aesthetic Threats Project Statements). Because illegal fossil collecting is routinely monitored by patrols, no change in this activity would result.

4. RECOMMENDED COURSE OF ACTION:

The recommended course of action is alternative A. This option is the most the park can do to manage a situation which exists outside the park boundaries.

A. Resource Management Actions:

THRO-N-0003-01 Coordination with public and private landowners outside the park regarding mineral development.

THRO-N-0003-02 Maintenance of lease administration and exercising federal access regulations to protect and manage park resources.

B. Monitoring Action:

THRO-N-0003-03 Monitoring of geological activity which

could threaten park structures or compromise visitor safety. Routine monitoring, in conjunction with other activities, for illegal fossil collecting.

1. THRO-N-0004 VEGETATION AND SOILS MANAGEMENT

2. Statement of Problem: The park is located within the mixed grass prairie region of the Northern Plains. The rough topography, coupled with the variety of soils resulted in the formation of several different plant communities. Upland draws with southern exposures are characterized by dry shrub communities, but draws with northern exposure are dominated by trees native to the northern plains. Floodplains produce widely spaced cottonwood and green ash, with dense stands of low growing willow. The gently rolling uplands and plateaus are covered with native prairie grasses and forbs.

Historically, the area was subject to intense livestock grazing pressure. The vegetation of the area had been so degraded by the 1930's that a drought contributed to an economic collapse. With grazing, as well as the control of natural fire, the resulting impacts on the vegetation included a reduction of plant cover and species diversity, increases in soil compaction and gully erosion, and a general loss of soil fertility.

This decline in productivity was put in check when the private lands were reaquired by the federal government, and grazing control was instituted. Following establishment of the park, livestock grazing was eliminated from the area. Although bison were reintroduced, numbers were held at low levels so that natural revegetation and rehabilitation could take place. Policy has dictated that the bison population be kept low enough to allow vegetation recovery (see Bison Project Statement). Also, total fire suppression has been used to protect the vegetation resources, as well as private and public property. Exotic plant management, particularly leafy spurge control, has been applied.

Prairie dogs, which have shown tremendous population explosions and colonization in other grassland areas, occur in the park, but have not to date shown these tendencies. At the present time, it appears that most of the soil and vegetation restoration has been accomplished in the park with the exception of controlling exotic plant invasion. It now appears to be necessary to develop a program to restore natural grazing systems to the park. In addition, it is necessary to restore a natural fire regime. With these programs will come the reestablishment of associated ecosystem processes of nutrient cycling, energy flow, and hydrologic cycling.

At the present time the park's strategy is oriented toward maintaining previous management programs and experimentation in an effort to achieve natural systems management. A model needs to be developed to determine the optimum mix of large grazing herbivores in this natural system. Another model, addressing the interaction of fire and these grazing systems, needs to be completed at the same time. These models will provide a basis from which to develop future ecosystem management strategy. In the interim a system to optimize bison grazing is being developed (see Bison Management Project Statement). Another

planned program is to investigate the possibility of restoring elk to the natural grazing system.

To restore the fire regime, a wildland fire program is being developed and will, in the future, be implemented (see Wildland Fire Management Project Statement). This fire program will reduce chemical components now tied up in rank vegetation, returning these nutrients to the soil. These nutrients will then be available in the soil for new plant growth. In conjunction with these restoration programs, the invasion of leafy spurge and other exotic plants, and the role of prairie dogs in the ecosystem must be considered.

Until recently, vegetation typing, condition, and trends have not been studied. Present research projects dealing with these subjects are underway and being developed. Present research regarding vegetational and habitat use by bison will provide needed information regarding species consumed, species abundance in the grassland, and the resultant effect of grazing on vegetational diversity. In addition, this study will locate specific range types and a system for monitoring the vegetation therein, using permanent transects. From changes in vegetation, measured over time, management strategies can be adjusted to ensure the protection of the vegetational resource.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

A. Alternatives listed for the management of fire, bison, elk and other grazing species and exotic plants are applicable as alternatives under vegetation management. Please see those project statements. Other alternatives relating to vegetation management are as follows:

B. No Action - Maintain Present Management: Under this alternative the bison carrying capacity study and vegetation map would be completed. There would be no further study of utilization, condition, trends, fire, or species relationships to vegetation and ecosystems.

As a result of this action, there would be no assurance that the soil and vegetation of the park are being properly utilized, or influenced by natural forces. Also the effects of grazing in wildlife habitat management would remain unknown. If these were the case, a limited, unsound data base would exist, which would prevent the development of sound management decisions in the future.

C. Increase Research and Monitoring: Ecosystem models would be developed to depict the vegetation - herbivore - fire interaction. Impacts of major herbivores and fire on vegetational ecosystems (utilization, trend, and condition) would be studied and monitored. A system of photographic study plots, permanent range transects, and exclosures to allow selective use by species of grazers as well as no use, will be established. Knowledge derived from these studies will allow us to develop a more natural scheme of ecosystem management.

4. RECOMMENDED COURSE OF ACTION:

The recommended action includes recommended courses of action from the following project statements: Wildland Fire Management, Bison, Elk, Exotic Plant Management and Deer and Pronghorn Management. In addition, alternative C, listed in this project statement is also recommended in conjunction with the others.

A. Resource Management Actions:

THRO-N-0004-01 Addressed in other project statements.

B. Monitoring Actions:

THRO-N-0004-02 Develop a system of permanent transects to measure utilization, trend and condition.

C. Research Actions:

THRO-N-0004-03 Develop a synthesis with a model of the herbivore - vegetation - fire dynamics of the park.

1. THRO-N-0005 WATER RESOURCES MANAGEMENT

2. Statement of Problem: The major water resource in the park is the Little Missouri River. The river flows through 9 miles of the South Unit and 14 miles of the North Unit. The Little Missouri River bisects both units of the park. The river is a navigable stream whose ownership of water and the submerged land to the high watermarks rests with the State of North Dakota. The river was considered navigable at the time of statehood and is legally considered navigable, an opinion confirmed by the U.S. Army Corps of Engineers and the Solicitor's Office in 1969. The river experiences great seasonal flow rate fluctuation from as high as 65,000 cfs to a near trickle. The river is wild and free-flowing and is designated a State Scenic River. The creeks within the subwatersheds of the park are mostly intermittent. The lower 1 1/2 miles of Knutson Creek, which flows from the west 2 1/2 miles through the park to the river, is permanent.

There are 13 developed springs and 18 wells in the park. Data has been collected on flow rate and some chemical characteristics of these resources. There are innumerable other springs and seeps in the park which are uninventoried and undeveloped.

Little information is available at this time concerning ground water in the park which would show deviations in water tables. However, the USGS has entered into an agreement with the National Park Service to conduct a study of ground water in both units of Theodore Roosevelt National Park and in time a profile of ground water quantities should appear. There are 11 water systems in the park for visitor and administrative use. These systems have been approved for human use and microbiological analysis is administered every two weeks when the systems are in use. There are 5 sewage disposal systems (Cottonwood and Squaw Creek Campgrounds, Painted Canyon, and the headquarters in each unit).

Medora, park headquarters (South and perhaps North), Cottonwood Campground, Squaw Creek Campground, Peaceful Valley Ranch and portions of the park road are located within the Little Missouri River floodplain. These areas are prone to flooding with rapid spring thaws, during the periods of ice-out.

Because oil and gas drilling is occurring outside the park within the aquifer, there is a risk of aquifer contamination from such activity. Within the watershed, large oil and gas storage and treatment facilities are present, and there is a risk of spillage into tributaries of the river and subsequent contamination of the river in the park. The possibility of oil or chemical contamination of the river exists where pipelines, railways and highway bridges cross. There is a need for a comprehensive water resources management plan to address the park water resources problems and management actions.

In the early 1960's, a number of 300 to 500 gallon concrete containers called "dish tanks" were installed at various

locations within the park. These tanks are situated at ground level, and are either spring or well fed. Dish tanks were placed as part of the wildlife management program, to provide water sources, but more importantly, to disperse range use by the bison herd. Heavy use and severe weather conditions have caused the concrete to crack and break in several instances. Also, drain pipes frequently clog causing tank overflow.

Since 1976, efforts have been made to replace concrete and galvanized steel systems with fiberglass tanks and plastic pipe, which make the systems much more weatherproof. This program should continue. In addition, a new spring has been located and is scheduled for development. It will replace a nearby dish tank system which has been destroyed by soil slumping along a cliff base.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

A. Reduced Water Resources Management Program: Under this alternative, a water resources management plan would not be prepared. This would result in no identification of possible pollution sources or materials, nor contingency plans to handle pollution emergencies. Maintenance of developed water systems in the natural zone would be eliminated. The one system destroyed by slumping would not be replaced, as development of an alternative source would be delayed.

Later, because replacement of concrete tanks and steel pipe systems would be halted, additional systems would become inoperable. A lack of periodic maintenance would accelerate this problem. As a result, the fewer working watering systems would tend to concentrate range use by large herbivores. A strong possibility of intensive use or overuse in the areas surrounding the operable systems would result. Bison, when concentrated in large numbers, can severely overgraze grasslands. Historically, after intensive use in an area, bison roamed to another area allowing the grazed area to recover. Because the bison are captive, movement is restricted to the park and excessive use could be expected around the few operable watering systems.

B. No Action - Status Quo: Under this alternative, no water resources management plan would be prepared. The same problems from lack of planning that were discussed in alternative A would also apply under this option.

This alternative would keep most of the watering devices in the natural areas operating. However, without the replacement of concrete tanks with fiberglass tanks, failure of some tanks is expected. Once the concrete tanks crack and break from exposure, repair is difficult and expensive and further breakdown and repair must be anticipated. Although not expected to have impacts as significant as described for alternative A, some overuse by large ungulates would be expected.

C. Water Resources Management Program: This option would

provide for the completion of a water resources management plan. Such a plan would include a program of monitoring possible pollution sources, chemicals being moved through or near the park, and both natural and developed zone watering systems. This plan would ensure that all developed water sites would remain operable. Progressive replacement of failing concrete and steel systems by fiberglass tanks and plastic pipe would be accomplished. Periodic maintenance would continue, although maintenance costs would most probably decrease, as the fiberglass and plastic systems are more durable and better suited to the climate. Replacement of the system destroyed by slumping could continue, using an alternate water source. As a result of this program, a more effective and efficient wildlife watering system would be developed and maintained, and it would ensure a more uniform distribution of grazing pressure by large herbivores.

4. RECOMMENDED COURSE OF ACTION:

At this time, alternative C appears to be the most reasonable to follow. A water resource management plan should be considered a basic element in natural resource management. This option provides the best protection for park water resources from pollution.

This course of action allows for continued replacement of natural zone watering systems without delay. The current park staff has experience in installing and maintaining these systems, and delays in replacement may involve additional costs to train new personnel.

A. Resource Management Actions:

THRO-N-0005-01 Completion of a comprehensive Water Resource Management Plan.

THRO-N-0005-02 Maintain a wildlife watering system.

B. Monitoring Actions:

THRO-N-0005-03 Monitor water quality in all water systems.

THRO-N-0005-04 Monitor movement of chemicals and hazardous materials being moved near or through the park.

THRO-N-0005-05 Monitor location of new and existing oil storage tanks which could spill into the Little Missouri River or its tributaries.

1. THRO-N-0006 ACID DEPOSITION MONITORING

2. Statement of Problem: Presently, there are 101 National Atmospheric Deposition Program (NADP) sites operating in the United States, one of which is located at Theodore Roosevelt National Park's North Unit. The major objective of the NADP is to provide accurate data concerning patterns in the chemistry of wet and dry fallout in major physiographic, agricultural, aquatic, and forested areas throughout the U.S. The park was selected as a site because other air pollution and atmospheric chemistry monitoring was underway (see Air Quality Management Project Statement), and because of the high probability of significant acidic deposition from known point sources of substances released into the atmosphere (Bigelow, D.S. 1982. NADP Instruction manual, site operation. Nat. Atmos. Dep. Pro. 40pp.).

There are two forms of atmospheric deposition, dry and wet. Wet deposition includes precipitation in any form, and is best described as a mixture of dissolved particles in a water solution. All other materials that have been scattered by winds and deposited on the surface, are dry deposits.

The gathering of this information not only requires extensive systematic sampling stations, but rigorous consistency in sampling and rigorous precision in analyzing the samples. This is achieved through the use of standardized equipment and procedures. The equipment used includes a monitor consisting of dry and wet catchment containers, a precipitation event recorder, a pH meter, a conductivity meter and an accurate weighing scale. The procedure involves weekly collections of wet samples and eight-week interval collections of dry samples. A portion of the wet sample is analyzed for pH and conductivity at the site and the remainder is sent to the Central Analytical Laboratory in Champaign, Illinois for repetition of pH and conductivity, as well as determination of Ca^{++} , Mg^{++} , Na^{+} , K^{+} , NH_4^{+} , NO_3^{-} , SO_4^{--} , Cl^{-} , and PO_4^{---} concentrations. The dry sample is also sent to the same laboratory, where it is washed down and similarly analyzed. Results from analysis of these samples are sent to the park and to the NPS Water Resources Field Support Laboratory for compilation to establish a data base from which to measure significant changes.

Precipitation is a very good scavenging agent for many substances (both solid and gaseous) in the atmosphere, and changes in the chemical composition of precipitation are good indicators of change in atmospheric composition. The nutrient status, growth, and development of plants on land and in surface waters are influenced by the availability of beneficial nutrients and injurious substances dispersed in the atmosphere. Similarly, the health and reproductive capacity of domestic and wild animals and fish populations are influenced by atmospheric trace constituents. It is now recognized that substances deposited as precipitation, aerosols, and gases significantly augment the supply of both essential elements and potentially injurious substances (Bigelow, D.S. 1982. NADP Instruction manual, site operation. Nat. Atmos. Dep. Pro. 40pp.) With the increase and expansion, in this region, of emitting sources of

potential pollutants, there is an increasing need for careful measurement of the amounts, nature, and biological effects of these substances. Such measurements are essential for the responsible management and protection of the park resources. The NADP station went into operation in the North Unit of the park in the summer of 1981. A point in time well after acid rain had been identified as a major threat to ecosystems both in North America and Europe. As with the air quality monitoring systems presently in existence in the park, the acid rain data is not a true base, since it must be assumed that the PH of rain and dry deposition falling on the park was already demonstrating the effects of fossil fuel development and use when the system started up.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

A. No Action - Current Monitoring: This alternative would continue our participation in the National Atmospheric Deposition Program, and thus, regular monitoring of both wet and dry acidic deposition. This program, if continued, will provide a baseline from which later measurements can be evaluated, and it documents instances of significant acidic deposition.

B. Research to Measure Effects on Natural Resources: In an effort to establish a baseline of the effects of air pollution and acid deposition, a research proposal entitled The determination of the endemic occurrence and variability of insect, disease, oxidant, and physiological injuries on vascular plants, was submitted to the NPS Research Center for funding. The purpose of this study is to document the present conditions in the park prior to continued energy development. This is desirable in order to monitor and detect any changes in the future which may be attributable to acid deposition. + AQ changes

A baseline lichen study to establish species which are sensitive to air pollution was completed in 1983. Lichens were found to be particularly sensitive to changes in air quality in the northeast. But very little is known regarding acid deposition + AQ effects on lichens and other flora, and so further research is needed.

Hopefully the first study mentioned will be funded, and the second will continue. As the technology develops, an integrated approach must be taken to examine physical environmental characteristics, together with biological characteristics. Additional research proposals will be developed to evaluate acid deposition impacts to the park ecosystem.

4. RECOMMENDED COURSE OF ACTION:

Both alternatives are recommended for selection. Continued monitoring, as discussed in the first alternative, is necessary to establish a baseline from which to measure the effects of acid deposition. The second alternative takes additional steps to establish plant species which are sensitive to acid deposition and seeks to determine natural levels of plant injury and disease in order to measure more accurately the effects of acid deposition.

A. Monitoring Actions:

THRO-N-0006-01 Continued weekly collection of wet samples.

THRO-N-0006-02 Continued collection of dry samples every 8 weeks.

B. Research Actions:

THRO-N-0006003 Continued study of various lichen species which are sensitive to air pollution, and/or including acidic deposition.

THRO-N-0006-04 Initiation of a study to determine the extent of natural injury to plants, from which to measure the effects of acid deposition on the plants.

1. THRO-N-0007 EXTERNAL AESTHETIC THREATS

2. Statement of Problem: It can be argued that scenic vistas and feelings of solitude are the most important resources to be found in large national parks. It is therefore important to protect these resources from disruption by elements of man's activity.

In the mid 1970's, energy exploration and development increased dramatically in the region which surrounds each unit of the park. The result has been the location of hundreds of oil and gas wells within a few miles of each unit.

Although the U.S. Forest Service in the mid 1970's planned for zones of no or reduced development on lands they managed around the boundaries of the park, there was little protection they could offer as most lands were already under lease for oil and gas development. These leases had to be and were honored which has resulted in some oil and gas wells coming into production as close as a few hundred feet from the park boundary. The future possibility of buffer protection is unlikely as such protection is not conferred by law but rather is administrative in nature.

The counties of Billings and McKenzie have no existing land development or zoning laws that offer the park any protection from intrusive developments adjacent to the boundary.

The impact to scenic vistas from points inside the park toward the outside is significant. From most high points in each unit, oil and gas wells and tanks, as well as radio towers and power transmission lines, are obviously visible. These structures disrupt the badlands historical scene, and the feeling of solitude in one's environment. Another impact to the scenic vistas of the park exists from heavy, black columns of smoke from the burning of oil reserve pits near wells. At times, winds blow this smoke directly over the park, and these smoke columns are routinely documented by park personnel. Although burning permits are required, few are issued by the State Health Department, and frequent illegal burning takes place. State personnel are hard pressed to effectively monitor the burning problem because of the extent of the area to be covered.

Auditory impacts to the aesthetic values of the park exist also. Occasionally, airplanes (both private and military) and helicopters passing low overhead intrude on the park's solitude. Recently, the National Park Service has been approached by local elected officials and the North Dakota State Aeronautics Commission to provide public land to the city of Medora to expand an existing airstrip. This expansion may increase use of the airport, increasing noise and visual intrusion in the airspace over the park, thereby reducing the visitor enjoyment of the park's natural zone. Park management at the local level is opposed to encumbering parklands with an airstrip unless or until such a development is found to be in the best interest of the majority of the park visitors. If such a development becomes a probability the park will become a participant with

other agencies in preparing an Environmental Assessment to address all possible impacts of an airport expansion. The public would be fully involved in any such assessment. Because the U.S. Forest Service is the principal landowner and has a special use permit with the city of Medora for the existing airstrip, they would likely be the lead agency for a joint Environmental Impact Statement. In the meantime, the park will continue to promote public awareness of the situation.

Extensive intrusions are generated from operating oil and gas pumps and traffic on Interstate 94 and U.S. Highway 85. Some pumps are run by propane-powered engines which run constantly, making noise similar to gasoline-powered engines.

Interstate 94 was constructed in the 1960's and it passes north of the City of Medora, through land which was formerly part of the park. It now forms a barrier between the headquarters area and the rest of the South Unit. East of this area, it forms the entire southern boundary of the unit, approximately 10 miles, while west the interstate forms the boundary for 1 mile. The separated area contains 2 miles of interstate highway. Traffic noise from some of the louder vehicles on the interstate can be heard throughout the South Unit.

The Burlington Northern Railroad runs just south of the South Unit, roughly paralleling the south boundary. The portion of the railroad adjacent to the park is as close as 150 yards in the Medora Headquarters area, and never more than 1 1/2 miles from the boundary. Noise from passing trains can generally be detected in the southern portion of the South Unit and, if atmospheric conditions are right, the noise may be detected throughout the unit. This disturbance has occurred historically, since the 1880's, when the railroad was constructed through Medora.

In the North Unit, U.S. Highway 85 winds through approximately 1 1/2 sections of the far east end of the park, with about 2 miles of roadway. Noise from louder vehicles on this highway can almost always be heard from high points in the unit, and depending on wind conditions, it may be detected throughout the unit.

As for the noise from visitor traffic in the park the vehicles are generally passenger and recreation vehicles and at the low park speed limits produce very little noise pollution except adjacent to the roadway.

The goal of the park management is to minimize or reduce levels of noise pollution from aircraft and motor vehicles.

In 1980, the park prepared its final documentation of Significant Vistas which were subsequently approved by the regional and Washington offices. In January of 1981, these Vistas were presented to the State for inclusion in the State Implementation Plan for Prevention of Significant Deterioration.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

A. No Action - Continued Monitoring: This alternative continues the efforts by the park staff to document incidences of smoke from oil and gas related activities which take place adjacent to the park. Incidences of noise pollution are not individually recorded, as these intrusions occur nearly continuously. The impacts from action under this alternative are the same as outlined previously. Additionally, mapping and photographing of all structures which are considered visual intrusions is underway. The visitor may lose a sense of solitude from noise intrusion, and the aesthetic value of the "wide open spaces" scenery is lost because of human developments adjacent to the park.

B. Establish Park Buffer Zone: An attempt would be made to enter into an agreement with adjacent landowners particularly the U.S. Forest Service, and the Bureau of Land Management, which has jurisdiction over all federal mineral leasing, to establish an area around the park in which human development would be curtailed. It is impractical to expect removal of existing structures, especially oil and gas units that are producing, but perhaps non-producing equipment may be removed.

In addition, with close cooperation with adjacent landowners and federal agencies, perhaps an area of a negotiated distance around the park could be set aside for no new above ground development. The technology for directional drilling into these areas from other locations exists.

An important proposal in the buffer zone establishment would be the elimination of the burning of oil reserve pits. Burning of pits which are located a long distance from the park boundaries would still be a problem, and reporting of these incidences to the state would continue.

The improvement of scenic vistas under this alternative are potentially great. A gradual reduction of oil and gas producing equipment in highly visible areas adjacent to the park would be of great benefit, though it would be dependent on the lifetime of the wells and the cooperation of all parties involved. Removal of wells near the park would also reduce levels of noise pollution.

4. RECOMMENDED COURSE OF ACTION:

Monitoring of external aesthetic threats must be continued as described in the first alternative. This information can be used as justification in establishing a buffer zone as outlined in Alternative B. In an effort to maintain or improve the park visitor's experience, it is essential that establishment of a buffer zone be investigated.

A. Resource Management Actions:

THRO-N-0007-01 Initiate action with adjacent private and

governmental landowners to establish a buffer zone around the park.

THRO-N-0007-02 Maintain a public awareness of issues surrounding the Medora Airport controversy. Participate in the development of an Environmental Impact Statement if it becomes necessary.

B. Monitoring Actions:

THRO-N-0007-03 Continued monitoring of heavy smoke produced outside the park that degrades scenic vistas.

THRO-N-0007-04 Continued monitoring of the location of new oil and gas developments adjacent to the park, which degrade scenic vistas and produce noise which can be heard within the park.

1. THRO-N-0008 RESOURCE BASELINE INVENTORIES

2. Statement of Problem: To date, few baseline inventories of the natural resources of the park have been conducted. Information concerning many of these resources exists, but is scattered and needs to be synthesized.

Data on aspects of abiotic resources such as climate, geology, topography, soil, and fire may be locally available, or can be easily obtained from other sources. Many of the park's biotic resources require updated surveys and field verification. These baseline inventories then form indices from which populations can be monitored in the future and comparison of management practices made.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

A. No Action: This alternative would continue the present system of management which provides for little, if any, biological inventory. This system assumes that natural systems continue operating at optimum levels, and makes some attempt to determine possible impacts from man's activity, but no base for comparison prior to disturbance is available. Thus impacts may be under or overstated.

B. Establish a Resource Baseline: This option would initiate action to gather basic information on the quantity and quality of the natural resources of the park. These data could then be used to assess population trends, frequency, and quality of these resources, and with subsequent monitoring, changes in the resource base.

4. RECOMMENDED COURSE OF ACTION:

Alternative B, establishing a resource baseline, provides the best protection for the park's natural resources. These inventories will generally be of a non-destructive sampling type, and so, no environmental impacts are anticipated.

A. Resource Management Actions:

THRO-N-0008-01 Baseline surveys of various natural resources to determine their quality and quantity and natural history.

B. Monitoring Actions:

THRO-N-0008-02 Monitoring of sensitive resources for decline or degradation especially caused by activity of man.

C. Research Actions:

THRO-N-0008-03 Initiate research proposals to study problems discovered in baseline surveys and monitoring activities.

1. THRO-0009

BISON MANAGEMENT

2. Statement of Problem: The buffalo herds in the North and South Units of the park are, when considering wildlife resources, the area's most notable attraction. Presently, the estimated number of buffalo in the South Unit is 250; in the North Unit 120. In both units these animals are free roaming within the park boundaries. Bison were reintroduced into the South Unit of the park on December 14, 1956. This small herd, which was made up of 12 mature cows, 12 yearling heifers, and 5 yearling bulls, was obtained from Fort Niobrara National Wildlife Refuge in Nebraska. Before shipment, these animals were tested for brucellosis and no reactors were found. It is thought that the species of animals found within the park is most likely a cross between the American bison (Bison bison bison) and the Wood bison (bison bison athabasca). It is interesting to note that the park herd is one of the only brucellosis free herds in existence. For this reason, demand from other agencies for breeding animals from this stock is high. Bison from the South Unit were transplanted to the North Unit beginning with 20 in 1962.

Present management action provides for annual counts, and for maintenance of the North Unit herd at 75 animals and the South Unit herd at 200 animals. Though somewhat arbitrary, these figures were set to minimize the possibility of range depletion and escape to private rangeland. Range use by bison in both units is considered light. An optimum carrying capacity research program is underway, and this study should provide a data base for planning herd size. The study is being conducted by the Range Science Department, Montana State University. Though the data will provide a basis for bison carrying capacity, the question of how the park should manage large ungulate populations to simulate natural conditions remains unanswered (see Vegetation and Soil Management Plan Statement). There is also a need to develop a program to monitor bison forage utilization in the park on an biennial basis.

Another ongoing problem with this resource is that of escape and trespass on to lands of neighboring ranchers. Even though incidents of escape usually involve a lone bull or perhaps several bulls traveling together, retrieval costs, fence repair, and other associated expenses are substantial. The frequency of escapes are, for some reason, higher in the North Unit than the South Unit. Several incidents of 30 to 50 buffalo leaving the park have been documented in recent years.

Since the park's four-strand barbed wire fence has not been sufficient, installation of seven foot net wire fencing of the park boundary has begun, and scheduled for completion in the spring of 1985. Trails utilized by other wildlife which cross fence lines have been identified, and fence modifications are being installed in the new fence to allow movement in and out of the area by pronghorn, deer, and other wildlife (see Boundary Control Project Statement).

Roundups are programmed on an every-other-year basis. At this time the excess animals are removed from the main herd and marked and loaded for shipment. Surplus animals are provided to other agencies: Indian tribes working through the Bureau of Indian Affairs, other Federal agencies, State agencies, county and local agencies. At these times, animals are tested for brucellosis reactors within the herds and calves are vaccinated. The influence of this artificial selection on bison population characteristics and their relationships to sociality, herd sizes, and subsequent use on the range are unknown.

Both the North and South Units of the park are equipped with corrals and holding pens designed to handle bison. Both corrals are constructed of heavy, rough-cut lumber, and are designed to withstand the heavy impact incurred by working confined buffalo. The punishment these structures receive does result in some damage, and prompt repair and maintenance is essential, for both efficient and safe operation. In addition, the location of the corral in the South Unit was deemed inappropriate, and a plan to relocate the structure to the northeast corner was identified as a significant resource problem in 1981.

Not only do buffalo provide authenticity to the badlands scene, but their interrelationships with the ecosystem and other typical plains animals could likely be termed essential. There is a need to determine the role of bison in relation to other park resources. The fact that not all park visitors get the opportunity to view bison in their natural surroundings may be considered unfortunate, but it is felt that attempts to restrain the animals to one specific area for viewing purposes would not only be contrary to National Park Service mandates but would detract from the resource integrity.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

A. Discontinue present bison management program: This action would eliminate the semi-annual roundups and re-fencing of the park boundary. As a result, the bison population would steadily increase and most probably result in increased escapes, range destruction, and visitor-bison conflicts. Such a policy would be disastrous in terms of public relations and resources degradation.

Although initially cost saving, eventually a massive roundup would be necessary. Such an operation would be costly in terms of corral repair or expansion to handle the increased number of animals, and contracting of additional riders for the same reason.

B. Maintain Bison Management Plan: This alternative would continue the present course of action. Annual bison counts, semi-annual roundups for herd reduction, brucellosis testing, and calf inoculation would remain as an important management activity. Bison use of the vegetation would be maintained at low levels. Efforts to re-fence the park boundary would

continue, in order to prevent bison escapes thus reducing conflicts with adjacent land owners. Research on bison carrying capacity would be completed, and repair and upkeep of the corrals would remain at present levels providing for efficient and safe handling of the herd.

C. Reconstruct and relocate South Unit corrals: This option provides for reconstruction and relocation of the South Unit corral. The proposed relocation would be to the northeast boundary, on the north end of a long, flat plateau. This terrain would make it much easier to run animals into the corral, compared to the present location.

D. Increased Monitoring and Research Option: Under this alternative a program would be established to monitor bison forage utilization and seasonal distribution. While engaged in roundups, a program of measuring, sexing, and tagging of calves would be initiated to gather baseline data on sex ratios, calving weights, and other population parameters. At the same time research should be initiated concerning the effects of roundups and artificial culling on population characteristics, social structure, and range use.

This option can be incorporated with any of the previously mentioned alternatives. There would be no significant impacts to any natural resources, as this alternative would only serve to increase our knowledge, and upgrade our management of bison.

Some concern has been expressed that inbreeding could become a problem in a captive buffalo herd, especially one which originated from common stock. Tests at Wind Cave National Park in 1983 found a high level of genetic diversity in that herd. Theodore Roosevelt National Park will consider genetic studies at some later date to insure that the same holds true for this herd.

4. RECOMMENDED COURSE OF ACTION:

Alternatives B, C and D are recommended. Continuance of the Bison Management Plan provides for monitoring and controlling herd size, maintaining a disease-free herd, and reducing escapes. The South Unit corral would be relocated, and at the same time, research programs underway and proposed would provide carrying capacity data, and information regarding competition and other relationships between bison and other range wildlife.

A. Resource Management Action:

THRO-N-0009-01 Conduct Bison Management Plan including multi-agency coordination, semi-annual roundups and removal, brucellosis checks, and calf vaccination. Implement new research findings from carrying capacity studies.

THRO-N-0009-02 Maintain and construct bison-proof fence for the entire park.

THRO-N-0009-03 Respond to bison escapes by herding the animals back into the park.

THRO-N-0009-04 Maintain bison corrals in each unit of the park.

THRO-N-0009-05 Relocate and reconstruct ~~South~~ Unit corrals.
North

B. Monitoring Actions:

THRO-N-0009-06 Monitor herd population annually.

THRO-N-0009-07 Establish bison forage utilization monitoring program.

C. Research Actions:

THRO-N-0009-09 Conduct research on the effects of artificial selection on population characteristics, social structure, and range use.

THRO-N-0009-10 Determine the role of bison in relation to the park ecosystems.

1. THRO-N-0010 WILD HORSE MANAGEMENT

2. Statement of Problem: The population of wild horses* in the South Unit has varied from 42 to 72 animals. The present objective is to manage for a herd size between 40 and 50 animals. For the most part, the horses restrict themselves to the eastern portion of the unit. The exact number of mares, fillies, colts, and stallions is not known, as these animals are wary and cannot be approached too closely for censusing.

Most of the horses are thought to be descendants of two mares that escaped from the Barnhart ranch, and a white stallion of unknown ancestry. In addition, other animals have entered the population; 3 geldings which escaped from a local rancher in 1952 or 1953, 2 donated stallions and 3 wild stallions obtained from the Bureau of Land Management. The five introductions in 1981-82 were made in an attempt to enlarge the gene pool.

In 1964-65, plans were made to remove feral horses from the park. It was thought that they were not appropriate to the park scene. However, due to strong local pressure and unfavorable publicity against the proposal, the decision was made to maintain a herd of approximately 40 animals.

Perhaps the best reason for managing a feral horse herd pertains to the historic badlands scene during Theodore Roosevelt's time here. Roosevelt wrote in Ranch Life and the Hunting Trail, "In a great many - indeed, in most localities there are wild horses to be found, which although invariably of domestic descent, being either themselves runaways from some ranch or Indian outfit, or else claiming such for their sires and dams, yet are quite wild as the antelope on whose domain they have intruded..." Thus the herd adds authenticity to the historical interpretation of the park, and these animals are considered a historical demonstration.

However, they require management as a natural resource, to control population size and to protect the grassland resource. From periodic roundups, and subsequent sale at auction, proceeds are returned to the park for their management. To date, no determination has been made for a specific method that should be used to keep the herd at the desired number, or the proper age and sex ratios. Live capture, with direct reduction in some instances, will be used to accomplish management goals.

It should be noted that Tom Tescher, a local rancher residing southwest of Medora, has been maintaining records on the make-up of the wild horse herd in the park for a number of years. Tescher has records of the blood lines of most of the horses in the herd.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

A. No Action: This alternative would continue the present management which has not evaluated the impacts of horse use on

the badlands ecosystem nor determined the desirable population structure. Introductions of stallions have been made to influence color variation and possibly relieve suspected inbreeding problems. Inbreeding however was discounted in a recent study of the herd. (Frei, M.N. 1977. Wild Horse Evaluation Report for Theodore Roosevelt National Memorial Park. Unpublished, mimeo. 12pp.).

Under this alternative, impacts to the range would be undetermined, and proper population structure ignored, resulting in an unknown potential for increase. Periodic roundup for herd reduction would continue. Introduction and removal of animals have been justified historically, as ranchers captured and sometimes turned loose domestic horses throughout the badlands and in what is now the park.

Theodore Roosevelt referred to this "exchange" in his writings about ranching in the badlands. Actions such as Roosevelt mentioned most likely led to a variety both in color and conformation of the animals that made up the wild horse herds during his time in North Dakota.

B. Population Management Without Introduction: This option would discontinue the introduction of animals from other sources to add new genetic material. The resulting herd would probably tend toward a very limited pelage color scheme. This is not a significant impact unless a firm decision is made to retain a herd with a variable pelage color pattern.

Biologically, evolution toward a single color pattern poses no problem, and the potential for inbreeding defects has been significantly reduced by the animals introduced in the recent past. Another point to consider is that of maintaining a historic badlands horse herd, with the animals being direct descendants of the horses which were found here when the park was founded. This consideration has been compromised somewhat already from the introduction of other stallions.

Periodic roundups would be continued in order to reduce the herd and manage population potential by adjusting sex and age classes. This alternative does not address impacts to the ecosystem from exotic horses.

C. Population Management With Introduction: This alternative would include the use of outside sources of animals to supplement the genetic pool currently in existence. This program would be most beneficial in maintaining a herd with a variable pelage color pattern. Additionally, it may be useful if genetic defects, attributable to inbreeding, become apparent.

The notion of a historic band of badlands horses would be lost, as animals from outside sources are introduced. Population management through periodic roundups would continue, but again the ecological impacts of feral horses would not be evaluated.

D. Research of Ecological Impacts: This option deals with

evaluating the role and impacts of exotic horses in the badlands environment. Impacts to the vegetation of the park are not apparent, as lush growth is obvious. However, it is unclear if these animals utilize the range in ways to decrease plant diversity or cause local over-utilization.

Competition with native wildlife is not understood. Food habits and habitat preference need to be examined for overlap with other species. Soil compaction near watering sources and erosion from trailing may be important. This alternative can be initiated in conjunction with any of the previous three.

4. RECOMMENDED COURSE OF ACTION:

At this time a combination of the last two alternatives is recommended for management of the feral horse herd. This scheme would allow management for a desirable variety in pelage color and in the meantime, evaluation of environmental impacts from the presence of an exotic horse herd can be initiated. This ecological research as described in Alternative D, is dependent upon available funding of research proposals as they are submitted.

A. Resource Management Actions:

THRO-N-0010-01 Periodic introductions of animals may be made to influence pelage color variation.

THRO-N-0010-02 Periodic roundup to maintain desired herd size, sex ratios, and age classes.

B. Monitoring Actions:

THRO-N-0010-03 Yearly count of population to determine rate of expansion and changes in age and sex ratios.

C. Research Actions:

THRO-N-0010-04 Evaluation of the role and impacts of wild horses on the badlands ecosystem.

THRO-N-0010-05 Review of the literature to determine the breeds of horses typically found in the North Dakota badlands in the late 1800's.

*Any reference to wild horses means domestic horses that have gone wild and their descendants that inhabit the park.

1. THRO-N-0011 BIGHORN SHEEP MANAGEMENT

2. Statement of Problem: The Audubon Mountain Sheep (Ovis canadensis auduboni) was once common in the Little Missouri badlands. The Audubon bighorn was first reported by Lewis and Clark in 1805, when they found bighorn from the mouth of the Yellowstone to the Great Falls of the Missouri, wherever there were badlands. By the time Theodore Roosevelt arrived in the badlands, in the 1880's, bighorns were becoming scarce, and the Audubon bighorn was extinct by the turn of the century.

California Bighorn Sheep (O. canadensis californica) were introduced in the South Unit of the park in the 1950's. The herd is descendent from sheep that were originally brought from British Columbia by the North Dakota Game and Fish Department. This population has never really established itself, and, indeed, has declined in recent years. Aerial survey data from 1974 showed a population of 27 animals: 10 rams, 15 ewes, and 2 lambs. The 1983 survey resulted in a total population estimate of 6 animals: 2 rams and 4 ewes.

No concrete explanations are available for the decline in the park's bighorn population. It is possible for sheep to move off of park lands, however this possibility seems unlikely. Food, cover, and water are more abundant within the park, and with no roads into the area, visitor harassment is extremely light. In addition, aerial surveys locate the animals in the same region of the park each time, and never along fence boundaries either inside or outside of the park. Disease epidemics are a possibility, but necropsies performed on dead sheep attributed death to pneumonia. Lungworms or their larvae were also found, but other state herds in the area have maintained themselves even though lungworm is reported as common in those herds.

The state of North Dakota has recently reported increased lamb survival after treating selected herds with medication to combat lungworm infestations.

Obviously, recruitment through reproduction is a major problem. Again, no verifiable explanations have been developed. Predation, poor condition of ewes, and placental transmission of lungworm are possibilities.

The problem, then, is to decide whether to intervene with a research program or perhaps a restocking program, or to allow the mortality factor(s) to run its course. Local extinction is possible, but state herds in the vicinity may be available if needed for reintroduction. The objective for bighorn management is to perpetuate a natural population with the normal interrelationships with the park ecosystem, and to minimize the influence of man upon that population.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

- A. No Action: A no action policy would allow the mortality

factor(s) to run its course with no research to examine the problem more closely. In addition, immediate restocking to increase the herd numbers would not be attempted. However, liaison would be maintained with public agencies to consider the feasibility of sheep restoration in the park. Aerial surveys and monitoring by park personnel would continue until the existing herd began to increase or went to extinction. Such a policy, although providing no relief for the existing herd, may ensure that a disease vector has run its course and will not be transmitted to other bighorns.

Research initiated at this time would possibly be of little use because of the low number in the herd. In addition, many studies have been conducted regarding problems in maintaining bighorn herds. Most of these have been specific to a local population, and are based on a totally different set of conditions. Since the population is low, researchers would be hard pressed to locate the animals, and, in addition, might put extra stress on the few remaining animals.

B. Limited Action: A prompt remedial action is an alternative for consideration. This alternative would include a restocking program to quickly rebuild the population. Such a program may possibly expose stocked animals to the same mortality factor(s), resulting in not a solution, but a large expenditure of money, without positive results.

C. Bighorn Restoration Plan: This alternative would include a restocking plan on range unaffected by lungworm, or a plan to increase the number of reproductive-age animals in the existing population. At the same time a system of monitoring for population fluctuations, reproductive success, and habitat use would be initiated for either approach. Arrangements would also be made for necropsies, tissue samples, and blood samples (and their analysis) through a local veterinarian. Under either plan, if the population begins to decline for unapparent reasons, a research program would be initiated to find the cause for mortality.

4. RECOMMENDED COURSE OF ACTION:

At this time, the No Action alternative appears to be the most reasonable, however, the other options should be continually considered. A restocking program, as explained earlier, may only expose other animals to the same mortality factors. Also, a research program would probably not be useful, as location, stress in capture, and small sample size, of the remaining animals, would burden researchers in their efforts to determine the cause of the population decline.

In the immediate future, however, consideration will be given to perhaps working out a plan with the State whereby the remaining park bighorns would be salvaged and removed to an off-site enclosure where they would be treated for lungworm and hopefully propagate. In the meantime an enclosure would be constructed in the park at a selected, accessible site which the animals and

their progeny would in time be returned to. After a population increase in the enclosure which would serve as a trap to recapture them periodically for the purpose of remedivating to prevent a buildup of lungworm in the herd.

A. Resource Management Actions:

THRO-N-0011-01 Maintain liaison with state and federal agencies for consideration of the park for a bighorn restoration program.

B. Monitoring Actions:

THRO-N-0011-02 Monitor bighorn populations via aerial and ground surveys.

1. THRO-N-0012 DEER AND PRONGHORN MANAGEMENT

2. Statement of Problem: Whitetailed deer (Odocoileus virginianus), mule deer (O. hemionus), and pronghorn antelope (Antilocapra americana) all inhabit Theodore Roosevelt National Park. The pronghorn population is variable, as seasonally migratory herds move in and out of the park. During the winter, when separate social groups combine into wintering herds, groups of antelope frequent both units of the park, with the total population depending on general pronghorn cycles. It has generally been found that there are more of these animals inhabiting the South Unit than the North Unit. The pronghorn frequent the plateaus and larger grassland areas which occur near park boundaries. Few antelope are found on plateaus in the central portions of the two units, as pronghorn rarely move through areas of rugged terrain. Though small pronghorn herds are scattered throughout western North Dakota, a herd procured from Yellowstone National Park (17 males, 39 females, 10 male kids, 9 female kids) was released in January, 1951.

Intrusion of pronghorn home ranges near the park boundary by oil and gas development and associated roads and pipelines may have an effect on the numbers of these animals that will be found in the park in the future.

Because deer are able to move in and out of the park freely, an accurate count of their numbers is difficult. From yearly spring and fall aerial surveys, the estimated whitetailed deer population in the South Unit is 150 to 225, and 75 to 200 in the North Unit. The bottom lands of the Little Missouri River, which are typified by relatively heavy vegetation, is the preferred habitat of the whitetailed deer.

From trend studies conducted during the 1960's and 1970's, and from aerial surveys, the estimated population of mule deer in the South Unit is 600 to 700, and in the North Unit, 400 to 500. Although preferring a more open environment than the whitetailed deer, mule deer utilize hardwood and hardwood-conifer-covered draws in the higher portions of the park for cover. These animals are protected within the park by Title 36 of the Code of Federal Regulations. Extra protection by the ranger staff is afforded this group during the hunting season when outside pressure from area hunters is high.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

A. Discontinue Current Management Action: This policy would discontinue the twice yearly deer and pronghorn aerial surveys which are flown by the North Dakota Game and Fish Department, and funded by the Theodore Roosevelt Nature and History Association. A data base for these species would be lost, and serious herd under- or over-population may possibly go unnoticed.

As the fencing project to contain bison within the park continues, this alternative could result in serious problems as

all three species move in and out of the park. The bison fencing is seven-foot high net wire, which would eliminate ungulate movement from both directions. Populations of pronghorn in the north-central states have been decimated in the past when the animals were unable to migrate, because of man-made structures, during unfavorable climatic episodes.

B. Limited Action: This alternative would continue twice yearly aerial surveys of deer and pronghorn. These surveys furnish the park with population estimates, which can be compared from season to season, or year to year, to establish population trends. This would enable park personnel to identify dramatic decreases in the populations, such as resulted in and from a hemorrhagic disease epizootic suffered by whitetailed deer in the early 1960's.

A limited action policy would include the construction of barbed and smooth wire panels, within the net wire fence, to facilitate pronghorn and deer movement. These panels would be located along established game trails and in fence corners, where trapped animals would congregate. This action would reduce death loss of animals trapped within or outside the park during severe weather.

C. Deer and Pronghorn Management Plan: In addition to the steps listed under the Limited Action proposal, a stepped up census would be required, to cover a greater portion of the park. In conjunction with a more intensive census, carrying capacity research is needed. Such a study would include browse utilization surveys for deer, range plant utilization surveys for pronghorn, and identification of preferred and critical habitats. Food plant utilization surveys and censusing would continue on a year to year basis to balance the populations with the amount of available forage, thus preventing under or over-utilization. Research to determine the role of deer and pronghorn in the park ecosystem is needed. These studies would then be useful in formulating management strategies to manage these species within a dynamic ecosystem concept, in balance with other species and the available forage.

4. RECOMMENDED COURSE OF ACTION:

Alternative B, Limited Action, appears to be the most reasonable to follow. Because data from the last 10-15 years shows relatively stable population levels, an intensive management program to protect these animals from local extirpation or overpopulation seems unnecessary. In addition, Alternative B recognizes the importance of free movement in and out of the park. Studies in New Mexico were successful in demonstrating the ability of barbed and smooth wire panels in net wire fencing, allowing migration of pronghorn, while restricting livestock movement.

However, in the near future it may be necessary to accept alternative C as the recommended course of action. Especially if elk are reintroduced into the park, or as vegetation and

other herbivore research is initiated, the role of the deer and pronghorn in the park ecosystem should be investigated.

A. Resource Management Actions:

THRO-N-0012-01 Maintain patrols to prevent poaching during the hunting season.

THRO-N-0012-02 Continue to modify the fence to permit migration of deer and pronghorn.

B. Monitoring Actions:

THRO-N-0012-03 Continue aerial surveys semi-annually to assess population trends.

C. Research Actions:

THRO-N-0012-04 Conduct research on the role of deer and pronghorn in the park ecosystems.

THRO-N-0012-05 Research carrying capacity for each of the 3 species, and identify critical habitats.

1. THRO-N-0013 LONGHORN CATTLE MANAGEMENT

2. Statement of Problem: A herd of approximately 20 longhorn steers is maintained in the North Unit of the park. Occasionally steers die from exposure or old age, and replacements, as well as the original steers, have all been obtained from Fort Niobrara National Wildlife Refuge, Valentine, Nebraska. At the time of delivery the steers have ranged from one to five years of age.

These animals are displayed to allow visitors to see and photograph this famous, historically significant type of cattle. Of added relevance in this respect is the fact that the old Long X Trail, which was once used for longhorn cattle drives, passed through what is now the park's North Unit. In their present location, these animals are commonly observed by park visitors. Because of this, they have become a favorite attraction. Though the steers are allowed to roam freely throughout the North Unit, they restrict themselves to a sagebrush flat area of approximately 750 acres, located a short distance (2-3 miles) west of the district entrance station. The animals occasionally roam westward toward the Squaw Creek Campground but seldom, if ever, range further than this.

During the warm summer months the steers require little or no management. They feed on the new growth of grass, shrubs, trees, and water from the river, corral tanks, or from undeveloped springs in the area. Salt blocks are provided for additional mineral supplement. During the winter when prolonged cold spells are common, the cattle often need to be fed hay as conditions prevent their feeding for themselves. In addition, a water supply must also be maintained during this period. Other management includes inoculations as required and periodic health checkups. The buffalo corral in the North Unit is used to hold these animals when this work is performed.

In 1978, the area was recognized as warranting National Park status and established as such. With this action, the presence of the longhorns may have come into conflict with NPS policy in terms of natural systems management. The long term impacts of these animals on park natural systems are unknown and need to be evaluated.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

A. No Replacement: Since this is not a breeding herd, ultimately all of the animals would die, and with no replacement, the herd would cease to exist. In addition, because the animals, at times during the winter, require supplemental feeding, die-off could be rapid depending on weather conditions.

This condition would result in the elimination of an exotic species. However, this species has been determined as a significant contribution to the historical scene, and can be easily managed because the population can never increase. This

alternative then, would be inappropriate to implement.

B. No Action - Current Management Plan: Current action has resulted in a healthy herd that adds authenticity and historic color to the historical badlands scene. At times the animals will require supplemental feeding, but this has, in the past, been an insignificant expense. To avoid overuse in some areas, salt blocks should be moved periodically to areas showing less intensive use by the longhorns. This system may help minimize any damage to vegetational resources.

There would be little or no effect on the visitor availability to the longhorns. Most of the area utilized by the animals is open land, so distribution of salt blocks would probably not preclude visitors from a chance to view the steers.

As individual steers die, they would be replaced with animals from the source herd at Fort Niobrara. Efforts would be made to secure animals with different color variations as this, along with the distinctive horns of the group, promotes the overall quality of the exhibit.

C. Introduction of Breeding Stock: Upkeep and management would increase abruptly if breeding stock were introduced. As bulls tend to wander more than cows or steers, a fence enclosure would need to be erected to prevent their movement to neighboring ranches. However, the historical significance of the herd would not be enhanced by the addition of breeding stock, as interpretation of the animals centers around their ancestors' presence on the cattle drives of the 1800's. Basically, the cost of upkeep and maintenance of a reproducing herd make this option prohibitive.

4. RECOMMENDED COURSE OF ACTION:

The current management plan, alternative B, appears to be the most reasonable to follow. Retention of the herd in its present state is desirable as a historic display. The habits of the animals lend themselves to easy observation by visitors, because they inhabit open grassland portions of the North Unit. Even with careful management to disperse grazing pressure in these areas, there may be significant environmental impacts and these need to be evaluated.

A. Resource Management Actions:

THRO-N-0013-01 Maintain longhorn cattle management program.

B. Research Actions:

THRO-N-0013-02 Conduct research on longhorn cattle habitat selection, utilization, and environmental impacts.

1. THRO-N-0014 PORCUPINE AND BEAVER MANAGEMENT

2. Statement of Problem: Both porcupine (Erethizon dorsatum) and beaver (Castor canadensis) occupy wooded areas of the park which are found primarily along stream courses, ravines, and on north facing slopes, as their primary diet is composed of the cambium from woody plants. Most developed areas and high visitor use areas are located in wooded locations, and because the feeding habits of these two species weaken trees, a potential for damage or human injury from falling trees and branches exists.

It is the intuitive feeling of some staff members who have been at the park for a number of years, that porcupine and beaver numbers appear higher than in previous years. However, no quantitative data is available to compare the relative population size to that in years past. There is also concern that population regulating mechanisms are not adequate to control numbers of the two species, but again no data to support this idea is available. Both of these theories will require investigation especially considering our responsibility to maintain public use areas free of hazardous trees and limbs.

Because of the damage and hazard to visitor safety, population reductions through trapping and relocation, and shooting have taken place. The latest of these efforts occurred in 1972 when beaver were cutting a great number of cottonwood in Cottonwood Campground, and in 1982 when porcupine were depredating trees in the Peaceful Valley Picnic Area and Cottonwood Campground.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

A. No Management: This alternative would provide no protection for the woody species in developed and high visitor use areas, and may result in hazardous conditions for visitors and park staff. No effort would be made to monitor the relative population sizes in any way. From past experience it is apparent that both beaver and porcupine can have a significant impact in visitor use areas.

B. No Action - Continue Limited Management: Since our concern is directed toward potential damage to forest resources and visitor protection, activities to remove problem animals from the developed areas would continue. This is handled on a case by case basis.

Informal monitoring of hazardous situations in developed visitor use areas would continue. In addition, steps would be taken to find an acceptable repellant to discourage the animals in developed areas. There has been considerable study in this respect, and several repellants have been shown to be nearly 100% effective for periods of three to four months.

Implementation of this alternative would result in no major decrease to the two species populations, would protect forest resources, and provide some degree of visitor safety.

C. Beaver and Porcupine Research: This alternative would include a program to determine the factors influencing beaver and porcupine population dynamics, and their roles in the park ecosystem. It would also be useful to determine, through historical documentation, the number of beaver in this area at various points in written history, and the extent of hunting and trapping pressure during that period.

In addition, a program for regular monitoring of beaver and porcupine population levels and establishment of action thresholds would be initiated. This alternative would provide an understanding of species ecology and point the way to future management.

4. RECOMMENDED COURSE OF ACTION:

At this time, alternatives B and C provide the best protection for the wildlife species, the woodland resources in developed areas, and the visitor's safety. If an acceptable cost effective repellent can be found, developed areas such as Cottonwood Campground which have had reoccurring problems, could be afforded protection for an extended period of time.

A. Resource Management Actions:

THRO-N-0014-01 Conduct informal monitoring in developed areas until funding and/or problem reaches levels requiring regular systematic monitoring. Continue removal of problem animals on a case by case basis, with appropriate justifications, collecting permits, and completion reports.

B. Research Actions:

THRO-N-0014-02 Experiment with and evaluate repellants and their effectiveness.

THRO-N-0014-03 Conduct research on porcupine and beaver ecology and population dynamics as they relate to park ecosystems and use.

1. THRO-N-0015 ENDANGERED AND THREATENED SPECIES MANAGEMENT

2. Statement of Problem: Theodore Roosevelt National Park serves as a refuge of native prairie and thus as a preserve of habitats essential to a number of species listed as threatened or endangered. There are currently no federally listed threatened species inhabiting or which potentially could inhabit the park. However, the park comprises potential range for a number of endangered species.

The historical range of the northern swift fox (Vulpes velox hebes) included all of North Dakota, but no sightings were reported from 1915 to 1970. Recent reports indicate that this fox is returning to its original range, as recent sightings have been made in the Dakotas (Pfeifer, W.K. and Hibbard, E.A. 1970. A recent record of the swift fox (Vulpes velox) in South Dakota. J. Mammal. 56:525).

This species is dependant on a prairie environment, using shortgrass areas for subterranean dens. Potential habitat exists in the park for the northern swift fox, and though none have been sighted, surveys are needed to determine if any are currently inhabiting the park.

The blackfooted ferret (Mustela nigripes) is associated primarily with prairie dogs and prairie dog towns. With approximately 435 acres of active prairie dog towns scattered throughout the park, the possibility exists that ferrets may inhabit some of these prairie dog towns. Several sightings have been made in the park and the surrounding area, though none have been reliably confirmed. Again, a survey needs to be conducted to identify the possibility of ferret habitation.

The last recorded nesting of peregrine falcons (Falco peregrinus) in western North Dakota occurred in 1954 within the badlands south of the park (Cadieux, C. 1981. The peregrine falcon. In: These are the endangered. p 31-38). The past two Audubon Christmas Bird Counts have yielded a report of one falcon each year either within or immediately adjacent to the park. There is, therefore, a need to identify potential nesting habitat, monitor those areas, and increase routine raptor surveys.

The gray wolf (Canis lupus) historically occupied nearly all habitats of the northern hemisphere. This species, in North America, is now generally restricted to Alaska, Minnesota, Michigan, and National Park areas of Wyoming and Montana. There may be a small population of wolves in eastern North Dakota, as a recent kill was reported (Paradiso, J.L. and Nowak, R.M. 1982. Wolves. In: Wild mammals of North America: Biology, management, and economics. p 460-474). No wolves have been reported recently in western North Dakota, and it is likely that none exist in the park. Though once an integral part of the badlands ecosystem, it is impractical to consider a reintroduction program with livestock production being a major economic base in the area surrounding the park.

Bald eagles (Haliaeetus leucocephalus) are commonly seen along the Little Missouri River during spring and fall migration. Whooping cranes (Grus americana) have been seen along the river also, but these sightings are extremely rare. As these species utilize the riparian habitat within the park only briefly during migration, no management is directed towards them, though they are counted and habitat use recorded.

Five species are listed by the North Dakota Natural Heritage Program as endangered within the state, in addition to the federally listed species. They are: black bear (Ursus americanus), fisher (Martes pennanti), river otter (Lutra canadensis), least tern (Sterna albifrons), and the pugnose shiner (Notropis anogenus). None of these species has been recently recorded within the park, but an awareness of the rarity of these animals should be continually fostered.

Seventeen species of vertebrates and one invertebrate species are listed as threatened by the state. Five species of fish are included in this category, and a stream survey may be in order. Prairie falcons (Falco mexicanus) and golden eagles (Aquila chrysaetos) are often observed in the park, and the eagles are regularly censused and nests located. The merlin (Falco columbarius) has been observed infrequently, and nest locations are unknown.

The remaining state threatened species have not been located in the park, but the park staff will remain on the lookout for these. The mountain lion (Felis concolor) is also threatened statewide, and it is considered under the Carnivores Management Project Statement.

No federally listed plants, in either the endangered or threatened categories, have been located in the park. Two plants, bursage (Ambrosia acanthicarpa) and desert wire lettuce (Stephenomeria runcinata) are listed as endangered by the state, while alkali sacaton (Sporobolus airoides) is listed as threatened by the state. All three are found in the park, though their distribution and numbers are unknown. Additionally, these species are common in the southern mixed prairie and desert grassland, and so are most probably on the northern edge of their range. If this is the case, these plants may never have occurred here in high numbers.

As with all species of plants and animals, suitable habitat is a critical factor in their survival. A number of threatened or endangered species could potentially make use of available habitat in the park, so it is necessary to evaluate these habitats for suitability of introduction, and evidence of present use.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

A. No Action - Existing Management: This option would continue the present method of limited survey. Very little effort is

made toward evaluating the presence of the species which are difficult to locate. It is true that some of these animals would be very difficult to locate even with intensive survey. However, this option provides only a little to the park's data base.

B. Increased Surveying: This alternative includes additional efforts beyond those of the first option, to survey for a number of species not presently investigated. The ultimate goal of this plan would be to set up a program to systematically survey for known or potential populations. A benefit of this alternative would be the identification and estimation of the suitability of habitats for these species.

C. Evaluation for Reintroduction: Under this alternative, the habitat and suitability for reintroduction or supplementation of threatened or endangered species populations would be evaluated. For extirpated species, quantity and quality of habitat would be investigated. The quantity of suitable habitat must be evaluated for species with populations needing supplementation.

If stock of the species is available, and available habitat exists, introduction will be planned based on available funding. Any animals or plants introduced would be closely monitored to determine the success of the program.

4. RECOMMENDED COURSE OF ACTION:

Alternatives B and C are recommended at this time. This must be a progressive process starting with the surveying activities outlined in alternative B and moving toward alternative C as a goal. A primary mission of the Service is to manage for native flora and fauna, and so maintenance of populations of endangered and threatened species should be an important management objective.

A. Resource Management Actions:

THRO-N-0015-01 Continued protection of endangered and threatened species through routine patrols and habitat protection.

THRO-N-0015-02 Work with federal, state and private agencies which have expertise in the survey and management of T/E species.

B. Monitoring Actions:

THRO-N-0015-03 Surveys and monitoring continued for endangered and threatened species known to inhabit the park.

THRO-N-0015-04 Surveys and subsequent monitoring if populations of other T/E species exist in the park either seasonally or permanently.

C. Research Actions:

THRO-N-0015-05 Evaluation of habitat suitability for supplementation of existing populations, or starting of new populations of T/E species.

1. THRO-N-0016

ELK RESTORATION

2. Statement of Problem: Historically, elk (Cervus elaphus) were common in the North Dakota badlands. With unrestricted hunting and through competition with domestic livestock, elk were extirpated in the late 1800's. Because of the role of elk as major herbivores in the badlands ecosystem, a need exists to restore elk to the park. Some thought was given to elk restoration in the park in the 1960's and 1970's, but no action was taken.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

A. No Action: Under this alternative no effort would be made to restore elk within the park. The park ecosystems would continue to function in the absence of this herbivore. Park visitors would be denied the opportunity to view this animal which was part of the historic and natural scene.

B. Develop an Elk Restoration Plan: Under this alternative a restoration plan would be developed, and public comment solicited, following completion of the plan. If public comment and support is favorable, an elk population would be restored to the park. These animals would be expected to again serve as major consumers of herbaceous cover, interacting dynamically within the park ecosystem.

It can be anticipated that elk populations may increase to a level above carrying capacity, and risk a population crash in the absence of natural or artificial population control. Additional grazing pressure by a very large herd risks a decrease in vegetation diversity and density. Additionally, soil compaction and erosion, as well as competition with other herbivores may become a problem. Following the introduction, if natural population control is apparently lacking and population levels become too high, an artificial means of control would have to be implemented, based on a previously developed plan.

With large populations which may develop sometime after the introduction, the possibility of elk moving to adjacent lands exists. They could become a nuisance as a livestock competitor, or they might damage crops. But also, the elk could become an important and prized game species to be hunted in the area, with the park serving as a base for stocking adjacent ranges.

Through this alternative, park visitors would realize the opportunity to view a species which was historically present in the badlands ecosystem.

4. RECOMMENDED COURSE OF ACTION:

Alternative B is selected, but must be accompanied by an intensive effort to involve and educate the public, before it is implemented.

A. Resource Management Actions:

THRO-N-0016-01 Contact North Dakota Game and Fish Department and adjacent landowners regarding the

feasibility of elk reintroduction in the park.

THRO-N-0016-02 Develop a plan and Environmental Assessment for introduction of a viable population of elk into the park.

THRO-N-0016-03 During the public review process for the Natural Resources Management Plan, the public, through a press release, would be requested to comment on the feasibility of elk restoration.

B. Research Actions:

THRO-N-0016-04 Research the historical population levels of elk in the badlands ecosystem.

THRO-N-0016-05 Research movement, habitat preference and habitat utilization data in the literature and the same factors should be studied after the animals are reintroduced into the park.

1. THRO-N-0017

BOUNDARY CONTROL

2. Statement of Problem: In both the North and South Units of the park, boundaries are physically delineated by fencing. The purpose of this physical barrier is threefold: (1) to keep the resident buffalo population within the park, (2) to keep domestic cattle outside the park, and (3) to define the boundary.

In the past it has been found that the present four-strand barbed wire fence, which stands four or five feet tall, is not adequate to prevent buffalo escape. Barbed wire fencing has required almost constant maintenance to combat the adverse effects of weather and wildlife. Buffalo have no difficulty in jumping a five-foot fence, and if they are unusually anxious to get to the opposite side, they simply walk through. Breaks in the fencing not only allow buffalo to escape the park, but also allow domestic stock access to the more inviting grazing land within the park boundaries. The cost of the perpetual repair and maintenance of the barbed wire, added to the expenditures for buffalo retrieval and domestic stock removal, places an disproportionately heavy load on park funds and manpower. Nine tort claims against the government, totaling \$17,888, have been won on the basis that the park has not provided proper facilities for containing bison.

Following the construction of Interstate 94, a seven-foot high woven wire fence was constructed along the highway and park boundary. Only one documented bison escape from this area of woven wire has been recorded. Thus, efforts were begun in 1977 to construct a similar fence completely around the park. Though the number of bison escapes has decreased, escapes through the remaining barbed wire fences continue. To date, in the South Unit, 16 of 30 miles has been fenced with the high woven wire. In the North Unit, 6 of 30 miles has been fenced with woven wire. The park posts the boundary fence with NPS signs every 320 feet. The fence line is patrolled to maintain boundary control.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

A. No Action - No Woven Wire Fencing, No Boundary Control: This alternative cannot be recommended because of the previously mentioned economic considerations. Proper management demands a more adequate provision for containing the buffalo herd. Moreover, it is necessary to keep domestic stock from the park, so that a natural wildlife range can be maintained.

B. Corrective Fencing With Boundary Control: Barbed wire could be replaced with woven wire fencing in areas showing a high frequency of escape or trespass. Boundary signing and patrol would continue. Even though this option would not completely solve the problems associated with the present facility, it would perhaps partially fill the current needs. This alternative should be viewed as a stop-gap measure that would be followed up with the complete project as funding permits. As

mentioned earlier, partial fencing with woven wire has reduced, but not eliminated buffalo escapes. Impacts to soil and vegetation would follow the existing fence line. Some shrubby vegetation may have to be cut to allow for construction. Some grasses and low growing species would be trampled, and some soil compacted. However, these impacts are expected to be temporary, and all due care would be exercised to minimize these impacts.

C. Complete Woven Wire Fencing With Boundary Control: Judging from the favorable experience with the existing woven wire fencing, this option appears to answer the problems associated with barbed wire. Boundary signing and patrol would continue. Animal escapes and stock trespass would be reduced or eliminated, and storm damage and related repairs would virtually become a thing of the past. Form 10-238 packages 110 and 123 dated 12/14/73, propose replacement of the barbed wire with woven wire. Justification for the proposal is based on the historical and anticipated maintenance costs, and the possibility of future tort claims against the United States Government. It has been deemed necessary to determine movement routes of pronghorn and deer so that provisions can be made for their egress and ingress into the park. It has been found possible to leave "crawl" spaces along certain sections of the fence to allow passage for these animals.

Again, impacts to soil and vegetation would be minimal, as the new fence would follow the existing fence line. Some shrubs would have to be trimmed to allow access to the fence line, and some low growing species would be trampled. These impacts would be temporary, and care would be exercised to minimize these impacts.

Of primary importance here is to maintain the routes utilized by deer, pronghorn, and other wildlife to move in and out of the park. Traditional wildlife trails have been marked along the boundary in the South Unit, and the same will be done in the North Unit. Following fencing with woven wire, modifications would be constructed to allow movement of these animals in and out of the park. Pronghorn, as well as both species of deer, will readily crawl under a fence opening. The space required for these animals would not be sufficient for the passage of bison, horses, longhorns, or domestic cattle. A program to monitor the use of these crossings would be included, to judge if they are being used, and if the ungulates are being restricted to a significant degree by the woven wire fence.

4. RECOMMENDED COURSE OF ACTION:

Complete woven wire fencing with the present levels of boundary control is recommended at this time. Currently the park is proceeding with this option, as contracts have been let for portions of the job. There appears to be no reason, at this time, to delay the project.

A. Resource Management Actions:

THRO-N-0017-01 Construct bison-proof fence around both

units of the park. Maintain a system of wildlife crossing modifications in fence.

THRO-N-0017-02 Maintain boundary fence.

THRO-N-0017-03 Patrol boundary fence.

THRO-N-0017-04 Sign boundary fence.

B. Monitoring Actions:

THRO-N-0017-05 Monitor the effectiveness of wildlife crossings in the boundary fence.

1. THRO-N-0018

FIRE MANAGEMENT

2. Statement of Problem: Theodore Roosevelt National Park has no Fire Management Plan or Natural Fire Program. Since the park's establishment in 1947, these 70,000 acres have been rigorously protected by a policy of total and complete fire suppression. All fires, whether man-caused or natural, have been aggressively contained and suppressed. The park has no prescribed burning program and the only burning done in the last decade has been insignificant amounts at widely scattered locations to obliterate tracks made by illegal off-road motor vehicle traffic and for corral pasture management.

The problem, simply stated, is that park management does not know whether the policy of suppressing fire is in the best interest of the park's natural systems. Research and fire management results obtained throughout this region of the Great Plains in recent years, lead us to believe that this tradition of suppression may be leading towards the creation of homogeneous vegetation zones and may have some influence on normal plant succession within the park. This in turn could be detrimental to the perpetuation of habitat for native wildlife species and could be encouraging the proliferation of exotic plants. An additional consideration came into play in 1978 when 29,920 acres of the park were designated National Wilderness. In two Wilderness areas, 19,410 acres in the North Unit and 10,510 acres in the South Unit, the principles of Fire Management as stated in NPS policy should be applied, and lightning fires treated as natural phenomena.

Action must be taken to develop a fire management plan for the park. What actions the plan will dictate will depend on the application of existing knowledge, future research specific to the area and present day fire management techniques.

It should be noted in this overview that from 35 years of fire history, fires do not occur frequently within the park. Since 1947 only 26 fires have been recorded in the South Unit and of these, less than 50% have been naturally ignited. Suppression efforts contained the 26 fires to a total acreage burned of slightly more than 600 acres. Therefore, in 35 years, only 1.5% of the 46,000 acres in the unit has been affected by fire.

A program of fire management will require a commitment of funds to procure additional equipment and to train personnel in the application of fire management techniques.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

A. No Action: Under this alternative, fire suppression crews will continue to be dispatched for immediate suppression, with no regard for allowing the natural burning process to run its course. Man's intervention in the natural process may work to the detriment of park resources.

B. Wildland Fire Management Plan: Under this alternative, a

plan will be developed to restore fire to the park ecosystems. It is envisioned that the park will be zoned, and a combination of fire management strategies; total suppression, prescribed burning and natural fire management would be implemented.

In so far as possible, using specific parameters to safeguard human life and property, the burning process of natural fire would be allowed to run its course. By returning to a natural burning scheme, floral diversity through natural plant succession, perpetuation of habitat for native wildlife, and natural energy flow and nutrient cycling would result. In addition, burning may discourage the proliferation of exotic plants.

Visitors would enter and experience a more truly natural area. Although an active fire or the charred remains from a fire may be initially distressing to visitors, the opportunity to interpret and explain the natural role of fire in the prairie ecosystem would leave the visitor with a greater appreciation of the complexities of nature.

4. RECOMMENDED COURSE OF ACTION:

To continue alternative A, total fire suppression until alternative B, a wildland fire management plan is implemented.

A. Research Management Actions:

- THRO-N-0018-01 Maintain fire suppression program to protect park natural and physical resources.
- THRO-N-0018-02 Develop a Wildland Fire Management Plan.

B. Research Actions:

- THRO-N-0018-03 Conduct research on the role of fire in relation to park ecosystems, including fire history, fire size and fire frequency.
- THRO-N-0018-04 Conduct closely controlled, small scale experimental burns to determine fires effects on selected sites within the parks ecosystem.

1. THRO-N-0019

PRAIRIE DOG MANAGEMENT

2. Statement of Problem: Black-tailed prairie dogs (Cynomys ludovicianus) are a native mammalian species, and have inhabited the park since at least the time of its establishment in 1947. Because of their diurnal habits and the location of several colonies along roadways, prairie dogs receive a great deal of attention from park visitors.

Prairie dogs fill an important position in the environment of the plains. They provide prey for numerous predators such as coyotes, badgers, bobcats, golden eagles and to some extent hawks and snakes. Their burrows provide habitat for a variety of other wildlife species, and their disturbance of the soil creates conditions for pioneering vegetative species as well as dusting areas for the buffalo. Active prairie dog towns are also critical habitat for the endangered black-footed ferret.

Prairie dogs in the park have, and are creating some minor management problems. At certain locations towns have expanded into areas developed for visitor recreational use. Dogs are coexisting with campers in the Halliday Wells group campground and have tried to invade the concessioners' small horse pasture. At locations along the park road, especially in the Johnson Plateau area, the animals have occasionally dug holes up through the pavement, creating maintenance work and some hazard to two-wheeled vehicles. Over the years, in situations such as those described, removal action has been directed towards those dogs that invade visitor use areas or attempt to establish themselves in areas where they could create hazardous conditions. No action has been taken to prevent prairie dogs from establishing new towns in locations where they did not interfere with visitor use or park developments.

Some visitor/prairie dog conflicts have taken place where towns are adjacent to roads and parking areas. The dogs become used to the traffic and people. Visitors, seeing the tame animals, can not resist the urge to feed them. On occasion, persons attempting to hand feed the animals have been bitten. Signs prohibiting visitors from feeding the dogs were erected at problem locations in the mid 1970's. Although people still pass food to the prairie dogs to some extent, there are very few incidents of persons hand feeding them and being bitten.

Records indicate that until at least 1954 human control of prairie dogs in the park was practiced. In 1953, unknown persons poisoned approximately 115 acres of dog towns in the Knutson Creek drainage of the South Unit. Since that incident there are no authentic records of mechanical or chemical control actions. The early treatments were a response to fear held by local ranchers, at the park's inception, that the NPS policy of not regulating rodent populations would result in uncontrolled spread of prairie dogs onto adjacent lands. This has not come to pass, as forces as yet not totally identified have held prairie dog numbers in check.

In the last decade, expansion of dog towns, with some persons referring to these situations as population explosions, has occurred in neighboring states, principally South Dakota. This phenomenon has not taken place in western North Dakota. Some of the smaller towns in the park, over the years have gone through a series of occupancies and abandonments, but in general most of the towns of over a few acres in size seem to have remained occupied. Some pioneering efforts by prairie dogs have been recorded, but unless they were close by an established town, the pioneering effort failed.

In this park, there may be reason to be concerned as indications are that prairie dog town acreage has decreased to a small degree in the last 10 years. There is some feeling that under-utilization of the range could be creating undesirable habitat conditions for the species. Therefore, whatever management action is taken toward population regulation of the buffalo herd as well as the application of fire could directly affect the prairie dog population. Although some earlier occurrence records were kept, it was not until 1965 that a program of periodically measuring the acreage occupied by towns was initiated. The 1965 acreage figures for dog towns in the park were recorded as 15 towns occupying 670 acres in the two units. In 1973, 14 towns occupied 434 acres; in 1977, 16 towns occupied 499 acres; and the 1980-82 survey showed 16 towns occupying 443 acres.

The survey method used from 1965 until 1973 left room for error, since old aerial photos, with estimated acreages, were compared to existing conditions with the boundaries of towns simply sketched in by persons stationed at a vantage point. In 1973, a procedure for measurement was established that relied on measuring and mapping techniques rather than ocular estimation. The present technique seems reliable in determining the quantity of land actually occupied by colonies of prairie dogs, thus giving a truer picture of any fluctuations in prairie dog occurrence in the park.

Prairie dogs are found on lands outside the park, but colony density per land area is much lower. The U.S. Forest Service in 1979 determined the total acreage of dog towns on the Medora and McKenzie ranger districts to be close to 2,000 acres on 2,113,000 acres of land, a ratio of 1 acre of dog town for every 1,056 acres of land. At that same time, the ratio within Theodore Roosevelt National Park was 1 acre of town for each 158 acres of land.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

In addressing alternative management actions, the considerations for prairie dog towns as habitat for the endangered black-footed ferret has been weighed and no action will be taken that would decrease the quantity of this available habitat.

A. No Action: A no action policy would allow prairie dogs to establish or attempt to establish colonies wherever conditions

meet their needs. Visitor safety and maintenance costs would not be considered under this option. The program of locating, measuring, and monitoring prairie dog towns would be discontinued with no effort made to maintain records of this animal population or movements.

B. Limited Management: Limited action would involve continuing the present program of making no attempt to manipulate prairie dog populations except for infrequent direct control in developed areas, measuring towns periodically to track increases and decreases in the relative abundance of the species, and encouraging research but with no direct sponsorship from the NPS.

C. Accelerated Management: An accelerated management program would include continuing control in problem spots with more formal monitoring methods at increased frequencies. In the meantime, research would be conducted as required, to study the population dynamics and interrelationship of prairie dogs in the park with manipulation conducted to strive towards a population level suggested by the historic and biological research.

D. Prairie Dog Research Program: This alternative would address the relationships of prairie dogs with the park environment. In particular, studies need to focus on the habitat maintenance relationship with buffalo, the predator-prey and habitat relationship with black-footed ferrets and other predators, and the effects of prescribed burning and other management practices on prairie dog habitat. An involved research program may be some years in evolving; in the meantime, however, the park will encourage researchers to utilize the park's prairie dog resources in studies they might wish to undertake with the resulting knowledge applied as appropriate towards the management of the park's prairie dogs.

4. RECOMMENDED COURSE OF ACTION:

The recommended course of action would involve the limited management alternative for the foreseeable future with management action becoming more sophisticated as more is learned about the role of prairie dogs in the park. In developing programs in this plan, such as vegetation and soils management and fire management, it will be necessary to address the effects of these programs on prairie dogs on a (more or less) case by case basis with the consequences thoroughly identified prior to action.

A. Resource Management Actions:

THRO-N-0019-01 Provide for visitor safety and protect park developments by applying minimum, limited direct control measures as necessary.

B. Monitoring Actions:

THRO-N-0019-02 On a frequency of not less than 3-4 years, locate, map and determine size of all prairie dog towns in the park.

C. Research Actions:

THRO-N-0019-03 Determine the relationship of prairie dogs with other elements of the park environment, especially other wildlife species, including predator/prey relationships.

THRO-N-0019-04 Investigate the potential black-footed ferret habitat provided by park prairie dog towns.

1. THRO-N-0020 SHARPTAIL GROUSE MANAGEMENT

2. Statement of Problem: Prairie sharptail grouse (Pedioecetes phasianellus) are found throughout the North Dakota badlands, and are frequently observed in the plateau regions of the park, as well as the hills lying above the river breaks. Judging from the high frequency of sightings, the grouse are quite numerous.

Even though no specific management is directed at this species, efforts are currently being made to locate and mark all "dancing" grounds. This will be helpful in determining an approximate number, and also will be of assistance in any future studies of this gallinaceous bird. Grouse, of course, are protected within the boundaries of the park by virtue of the appropriate section of Title 36 of the Code of Federal Regulations.

Although grouse seem to be plentiful within the park, no baseline data concerning approximate numbers, habitat preferences, or effects of grazing herbivores upon "dancing" habitat is available.

Research should be initiated locally to ascertain the ability of this species to maintain traditional courting areas. Some experts are of the opinion that these areas were maintained in part by grazing herbivores (cattle, buffalo, etc.), and that birds alone may be unable to keep grasses and shrubs at the low level required for dancing. If this is found to be the case, artificial methods may be needed to encourage the perpetuation of grouse courtship rites within the park. Mr. Frank C. Farley in Life Histories of North American Gallinaceous Birds states "...These dances take place every April and May, and often the grain, when up, is tramped entirely away." This observation indicates that grouse do have the ability to maintain their dancing grounds, but since other opinions differ, research in this respect is indicated. Any study relating to this species should be supported, and used in future management of this bird.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

A. No Action: A no action policy would continue the informal method of discovering grouse dancing grounds and monitoring the park's population. Although grouse will most likely continue to utilize habitat in the park, a lack of baseline data would prevent park personnel from accurately monitoring population trends, as well as protecting and managing dancing grounds. This alternative would have no impact on current interpretive activity or visitor observation of the grouse.

B. Limited Management: This alternative would provide for a "stepping-up" of current monitoring efforts. A survey would be conducted in the spring, while large numbers of grouse are on the dancing grounds, to not only locate dancing grounds, but to arrive at an estimate of the population. Such a policy would increase the data base for future management activity. In addition, this option would not change current visitor use of

the resource.

C. Grouse Management Program: This program would incorporate the activities listed within the Limited Management alternative, as well as a research program to evaluate the ability of the species to maintain traditional courting areas. Additionally, information would be gathered on seasonal habitat use, interspersions of food, cover, water, and other essential requirements, and reproductive success, among others. All data gathered would then be used to formulate a sharptail grouse management program.

4. RECOMMENDED COURSE OF ACTION:

The last alternative, to establish a grouse management program, is suggested. Research is needed, as stated previously, to determine if artificial manipulation of vegetation around dancing grounds is necessary to insure the continuation of grouse courtship rites within the park. With the low grazing pressure from bison and other park herbivores, tall, rank vegetation covers a large portion of the park including many dancing grounds. In addition, baseline data to determine the status of the species within the park would be obtained. With changing land use and ever shrinking habitat, national park lands will become increasingly important for sharptail grouse, else they follow the path of the greater prairie chicken in the northern plains.

A. Resource Management Actions:

THRO-N-0020-01 Continue protection from hunting with stepped up patrols during hunting seasons.

THRO-N-0020-02 Location and mapping of dancing grounds, as discovered.

B. Monitoring Actions:

THRO-N-0020-03 Monitor dancing activity on previously located dancing grounds.

THRO-N-0020-04 Monitor degree of use between dancing grounds with various heights and densities of vegetation.

C. Research Actions:

THRO-N-0020-05 Evaluate the ability of grouse to maintain traditional dancing grounds.

THRO-N-0020-06 Investigate habitat requirements, reproductive success, and role of grouse in the park ecosystems.

1. THRO-N-0021 BACKCOUNTRY MANAGEMENT
2. Statement of Problem: Most of the backcountry management activity has concentrated on upgrading and marking a system of trails. Four trails, totaling 34 miles in the North Unit, and five totaling 80.5 miles in the South Unit, need to be periodically maintained and re-marked.

Practically all of the designated trails, as developed, followed abandoned roadways or cow trails. These trails lay lightly upon the land, as only minor excavation or filling was used, and only enough to rectify hazardous situations. Continued use by humans on foot or horseback may hasten erosion on steep reaches of the trails.

That 25.5 mile section of the Little Missouri River that courses through the park provides for public recreation by canoeists and snowmobilers. The waters of the river are owned by the state of North Dakota with the National Park Service owning and holding jurisdiction on adjacent lands. In 1974, an environmental assessment was prepared and subsequently the river within both units was designated as an authorized snowmobile trail. The waters of the river had been historically used by water craft at least as far back as Theodore Roosevelt's time. Water craft have been allowed to utilize the river ever since the park was established.

The river is a slow moving, meandering stream subject to spring flooding and very low rate of flow during the late summer and fall. In 1974, the state of North Dakota designated the Little Missouri a State Scenic River.

As a designated snowmobile trail, the river is so signed at the boundaries. The frozen river is open to snowmobile use as ice and snow conditions warrant. Use by snowmobiles is light with most use occurring during the winters of above average snow cover. The snowmobiling season generally extends from mid-November to mid-March. Patrols are initiated as use requires, with enforcement action taken against those who violate state or federal snowmobiling regulations. During 1981, regulations specific to snowmobiling in Theodore Roosevelt National Park were published in the Federal Register.

The canoeing season is very dependent upon snow melt runoff or spring rains. In an average year there is generally sufficient water in the river for canoeists from mid-April to mid-July. During the drier years there may not be sufficient water at any time to operate a canoe or raft.

Management of both types of river recreation demand very little in the way of personal services or maintenance. Sign maintenance and routine patrolling are generally all that is required. The park does not have accurate records of use as recreationists enter and leave the park via the river at will.

In addition to the established trail system, hikers and horseback riders are allowed to travel crosscountry in the park. This use is very light and very little impact to the environment is estimated. All overnight backcountry users must register at the unit's visitor center, and these visitors are instructed and cautioned about damaging backcountry resources.

Particularly sensitive objects and areas need to be protected. Petrified wood can be found throughout the park, and is concentrated in the Petrified Forest Plateau area. Areas seasonally used as breeding or mating habitat by some wildlife species may also need to be protected at those times.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

A. No Action - Current Management: Presently, from May through September, Backcountry Rangers in each unit patrol the backcountry to provide visitor and resource protection, as well as trail maintenance. Patrols are made along the river during the winter when snowmobile use warrants it. These patrols have been effective in controlling resource damage.

This option does not attempt to estimate day use of backcountry areas. Currently, only persons wishing to camp for 1 night or more are required to register for a backcountry permit. In some areas and certain times of the year, use may cause significant disturbances of wildlife mating or breeding activity.

B. Expanded Management: This option would incorporate the normal maintenance and patrol activities underway currently, and take measures toward estimating day use of the backcountry by visitors. The placing of registration stations at the head of major trails could help to estimate some of the day use these trails receive.

Careful scouting along major trails, by Backcountry Rangers, can identify areas to be avoided, to minimize conflicts with wildlife. Following critical periods for wildlife these areas can be reopened.

4. RECOMMENDED COURSE OF ACTION:

The second alternative, B, seems to be the most reasonable to follow. This option attempts to gain a better understanding of backcountry use, protects wildlife from disturbance during critical periods, while continuing resource and visitor protection.

A. Resource Management Actions:

THRO-N-0021-01 Patrol of backcountry areas including snowmobile trail.

THRO-N-0021-02 Maintenance of trails and trail signs in backcountry.

THRO-N-0021-03 Closing or restricting use in critical habitats when being utilized by wildlife.

B. Monitoring Actions:

THRO-N-0021-04 Issuance of backcountry camping permits to monitor overnight use.

THRO-N-0021-05 Establishment of trail registers at major trailheads to monitor day use of the backcountry.

1. THRO-N-0022 NONNATIVE GALLINACEOUS BIRD MANAGEMENT

2. Statement of Problem: The ring-necked pheasant (Phasianus colchicus) is a gallinaceous Asian bird which has been widely introduced into the United States. Pheasants are commonly found in their preferred habitat of moderate to heavy vegetated flood plain areas of the Little Missouri River, in both units of the park. These birds are seen often by park visitors, because of the pheasants' diurnal habits. Casual observations seem to indicate that pheasant numbers within the park fluctuate annually and seasonally dependent upon weather conditions, production and natural mortality. They never have, however, existed in large numbers.

Wild turkeys (Meleagris gallopavo) are found in both units of the park, generally in the wooded areas and around horse corrals where they pick up waste grain. Turkeys appear to be nesting in the park but do not appear to winter here. As with the pheasant, turkey numbers are not large and appear to fluctuate both annually and seasonally. Although turkeys are native to North America, there is no record of them being found in the Northern Great Plains until they were introduced. At the present, no funding is allocated toward a pheasant-turkey management program, although park staff do record sightings on Wildlife Observation forms (10-257). In the past, turkeys and pheasants were assumed not to be competing with other wildlife in the park. This may not necessarily be true.

One other species, Hungarian Partridge (Perdix perdix) is observed on rare occasions in the park. Since they appear rarely and in small numbers they are not considered in this plan. Even though these three birds are not native, until it were proven that turkeys, pheasants and partridge are competing with native species, they would be allowed to coexist with the native fauna. A research program may be necessary to determine population size, population fluctuation, and degree of competition with other wildlife species.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

A. No Action: A no action policy would continue to allow the park visitor to view these birds. However, opportunity would be affected by population size. Since no index as to population size would be available, severe overpopulation, resulting in damage to habitat or excessive competition with other gallinaceous birds, could not be quickly recognized. Likewise, a severe decrease in the population, possibly resulting in local extinction, may not be recognized. This option would continue the present scheme of management.

B. Limited Management: The limited action policy would involve compiling an index as to relative population size, to determine from year to year, an increase or decrease in the population. A strip census or drive count through preferred habitat would be utilized.

C. Pheasant-Turkey Research Programs: A research program would not only address problems of population dynamics, but also competition, habitat preference, and carrying capacity. It is also important to investigate the role of these nonnative birds in the ecosystem. Such a research program would be costly and probably would require the contracting of an outside institution to complete such a program. Data obtained from such research could then be used to address the impacts of this exotic species on native flora and fauna.

4. RECOMMENDED COURSE OF ACTION:

The limited management alternative appears to be the most reasonable. Pheasant and turkey management is not as critical a resource problem as others. By utilizing population index sampling, as outlined in the limited action alternative, critical problems could be identified, and more complete actions could be convened at that time. In addition, the limited action policy provides baseline data which would be beneficial if further management action is determined necessary. Research activities would, of course, be encouraged and undertaken as funds become available.

An additional management option might be considered. On occasion the State Game and Fish Department may need numbers of these birds for research or stocking purposes. On a case by case basis the park would consider the live trapping of pheasants and turkeys by the State for these purposes.

A. Resource Management Actions:

THRO-N-0022-01 Complete index of the population size from census activities.

B. Monitoring Actions:

THRO-N-0022-02 Monitor yearly relative population changes from compiled indices.

C. Research Actions:

THRO-N-0022-03 Research addressing population dynamics, competition with native species, habitat preference and carrying capacity would be initiated.

THRO-N-0022-04 Evaluation of the impacts of pheasants and turkeys on the plant communities of the park.

1. THRO-N-0023

CARNIVORES MANAGEMENT

2. Statement of Problem: Both the North and South Units provide habitat for populations of coyote (Canis latrans), bobcat (Felis rufus), red fox (Vulpes vulpes), badger (Taxidea taxus) and weasels (Mustela sp.). Sightings of lynx (Felis lynx) have been reported in the last decade and mountain lion (Felis concolor) have been reported as recently as 1983. These animals range freely throughout the park, and are not limited to its confines. Accurate population counts are not available, but all except the lynx, mountain lion, and weasels are reported frequently. Interpretive programs often consider these animals as subject matter, and a file of reference materials, including slides and observation records, is maintained.

Currently, no specific management is directed at any of the subject species. Primary management is aimed at the continued maintenance of as nearly a natural habitat as possible. This includes monitoring and encouraging the perpetuation of other indigenous plant and animal life, protection from hunting, and continued observation to increase management knowledge.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

A. No Action: This alternative would include the present carnivore management scheme. Such a program utilizes management actions for other plants and animals to maintain carnivore habitat. Though accurate population estimates would be unavailable, predatory populations tend to follow the trends of prey populations, and so with the continued monitoring of other animal species, indirect indices of predator numbers would be attained. This policy would be cost-saving, and have little impact upon the environment or species involved.

B. Limited Action: This policy would continue the present management strategy, but in addition, would include efforts to increase the scientific literature within the park library and files dealing with carnivore management. The additional literature would then be used to assess possible impacts of other management actions and to find methods for carnivore population estimation. Such a policy would cause little or no impact to the environment, but may cause changes in other management programs if they were to be determined detrimental to carnivore needs. Costs of this program would be very low, as most literature could be obtained from a variety of sources at no charge.

C. Mountain Lion Management Plan: The mountain lion is listed as threatened by the State of North Dakota Natural Heritage Program. Each reported sighting of mountain lion should be vigorously investigated to determine its authenticity. Because of its threatened status, an intensive census effort would be initiated, and denning sites as well as other critical habitat needs would be identified. From the resulting information a decision could be made whether to develop a program to encourage mountain lions to inhabit the park area. Such a

program would be costly in terms of man-hours and actual expenses for equipment. In addition, disturbance of dens is possible, and may interfere with reproductive success.

4. RECOMMENDED COURSE OF ACTION:

At this time the Limited Action policy seems the most appropriate. Current funding limitations and a lack of mountain lion sightings should result in deferring Alternative C until either or both of these elements change. Alternative A is short-sighted, since for a very low cost, Alternative B can be implemented and may possibly result in a much more complete management plan later.

In addition, an ongoing effort will be made to determine the effects of hunting and trapping near the park boundary on populations which roam freely in and out of the park. Contact will be made with Game and Fish Officers, and U.S. Fish and Wildlife Service trappers to determine if more animals are taken close to park boundaries than other areas of southwestern North Dakota.

A. Resource Management Actions:

THRO-N-0023-01 Manage for a natural ecosystem in which carnivores will continue to maintain their populations.

THRO-N-0023-02 Collection of literature concerning carnivore management.

B. Monitoring Action:

THRO-N-0023-03 Indirect monitoring of carnivore population through monitoring of prey populations.

C. Research Action:

THRO-N-0023-04 Research to determine population numbers and sex and age classes, as well as critical habitat needs.

1. THRO-N-0024

AVIAN MANAGEMENT

2. Statement of Problem: The badlands and adjacent grasslands provide a widely varying habitat for bird life. Shore birds are found along the Little Missouri River and nearby ponds and stock tanks. Predatory birds are active within the areas of sparse vegetation, where visibility is high, and gallinaceous and other seed-eating species are common in the prairie and wooded areas. Because of their diurnal habits, the more common birds are frequently observed by visitors.

With the exception of the sharptail grouse, pheasant, and turkey, which are covered in separate plans, no specific management is directed at these animals. All wildlife within the park boundaries are, of course, protected by Title 36 of the Code of Federal Regulations, Section 2.32, Paragraph 1 through 3. Interpretation of the park's bird life is rather extensive. They are frequently the subject of evening slide programs and guided nature walks, and the Theodore Roosevelt Nature and History Association offers for sale four separate books dealing with North American bird life, including a check list of the birds of the grasslands.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

A. No Action: Current management provides a favorable opportunity for park visitors to see and learn about bird life. These animals are assumed to exist in an environment that allows natural species survival and reproduction. There has been no assessment regarding unnatural influences (i.e. man, habitat alteration, etc.) causing adverse impacts. Most birds are migrating and are not restricted to the park. Impacts to birds outside the park would be difficult to measure.

B. Limited Action: A limited action policy would continue informal monitoring of populations by park personnel involved in interpretive walks, but would also include monitoring of habitat disturbances. Construction, repair to existing facilities, and other habitat disturbing projects would be assessed for impacts to bird species, and mitigation would be implemented.

C. Avian Management Plan: This option would involve an array of projects designed to enhance survival and propagation of a multitude of species. Such a project would be costly, and since many birds utilize other habitat improvements constructed for other wildlife (i.e. watering devices), such projects may do little to enhance species survival. A complete management plan can, however, provide information on population dynamics, habitat preferences, and species needs.

4. RECOMMENDED COURSE OF ACTION:

At this time the Limited Action alternative is the most reasonable. Informal monitoring would continue, but more careful assessment of impacts to habitats would be initiated. Such a program would provide for habitat protection and/or

mitigation of habitat loss or alteration. In addition, this policy would continue to provide visitors with an opportunity to observe the various species. A study to determine the relationship of predatory birds to the prairie dog population of the park is needed, as research on the subject is limited, and the knowledge would facilitate the wise management of this resource.

A. Resource Management Actions:

THRO-N-0024-01 Construction and other activities which could impact avian populations or habitat will be assessed and impacts minimized or mitigated.

B. Monitoring Actions:

THRO-N-0024-02 Continued informal monitoring of avian species by park personnel.

C. Research Actions:

THRO-N-0024-03 Research proposal will be drawn up to study the relationship between prairie dog population regulation and predation by predatory birds.

1. THRO-N-0025 SMALL MAMMAL, AMPHIBIAN, AND REPTILE MANAGEMENT

2. Statement of Problem: Small mammals found within the park include the cottontail rabbit (Sylvilagus sp.), whitetail jackrabbit (Lepus townsendii), little brown bat (Myotis lucifugus), big brown bat (Eptesicus fuscus), raccoon (Procyon lotor), pocket gophers (Thomomys sp.), prairie dogs (Cynomys ludovicianus) (see THRO-N-0020), and a variety of other ground squirrels and other small rodents. These animals are found in fairly large numbers in both units of the park, but pose no unique management problem. Species habitat is acceptable and there appears to be no external influence that reacts negatively with the resource. Natural predation by coyotes, hawks, eagles, owls, snakes, and weasels does occur, apparently in a healthy proportion to the population.

Various amphibians are found within the park including the painted turtle (Chrysemys picta), spadefoot toad (Scaphiopus bombifrons), leopard frog (Rana pipiens), and the tiger salamander (Ambystoma tigrinum). The habitat for these animals is typified by areas in the floodplain and along the banks of the Little Missouri River, around running wells or stock tanks, and near natural water holes filled by rain or runoff. They are seen infrequently, and only during the warmer months of late spring through early autumn. Because of the difficulty in censusing these populations, no counts have been made previously.

Reptiles found within the park include the prairie rattlesnake (Crotalis viridis), bull snake (Pituophis melanoleucus), yellow-bellied racer (Coluber constrictor), garter snake (Thamnophis radix), hog-nosed snake (Heterodon nasicus), short-horned lizard (Phrynosoma douglassi), and the sagebrush lizard (Sceloporus graciosus). These animals are found in most areas of the park, with the heaviest concentrations for most species in areas of moderate cover, such as the sagebrush flats of the stabilized floodplain. Apparently numerous, these species are commonly sighted by visitors and park personnel during the warmer summer months.

These animals, like all others within the park boundary, are protected by virtue of Title 36, Code of Federal Regulations, Section 2.32, Paragraph 1 through 3. No other specific management action is currently directed at this group.

Deleterious impact to these groups from natural or man-caused action has been minimal to non-existent. Normal predation from eagles, hawks, foxes and coyotes exists, but seems to be in a healthy proportion to each of the populations. Food supply for the various species is considered to be normal, and their roles in the badlands environment are often discussed and explained as a part of the park's interpretive program. However, the role of these animals may not be fully understood. Further, it is apparent that some of these species could be eliminated if areas of critical habitat, which may be small in size, are destroyed or disturbed.

3. ALTERNATIVE ACTIONS AND THEIR PROBABLE IMPACTS:

A. No Action: This alternative would continue the current course of action. Informal monitoring and the maintenance of a stable, natural environment have resulted in an apparent equilibrium in population numbers. No substantial increases or decreases in populations have been noted in the past decade. However, without a more structured monitoring system, impacts to critical habitats might go unnoticed, until local extirpation results.

B. Limited Action: This policy would upgrade the monitoring of these populations, as well as the maintenance of the natural environment. In addition, efforts to locate scientific literature regarding these species' management and role in the ecosystem would be initiated. Research or study of these species would be encouraged, and a copy of the results of these projects would be retained in the park files for management purposes.

C. Small Vertebrate Research: This alternative could encompass a very involved research program to identify specific habitats, food sources, population densities, and ecosystem roles. This baseline data is somewhat lacking at present, but is necessary to gain a full understanding of these species.

4. RECOMMENDED COURSE OF ACTION:

Both alternatives B and C are recommended at this time. Alternative B generates more interest in these often neglected species than alternative A, yet would probably add little cost or man-hours to overall management plans. With current literature readily available, steps to solve problems which may arise could be initiated much more quickly. Indeed, a review of the literature may point out problems which need to be addressed in management planning. As funding becomes available, the research program outlined in alternative C should be initiated. Research dealing with these species may not be a high priority, but, as with all species they have a vital function in the ecosystem, which we do not fully understand.

A. Resource Management Actions:

THRO-N-0025-01 Protection of the individual species and their habitats with regular patrols.

THRO-N-0025-02 Collection of scientific and technical publications to be used in management planning for these species.

B. Monitoring Actions:

THRO-N-0025-03 Regular monitoring and recording of species numbers and habitat.

C. Research Actions:

THRO-N-0025-04 Research started to identify specific

habitats, food preference and sources, population densities, and ecosystem roles.

IV. FIVE YEAR RESOURCE MANAGEMENT
PROGRAMMING SHEETS

NATURAL RESOURCES

CULTURAL RESOURCES

NATIONAL PARK SERVICE

RESOURCES PROGRAMMING SHEET

PARK Theodore Roosevelt National Park
 REGION Rocky Mountain Region
 STATE North Dakota
 DATE April 15, 1983

Priority	Action Type *	RMP Reference Number	Project & Activity Title	LAST YEAR FY 19		CURRENT YEAR FY 1983		NEXT YEAR FY 1984		FY 1985		FY 1986	
				FUNDED	WT \$1000	FUNDED	WT \$1000	ADDITIONAL REQUIRED	BUDGETED	ADDITIONAL REQUIRED	PLANNED	ADDITIONAL REQUIRED	PLANNED
1		THRO-N-0001	Air Quality Management										
	A	0001-01	Agency Coordination			.05	1.0 .01	1.0 .01	1.0 .05	1.0 .01	1.0 .01	1.0	1.0
	A	0001-02	Public Relations			.02	.5 .01	1.0 .02	1.0 .02	.5 .01	1.0 .01	1.0	1.0
	A	0001-03	Point Source Maps			.02	.5 .05	2.0 .02	2.0 .02	.5 .02	.5 .02	.5	.5
	B	0001-04	Air Quality Monitoring (Air Quality Div. Fund.)			4	10.0 .05	2.0 .05	13.0 .05	20.0 .05	3.0 .45	20.0	3.0
	B	0001-05	Indicator Species Monitoring							.1	2.0 .1	39.0 .1	39.0
	C	0001-06	Indicator Species Baseline				.1	3.0 .1	3.0 .1	3.0 .1	17.0 .1	3.0 .1	7.0
2		THRO-N-0002	Exotic Plant Mgmt.										
	A	0002-01	Leafy Spurge Mgmt. (Maintenance Funded)			.5	15.0		.5	15.0	1.3	25.0	.5 15.0 1.3 25.0
	A	0002-02	Other Exotics Mgmt. (Funded under 0002-01)										
	B	0002-03	Exotic Plant Distr.										
	B	0002-04	Spurge Prog. Effective.										
3		THRO-N-0003	Geol. Res. & Mineral Mgmt.										
	A	0003-01	Landowner Coord.										
	A	0003-02	Lease Admin. & Access			.05	1.0 .02	2.0 .05	2.0 .05	1.0 .02	2.0 .05	3.0	3.0
	B	0003-03	Monitoring Geol. Activity										

* Action Type: A = Resource Management B = Monitoring C = Research

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PARK Theodore Roosevelt National Park
 REGION Rocky Mountain Region
 STATE North Dakota
 DATE April 15, 1983

NATIONAL PARK SERVICE
 RESOURCES PROGRAMMING SHEET

Pri- ority	Action Type	RFP Reference Number	Project & Activity Title	LAST YEAR FY 19		CURRENT YEAR FY 1983		NEXT YEAR FY 1984		FY 1985		FY 1986	
				FUNDED	WY \$1000	FUNDED	ADDITIONAL REQUIRED WY \$1000	ADDITIONAL REQUIRED WY \$1000	BUDGETED WY \$1000	ADDITIONAL REQUIRED WY \$1000	PLANNED WY \$1000	ADDITIONAL REQUIRED WY \$1000	PLANNED WY \$1000
7		THRO-N-0007	External Aesthetic Thr.										
	A	0007-01	Buffer zone			.05	1.0	.02	1.0	.05	1.0	.02	1.0
	B	0007-02	Smoke Monitoring										
	B	0007-03	Structure Monitoring										
8		THRO-N-0008	Res. Baseline Inventory										
	A	0008-01	Baseline Surveys			.08	1.8	.2	9.0	.08	1.8	.2	9.0
	B	0008-02	Degrad. Monitoring										
	C	0008-03	Research Proposal			.05	1.7	.05	1.0	.1	4.0	.1	4.0
9		THRO-N-0009	Bison Mgmt.										
	A	0009-01	Reduction Program			.1	1.5	.1	2.0	.1	1.5	.1	2.0
	A	0009-02	Fencing										
	A	0009-03	Bison Escapes			.2	3.7	.1	1.0	.2	3.5	.1	1.0
	A	0009-04	Corral Maintenance			.1	3.0	.1	1.0	.1	3.0	.1	2.5
	A	0009-05	Rebuild Corrals									.4	19.0
	A	0009-06	Population Size			.05	.5		.05	.5		.05	.5
	B	0009-07	Forage Utilization										
	C	0009-08	Carrying Capacity						.2	5.0		.2	5.0
	C	0009-09	Popul Dynamics										

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RESOURCES PROGRAMMING SHEET

Priority	Action Type	RFP Reference Number	Project & Activity Title	LAST YEAR FY 19		CURRENT YEAR FY 1983		NEXT YEAR FY 1984		FY 1985		FY 1986	
				FUNDED	WT \$1000	FUNDED	WT \$1000	ADDITIONAL REQUIRED	WT \$1000	ADDITIONAL REQUIRED	WT \$1000	ADDITIONAL REQUIRED	WT \$1000
13		THRO-N-0013	Longhorn Management										
	A	0013-01	Management Program		.05	2.0			.05	2.0		.05	2.0
	C	0013-02	Environmental Impacts				.05	6.0		.05	6.0		.05
14		THRO-N-0014	Porcupine & beaver Mgmt										
	A	0014-01	Management Program		.05	1.0		2.0	.05	1.0		2.0	.05
	C	0014-02	Evaluation Repellants				.08	3.0		.08	3.0		.08
	C	0014-03	Population Dynamics				.04	5.0		.04	5.0		.04
15		THRO-N-0015	T/E Species Management										
	A	0015-01	Protection-Patrols		.05	1.5			.05	1.5		.05	1.5
	A	0015-02	Agency Liason		.01	.2	.03	.8	.01	.2	.03	.8	.04
	B	0015-03	Population Monitoring		.01	.2	.1	4.0	.01	.2	.1	4.0	.11
	B	0015-04	Exist. Surveys		.01	.2	.1	5.0	.01	.2	.1	5.0	.11
16	C	0015-05	Habitat Suitability				.05	9.0		.05	9.0		.05
		THRO-N-0016	Elk Restoration										
	A	0016-01)	Feasibility Study										
	A	0016-02)	Plan and Assessment										
	A	0016-03)	Public Comment		.02	1.0	.05	2.0	.02	1.0	.08	5.0	.1

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Priority	Action Type	RMP Reference Number	Project & Activity Title	LAST YEAR FY 19		CURRENT YEAR FY 19 83		NEXT YEAR FY 19 84		FY 19 85		FY 19 86	
				FUNDED	WY \$1000	FUNDED	WY \$1000	ADDITIONAL REQUIRED	WY \$1000	ADDITIONAL REQUIRED	WY \$1000	ADDITIONAL REQUIRED	WY \$1000
	C	0016-04	Historic Population Levels				.05	4.0		.05	4.0		
	C	0016-05	Habitat Utilization					.02	1.0	.05	4.0	.05	10.0
17		THRO-N-0017	Boundary Control										
	A	0017-01	Construct Fence*	.02	1.0	.02	1.0						
	A	0017-02	Maintain Fence	.05	2.0	.05	2.0		.05	2.0		.05	2.0
	A	0017-03	Patrol Fence	.05	1.5	.05	1.5		.05	1.5		.05	1.5
	A	0017-04	Sign Fence	.05	.5	.05	.5		.05	.5		.05	.5
	B	0017-05	Wildlife Crossings	.05	2.0	.05	2.0		.05	2.0		.05	2.0
18		THRO-N-0018	Fire Management										
	A	0018-01	Fire Suppression	.05	2.5	.05	2.5		.05	2.5		.05	2.5
	A	0018-02	Fire Management Plan	.05	.5	.05	.5	.1	11.0	.5	4.0	.2	8.0
	C	0018-03	Fire Ecology				.05	7.0	.05	7.0		.05	7.0
	C	0018-04	Research Burns				.03	1.0	.03	1.0	.03	1.0	.03
19		THRO-N-0019	Prairie Dog Mgmt.										
	A	0019-01	Safety & Maint.				.01	1.0	.01	1.0	.01	1.0	.01
	B	0019-02	Colony Mapping				.03	1.0				.03	1.0
	C	0019-03	Prairie Dog Ecology				.01	12.0		.01	12.0		.01
	C	0019-04	Perret Habitat				.01	7.0		.01	7.0		.01

*\$450,000 PRIP Project 1983 and \$350,000 PRIP Project, 1984.

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PARK Theodore Roosevelt National Park
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DATE April 15, 1983

NATIONAL PARK SERVICE
RESOURCES PROGRAMMING SHEET

Activity	Action Type	RFP Reference Number	Project & Activity Title	LAST YEAR FY 19		CURRENT YEAR FY 19		NEXT YEAR FY 19		FY 19		FY 19	
				FUNDED	WY \$1000	FUNDED	ADDITIONAL REQUIRED WY \$1000	ADDITIONAL BUDGETED WY \$1000	ADDITIONAL REQUIRED WY \$1000	ADDITIONAL PLANNED WY \$1000	ADDITIONAL REQUIRED WY \$1000	ADDITIONAL PLANNED WY \$1000	ADDITIONAL REQUIRED WY \$1000
20		TR00-N-0020	Sharptail Grouse Mgmt										
	A	0020-01	Hunting Patrols										
	A	0020-02	Dance Area Location			.05	1.5	.05	1.5	.05	1.5	.05	1.5
	B	0020-03	Dance Area Activity										
	B	0020-04	Dance Area Use										
	C	0020-05	Dance Area Maintenance			.05	2.0	.05	1.8	.05	1.8	.1	3.8
21	C	0020-06	Grouse Ecology				.05	8.0	.05	8.0	.05	8.0	.05
		TR00-N-0021	Backcountry Management										
	A	0021-01	Backcountry Patrol			.1	1.5	.1	1.5	.1	1.5	.1	1.5
	A	0021-02	Trail Maintenance			.1	2.5	.1	2.5	.1	2.5	.1	2.5
	A	0021-03	Critical Hab. Prot.				.03	.5	.03	.5	.03	.5	.5
	R	0021-04	Permit Issuance			.05	.5	.05	.5	.05	.5	.05	.5
	R	0021-05	Trail Registers				.02	.5	.02	.5	.02	.5	.5

V.

ENVIRONMENTAL ASSESSMENT
NATURAL RESOURCE MANAGEMENT PLAN

SUMMARY: The Natural Resource Management Plan contains twenty-five project statements. Recommended actions include resource management activities, monitoring programs, and research. None of the recommended actions will result in significant and/or long-term adverse impacts to park resources, values, or ecological processes. However, failure to implement most of the recommended actions will most probably result in significant, long-term and perhaps irreversible adverse impacts to these resources.

Some resource management activities involve resource manipulation. Bison, porcupine, beaver, and wild horse populations will be periodically reduced to maintain their numbers within carrying capacity, thereby protecting other resources from overuse. Backcountry trail maintenance will involve some disturbance of soil and vegetation, but ultimately will benefit these resources by reducing erosion. Boundary fencing will have an impact, as some shrub growth must be removed or trimmed to accomplish this task. However, these impacts are anticipated to be very light and short-term. Spraying and mowing of exotic plants may initially eliminate a variety of plants in the treated area, but ultimately will allow the return of native plant communities.

The other recommended resource management activities do not involve resource manipulation and therefore will not result in adverse impacts. These actions include protection activities and development of action plans. As with the manipulation actions, these actions are necessary to further protect, preserve, maintain, or restore the park's natural resources, values, and ecological processes.

Monitoring and/or research are recommended in all project statements. None of these actions involve manipulation of park resources or ecological systems, and none will cause adverse environmental impacts. Since these programs will provide data for more ecologically sound management decisions, the primary impacts will again provide for further protection, and will preserve, maintain, and/or restore the park's natural resources, ecological processes, and aesthetic values.

VI. ENVIRONMENTAL ASSESSMENT MATRIX
AND CUMULATIVE IMPACTS

PROJECT STATEMENT:

AIR QUALITY MANAGEMENT

THRO-N-0001

NEED FOR PROGRAM: Air quality has deteriorated significantly following increased energy development.

ALTERNATIVE ACTIONS:RESOURCES AFFECTED:

A. Discontinue
Monitoring and
Coordination.

- 1) Air Resources.
- 2) Flora and Fauna.
- 3) Visitor. This alternative cannot be initiated because of legal mandates from the Clean Air Act. Such a policy would leave us totally uninformed as to the scope and severity of the air pollution problem.

B. No Action-Maintain
Present Monitoring
Actions.

- 1) Air Resources. Continue efforts to monitor chemical and visual pollution.
- 2) Flora and Fauna. Does not measure effects of air pollutants on park's flora or fauna.
- 3) Visitor. Smoke plumes and chemical odors decrease the enjoyment of park by visitors.

C. Research and
Monitoring.

- 1) Air Resources. Continue efforts to monitor chemical and visual pollution.
- 2) Flora and Fauna. Selection of indicator species to measure cumulative effects of pollution, by establishing a baseline of their life histories from which to measure.
- 3) Visitor. Accumulation of data provides a good case for tougher laws, which can protect resources and provide a more enjoyable visitor experience.

PROJECT STATEMENT:

EXOTIC PLANT MANAGMENT

THRO-N-0002

NEED FOR PROGRAM: To control exotic plants which have spread over many disturbed sites and have invaded native prairie.

ALTERNATIVE ACTIONS:

A. Discontinue Exotic Plant Management.

RESOURCES AFFECTED:

- 1) Native Plant Communities. Vast enchroachment of leafy spurge throughout South Unit. Could become established in the North Unit. Would eliminate native plant communities in riparian and upland draw situations.
- 2) Native Wildlife. The destruction of plant communities in upland draws and riparian areas would eliminate a variety of plant species utilized for food by wildlife.
- 3) Park Visitors. Would lose the opportunity to study and appreciate native floral communities and their associated fauna.

B. Current Action.

- 1) Native Plant Communities. Slows but does not eliminate spurge expansion, generally holds spurge infestation to west of the river, South Unit. Threatens destruction of native flora of riparian and upland draws.
- 2) Native Wildlife. As infestation slowly expands, disruption of plant communities and associated wildlife continues.
- 3) Park Visitors. Expected to continue to be dissatisfied with spurge infestation and progress of controlling action.

C. Study and Research.

- 1) Native Plant Communities. Areas being tested would be benefited, other areas would be subject to spurge expansion.
- 2) Native Wildlife. May be disturbed in study sites, would be dependant on status of native plant communities.
- 3) Park Visitor. May satisfy some groups which favor more intensive control.

D. Expanded Control.

- 1) Native Plant Communities. Would provide for greater number of treatment sites. Would allow for more regeneration of native plant communities. Eventually would provide better protection to existing stands of native plants.
- 2) Native Wildlife. Protects habitat, encourages faster regeneration of native plant food patches. Prevents further depletion of food source plants.
- 3) Park Visitors. Satisfies users who wished for quicker control of spurge. Allows visitors to enjoy a more pristine floral community.

PROJECT STATEMENT:

GEOLOGICAL RESOURCES AND
MINERAL MANAGEMENT

THRO-N-0003

NEED FOR PROGRAM: Monitor geologic activity and mineral development affecting park development and resources.

ALTERNATIVE ACTIONS:

A. No Action -
Status Quo.

RESOURCES AFFECTED:

- 1) Damage from geologic activity. Continued monitoring of threatening geologic activity. Reconstruction or safety measures initiated if needed.
- 2) Mineral Activity. Park staff monitors mineral activity near the park. Impacts addressed in other project statements.
- 3) Illegal Fossil Collection. No problems expected, as routine patrols have discovered little illegal activity in the past.

B. Reduced
Monitoring.

- 1) Damage from geologic activity. Discontinue monitoring of erosion and slumping. Some problems could not be anticipated, and so destruction or safety problems may exist.
- 2) Mineral Activity. Efforts to monitor mineral activity would be reduced. Impacts are addressed in other project statements.
- 3) Illegal Fossil Collection. Same as in A.

PROJECT STATEMENT: VEGETATION AND SOIL MANAGEMENT

THRO-N-0004

NEED FOR PROGRAM: To develop a synthesis of the herbivore - fire - vegetation dynamics of the park.

ALTERNATIVE ACTIONS:

A. No Action-Maintain
Present Management.

RESOURCES AFFECTED:

- 1) Vegetation. Vegetation map would be completed. No further study of utilization, condition or trend. Work to understand fire and vegetation in the ecosystem curtailed. No assurance of proper utilization.
- 2) Soil. No assurance of proper influence of natural forces.
- 3) Wildlife. Effects of grazing on habitats unknown. No synthesis of ecosystem dynamics for fire, wildlife, and vegetation.

B. Increased Research
and Monitoring.

- 1) Vegetation. Vegetation map would be completed. Further study of range use and vegetation initiated. Role of fire in the badlands investigated. Move toward developing ecosystem models.
- 2) Soil. Effects of grazing and burning on soil incorporated in models.
- 3) Wildlife. Effects of grazing on habitats will be studied. Synthesis of ecosystem models including fire, wildlife, and vegetation.

PROJECT STATEMENT: WATER RESOURCE MANAGEMENT

THRO-N-0005

NEED FOR PROGRAM: Develop management plan, assess pollution possibility, update natural zone system.

ALTERNATIVE ACTIONS:RESOURCES AFFECTED:

A. Reduced Water Resources Management Program.

- 1) Water Resources Management Plan. No management plan to identify pollution sources or hazardous materials to be moved through the park, nor contingency plans for controlling pollution emergencies.
- 2) Natural Zone Watering Systems. Maintenance of natural zone water systems would be discontinued. Updating and replacing of systems would be discontinued. Possibility of local overuse by bison near operating sources.
- 3) Developed Zone Watering Systems. For public health and safety reasons monitoring of water quality and upkeep of systems are continued.

B. No Action-Status Quo.

- 1) Water Resources Management Plan. Same as A.
- 2) Natural Zone Watering Systems. Existing tank systems would be maintained. However without replacement of concrete tanks, breakdown is expected in some. Some local overuse by bison near operating sources is expected.
- 3) Developed Zone Watering Systems. Same as A.

C. Water Resources Management Program.

- 1) Water Resources Management Plan. Management plan developed to identify pollution sources or hazardous materials to be moved through the park, develop contingency plans to control pollution emergencies.
- 2) Natural Zone Watering Systems. Progressive replacement of failing concrete and steel systems. Replacement of systems destroyed by slumping, etc. Helps to ensure distribution of grazing pressure. Monitor flow and quality.
- 3) Developed Zone Watering Systems. Same as A.

PROJECT STATEMENT: ACID DEPOSITION MONITORING

THRO-N-0006

NEED FOR PROGRAM: Acidic deposition may be injuring or eliminating sensitive plant species.

ALTERNATIVE ACTIONS:

A. No Action-
Continued
Monitoring.

RESOURCES AFFECTED:

- 1) Wet Acidic Deposition.
- 2) Dry Acidic Deposition. Continued monitoring and collection of wet and dry samples of acidic deposits. On site tests of pH and conductivity of wet samples. Samples of both wet and dry deposition will be sent to the Central Analytical Laboratory.
- 3) Plants. No immediate effects, may help to identify impacts of acid deposition on native plants.

B. Research to Measure
Effects on Natural
Resources.

- 1) Wet Acidic Deposition.
- 2) Dry Acidic Deposition. Initiate new research project to determine the natural occurrence and variability of insect, disease, oxidant, and physiological injuries on vascular plants. Establishes a baseline from which to measure air pollution effects on plants.
- 3) Plants. Continue study to find species of plants which are most sensitive to acid deposition, and monitor their population levels in relation to continued acid deposition.

PROJECT STATEMENT: EXTERNAL AESTHETIC THREATS

THRO-N-0007

NEED FOR PROGRAM: Impairment of scenic vistas and excessive noise compromise aesthetic qualities of the park.

ALTERNATIVE ACTIONS:

A. No Action-
Continued
Monitoring.

B. Establish a
Park Buffer Zone.

RESOURCES AFFECTED:

- 1) Scenic Vistas. Continued documentation of smoke columns and construction of structures causing an impairment to scenic vistas.
 - 2) Park Solitude. Continued development of oil and gas resources adjacent to the park will probably increase degradation to scenic vistas and add to the noise problem.
-
- 1) Scenic Vistas.
 - 2) Park Solitude. Establishment of a buffer zone with more stringent controls of burning and mineral development would reduce impairment of scenic vistas, and reduce noise problems from oil and gas well engines. Such a buffer must be negotiated with other state and federal agencies and private landowners.

PROJECT STATEMENT: RESOURCE BASELINE INVENTORIES

THRO-N-0008

NEED FOR PROGRAM: To gather and synthesize basic quantity, quality,
and trend data for future comparison and impact
mitigation of the park's natural resources.

ALTERNATIVE ACTIONS:

A. No Action.

RESOURCES AFFECTED:

1) Natural Resources and Environmental Factors. Biological inventories are lacking: information is collected as time permits. Assumes natural systems are operating at an optimum level. Restricted ability to significantly document environmental impacts. Lack of prior data for comparisons.

B. Establish a
Resource Baseline.

1) Natural Resources and Environmental Factors. Initiation of comprehensive biological inventories and surveys. Attempts to discover if natural systems are operating at optimum levels. Sets a baseline from which impacts to environment can be measured by comparing previous and new data.

PROJECT STATEMENT:

BISON MANAGEMENT

THRO-N-0009

NEED FOR PROGRAM: Provide basis for proper carrying capacity, role of bison in the ecosystem, upkeep of corrals.

ALTERNATIVE ACTIONS:

A. Discontinue Bison Management Program.

RESOURCES AFFECTED:

- 1) Bison.
- 2) Other Wildlife. Steady increase in bison population would result in increased escapes, range destruction, and visitor - bison conflicts. Eventually a massive roundup would be needed and would be costly. May overtax forage, causing excessive competition with other wildlife.
- 3) Vegetation and Soils. Population levels above carrying capacity would likely result in various degrees of overgrazing and soil compaction in heavily used areas. Erosion may be accelerated in steep areas.
- 4) Corrals. With no maintenance, corrals would degenerate, would then be expensive to repair, unsafe to use.
- 5) Visitors. May result in greater chances of visitor - bison conflicts.

B. Maintain Bison Management Program.

- 1) Bison.
- 2) Other Wildlife. Bison population held to a manageable number. Fencing of the entire park will decrease escapes, prevent range destruction. Semi-annual roundups continued. Carry capacity research continued. Reduces the possibility of forage competition with other wildlife.
- 3) Vegetation and Soils. Possibility of overgrazing eliminated. Soil compaction may exist in areas intensively used. Erosion may exist in steep areas.
- 4) Corrals. Corrals retained in acceptable state of repair for safe handling.
- 5) Visitors. Few visitor - bison conflicts expected.

C. Reconstruct and Relocate South Unit Corrals.

- 1) Bison.
- 2) Other Wildlife. Provides for a more efficient roundup in less rugged terrain. Population maintained at manageable level. To be used in conjunction with Alternative B. Impacts the same as in B.
- 3) Vegetation and Soils. Same as in B.
- 4) Corrals. Corrals constructed and retained in state of good repair.
- 5) Visitors. Same as in B.

PROJECT STATEMENT:

BISON MANAGEMENT (cont.)

THRO-N-0009

D. Increased Monitoring and Research.

- 1) Bison.
- 2) Other Wildlife.
- 3) Vegetation and Soils.
- 4) Corrals.
- 5) Visitors. To be used in conjunction with Alternative B. Measuring of forage utilization, seasonal distribution, aging, sexing, and tagging provide baseline data for management. Study the effect of artificial culling on population dynamics. Data would be used to enhance the Bison Management Program. Impacts to other wildlife and vegetation and soils same as in B.

PROJECT STATEMENT:

WILD HORSE MANAGEMENT

THRO-N-0010

NEED FOR PROGRAM: To establish management scheme and assess ecological impacts from exotic horse herd.

ALTERNATIVE ACTIONS:RESOURCES AFFECTED:

A. No Action.

- 1) Impacts to the badlands ecosystem. Impacts of exotic horse herd on badlands ecosystem undocumented.
- 2) Horse pelage color variation. Introduction of stallions used to influence pelage color variations.
- 3) Population management. Periodic reduction of herd by roundup. Sex ratios and age structures ignored in herd management.
- 4) Herd size. Herd of approximately 40 -50 animals maintained.
- 5) Historic band of badlands horses. Continued introduction precludes the establishment of a historic band of badlands horses.

B. Population
Management
Without
Introduction.

- 1) Impacts to the badlands ecosystem. Same as A.
- 2) Horse pelage color variation. Discontinues introduction - may result in a limited pelage color scheme.
- 3) Population management. Periodic reduction of herd by roundup, sex and age classes manipulated to control herd reproductive potential.
- 4) Herd size. Same as A.
- 5) Historic band of badlands horses. The opportunity to establish a band of exclusively badlands horses may exist.

C. Population
Management
With
Introduction.

- 1) Impacts to the badlands ecosystem. Same as A.
- 2) Horse pelage color variation. Introduction of animals used to influence pelage color variations.
- 3) Population management. Same as B.
- 4) Herd size. Same as B.
- 5) Historic band of badlands horses. Continued introduction precludes the establishment of a historic band of badlands horses.

PROJECTS STATEMENT:

WILD HORSE MANAGEMENT (cont.)

THRO-N-0010

D. Research of
Ecological
Impacts.

- 1) Impacts to the badlands ecosystem.
- 2) Horse pelage color variation.
- 3) Population management.
- 4) Herd size.
- 5) Research of Ecological Impacts. Provides for the evaluation of the role in and the impacts on the badlands environment by exotic horses. Vegetation use, food habits, competition with native wildlife, soil compaction, and water use would be studied. This option can be used in conjunction with any of the other previous three alternatives.

PROJECT STATEMENT:

BIGHORN SHEEP

THRO-N-0011

NEED FOR PROGRAM: Steady decline in population from unknown causes has resulted in near local extinction.

ALTERNATIVE ACTIONS:RESOURCES AFFECTED:

A. No Action.

1) Bighorn Sheep. Continue annual aerial surveys and ground monitoring. Allow mortality factor(s) to run its course.

B. Limited Action.

1) Bighorn Sheep. Restocking of bighorns as a remedial action to increase population size. Hopefully to reduce impact of further mortality.

C. Bighorn Restoration Plan.

1) Bighorn Sheep. Restocking of reproductive age bighorn, provided a holding facility and medication system are devised for the South Unit. Increase monitoring efforts to include population fluctuation, reproductive success, habitat use.

PROJECT STATEMENT: DEER AND PRONGHORN MANAGEMENT

THRO-N-0012

NEED FOR PROGRAM: To allow for migration through net - wire fence,
continued seasonal census.

ALTERNATIVE ACTIONS:

RESOURCES AFFECTED:

A. No Action.

- 1) Pronghorn, Mule deer, Whitetailed deer.
Discontinue seasonal aerial surveys used to estimate population.

B. Limited Action.

- 1) Pronghorn, Mule deer, Whitetailed deer.
Continues seasonal aerial surveys used to estimate populations. Provides for construction of passes within net wire fence to enable free migration in and out of the park for deer and pronghorn.

C. Deer, Pronghorn,
Management Plan.

- 1) Pronghorn, Mule deer, Whitetailed deer.
Continues seasonal aerial surveys. Provides for construction of passes within net wire fence. Establishes park carrying capacity for all 3 species. Identifies preferred and critical habitat. Provides forage utilization data for management of all 3 species within carrying capacity. Research the role of deer and pronghorn in the park ecosystem.

PROJECT STATEMENT: LONGHORN CATTLE MANAGEMENT

THRO-N-0013

NEED FOR PROGRAM: Continue the management of historically significant resource and evaluate impacts to native rangeland.

ALTERNATIVE ACTIONS:

RESOURCES AFFECTED:

A. No Replacement.

- 1) Longhorn Steers. Because no maintenance or replacement would take place, the herd would ultimately die out.
- 2) Vegetation. With no management, some damage to the range would be expected near permanent water sources and salt licks.
- 3) Visitors. Would lose the opportunity to view a significant historical display if herd went to extinction. Range damage would be esthetically displeasing.

B. No Action-Current Management Plan.

- 1) Longhorn Steers. Provides for continued maintenance and replacement of animals to retain a healthy herd of about 20 head. At times may require salt and supplemental feeding.
- 2) Vegetation. Efforts made to disperse grazing pressure. Movement of salt blocks may minimize local overuse. Impacts of grazing in this localized area may be significant, and need to be determined.
- 3) Visitors. Visitor opportunity to view longhorns would not be diminished.

C. Introduction of Breeding Stock.

- 1) Longhorn Steers. Upkeep and management would increase significantly. Would require frequent roundup and reduction. Additional fencing might be required to control wandering bulls.
- 2) Vegetation. Increased efforts to disperse grazing pressure, might require use of more land than is presently allocated for longhorn grazing.
- 3) Visitors. Visitor opportunity to view longhorns might increase, but historical significance of the herd would not be enhanced.

PROJECT STATEMENT: PORCUPINE AND BEAVER MANAGEMENT THRO-N-0014

NEED FOR PROGRAM: Damage to trees in sensitive park areas requires
 population management.

ALTERNATIVE ACTIONS:

A. No Management.

RESOURCES AFFECTED:

- 1) Porcupine and Beaver. Beaver and porcupine would continue to increase.
- 2) Hardwood Trees. Damage to hardwood trees in developed areas would continue, possibly increase.

B. No Action-
Continue Limited
Action.

- 1) Porcupine and Beaver. Beaver and porcupine population may increase if live reduction from developed areas is utilized.
- 2) Hardwood Trees. Monitoring of problem areas continued. Use of repellants to discourage depredation in developed areas.

C. Beaver and
Porcupine
Management.

- 1) Porcupine and Beaver. Research initiated to determine the factors influencing porcupine and beaver population dynamics and the roles of these species in the ecosystem.
- 2) Hardwood Trees. A balancing of the animal populations with the habitat's carrying capacity would tend to decrease damage to hardwood trees by reducing over - utilization in developed areas.

PROJECT STATEMENT: ENDANGERED AND THREATENED THRO-N-0015
 SPECIES MANAGEMENT

NEED FOR PROGRAM: To determine the extent of potential and existing
 populations of T/E species and identify quantity and
 quality of habitat.

ALTERNATIVE ACTIONS:

A. No Action -
 Existing
 Management.

B. Increased
 Surveying.

C. Evaluation for
 Reintroduction.

RESOURCES AFFECTED:

1) Endangered and Threatened Plants and
 Animals. Continued limited surveys to
 monitor species known to exist or inhabit
 certain areas of the park. Adds slightly
 to a limited data base.

1) Endangered and Threatened Plants and
 Animals. Concentrated effort to survey
 for suspected and known T/E populations
 in the park. Adds significantly to data
 base. Increases familiarization with T/E
 species habitat requirements.

1) Endangered and Threatened Plants and
 Animals. Habitat and suitability for
 reintroduction or population supple-
 mentation evaluated. Plans for
 reintroduction formulated. Conducted
 following completion of alternative B.

PROJECT STATEMENT:

ELK RESTORATION

THRO-N-0016

NEED FOR PROGRAM: To restore a native herbivore to better simulate a natural ecosystem.

ALTERNATIVE ACTIONS:RESOURCES AFFECTED:

A. No Action.

- 1) Elk. Elk would continue to be absent from the historical and natural park scene.
- 2) Vegetation and Soil. No effects.
- 3) Depredation on Adjacent Lands. No effects.
- 4) Visitors. No opportunity to view a species which was historically significant in the badlands ecosystem.

B. Develop an Elk Restoration Plan.

- 1) Elk. Elk would again become a part of the natural and historic park scene, if the public reaction is favorable toward their reintroduction. If natural population regulation factors are absent, artificial control may be needed.
- 2) Vegetation and Soil. If the herd expands greatly, some overgrazing may result. Trailing may cause erosion in some steep areas. Soil compaction near watering sites may develop.
- 3) Depredation on Adjacent Lands. If the herd expands greatly, some animals may move to adjacent lands, where crop damage and competition with domestic livestock may become a problem.
- 4) Visitors. Visitors would have the opportunity to view a species which was historically present in the natural badlands ecosystem.

PROJECT STATEMENT:

BOUNDARY CONTROL

THRO-N-0017

NEED FOR PROGRAM: Control bison escapes, cattle trespass.

ALTERNATIVE ACTIONS:

A. No Action -
No Woven Wire
Fencing.

B. Corrective Fencing
With Boundary
Control.

C. Complete Woven
Wire Fencing With
Boundary Control.

RESOURCES AFFECTED:

1) Bison. Buffalo escapes which are costly, would continue. Domestic stock trespass would be expected to continue. Not feasible since funds have been secured to increase amount of boundary fenced with net-wire.

2) Vegetation and Soil. No effect.

3) Other Wildlife. No restriction to normal migration and/or seasonal movement of wildlife.

1) Bison. A stop - gap measure. May result in reducing frequency of bison escapes and domestic stock trespass.

2) Vegetation and Soil. Some trampling and cutting expected in order to gain access to fence line. Impacts expected to be minimal.

3) Other Wildlife. Some restriction to movement of wildlife in woven wire fenced areas. Animals trail along fences until a barbed wire area is encountered.

1) Bison. Bison escapes and stock trespass would be eliminated. May allow for a higher bison carrying capacity. Reduced repair and retrieval of escaped animal costs expected.

2) Vegetation and Soil. Same as in B.

3) Other Wildlife. High and low passes would be incorporated into the woven wire fence to allow for normal wildlife movement.

PROJECT STATEMENT:

FIRE MANAGEMENT

THRO-N-0018

NEED FOR PROGRAM: To abide by established policies for natural areas and wilderness, Theodore Roosevelt National Park must develop and apply a fire management program. The current park management practice of suppression of wild fires is no longer applicable or in the best interest of the park's natural systems.

ALTERNATIVE ACTIONS:A. No Action.RESOURCES AFFECTED:

- 1) Vegetation. Man will interfere with natural process, perhaps to the detriment of biota.
- 2) Visitor Use. Visitors would enter an area assumed natural but where a major component of the process is being disrupted.
- 3) Soils. Soil chemistry would evolve under artificial conditions. Nutrients would remain tied up in vegetation for some period of time.
- 4) Exotic Vegetation. Fire sensitive exotics may continue to require mechanical or chemical control.

B. Wildland Fire
Management
Plan.

- 1) Vegetation. This natural process would be allowed to take place within specific parameters.
- 2) Visitor Use. Visitors would enter and experience a more truly natural area.
- 3) Soils. Soils would develop under natural conditions with organic components broken down to release inorganic nutrients.
- 4) Exotic Vegetation. Fire may be beneficial in containing certain exotic invaders.

PROJECT STATEMENT:

PRAIRIE DOG MANAGEMENT

THRO-N-0019

NEED FOR PROGRAM: Prairie dogs are an integral part of the prairie ecosystem, by providing prey for avian and mammalian predators, and maintaining a shortgrass habitat for use by other mammals.

ALTERNATIVE ACTIONS:RESOURCES AFFECTED:

A. No Action.

- 1) Prairie Dogs. Monitoring would be discontinued, no colony size (area) or location shift data available.
- 2) Vegetation. No measurable impact expected, vegetation types found within and adjacent to colonies would be maintained by the animals.
- 3) Safety and Maintenance. Colonies in vicinity of developments may cause damage to roads, spread into visitor use areas where visitor desire to feed the animals may result in bites.

B. Limited Management.

- 1) Prairie Dogs. Measure colonies at least once every 3 - 4 years to determine colony size and location of colonies.
- 2) Vegetation. Same as in A.
- 3) Safety and Maintenance. Some direct control on individual animals to reduce maintenance and visitor safety problems in developed areas.

C. Accelerated Management.

- 1) Prairie Dog. Increase frequency of colony monitoring, initiate research on population dynamics.
- 2) Vegetation. Same as in A.
- 3) Safety and Maintenance. Same as in B.

D. Prairie Dog Research Program.

- 1) Prairie Dogs. Colony monitoring continued, study interrelationships of prairie dogs with bison, predators, and the potential for colony expansion from prescribed burning.
- 2) Vegetation. Prescribed burning around colonies may provide temporary shortgrass habitat for colony expansion.
- 3) Safety and Maintenance. Same as in B.

PROJECT STATEMENT: SHARPTAIL GROUSE MANAGEMENT THRO-N-0020

NEED FOR PROGRAM: Create a data base for future management, delineate habitat requirements, reproductive success, and role of grouse in the ecosystem.

ALTERNATIVE ACTIONS:

A. No Action.

RESOURCES AFFECTED:

- 1) Sharptail Grouse. Continue informal efforts to locate dancing grounds, and monitor population; data base would not be formed; protection and management of dancing grounds would not be accomplished.
- 2) Visitor. No change in visitor use.

B. Limited Management.

- 1) Sharptail Grouse. Increase efforts to locate dancing grounds; make population estimation; develop data base for future management decisions.
- 2) Visitor. May enhance visitor enjoyment by location of additional dancing grounds available for observation.

C. Grouse Management Plan.

- 1) Increase efforts to locate dancing grounds; make population estimation; develop data base; determine need for habitat manipulation; establish seasonal habitat use, reproductive success, essential habitat requirement. Develop a Grouse Management Plan.
- 2) Visitor. Same as in B.

PROJECT STATEMENT:

BACKCOUNTRY MANAGEMENT

THRO-N-0021

NEED FOR PROGRAM: To protect resources, maintain trails, provide visitor protection, monitor overnight and day use.

ALTERNATIVE ACTIONS:

A. No Action -
Current
Management.

RESOURCES AFFECTED:

- 1) Natural Resources, Visitor Protection, Trail Maintenance. Continued patrols of backcountry in summer to discourage resource damage, provide visitor protection, maintain trails.
- 2) Overnight Use. Continued issuance of camping permits to monitor overnight use in the backcountry.
- 3) Day Use. No system exists to monitor day use of the backcountry.
- 4) Critical Wildlife Habitat. No provisions made to minimize disturbance to wildlife during critical times, e.g. mating, breeding, etc.

B. Expanded
Management.

- 1) Natural Resources, Visitor Protection, Trail Maintenance. Same as in A.
- 2) Overnight Use. Same as in A.
- 3) Day Use. Trail head registration system to estimate day use, establish areas of heavy use which may need protection.
- 4) Critical Wildlife Habitat. Provisions made to minimize disturbance to wildlife during critical periods.

PROJECT STATEMENT: NON-NATIVE GALLINACEOUS BIRD MANAGEMENT THRO-N-0022

NEED FOR PROGRAM: Establish baseline population data, competition, habitat use.

ALTERNATIVE ACTIONS:

A. No Action.

RESOURCES AFFECTED:

- 1) Pheasants and Turkey. No index as to population sizes would exist; significant problems could not be identified; no management action to resolve the problem could be undertaken.
- 2) Visitor. Viewings and sightings of the species would vary depending on population size.

B. Limited Management.

- 1) Pheasants and Turkey. Compile indices of populations so year to year comparison could be made; significant increases or decreases can be identified; management actions to combat the problem can be initiated.
- 2) Visitor. Management actions deemed necessary could maintain a stable population to be viewed.

C. Pheasant and Turkey Research Programs.

- 1) Pheasants and Turkey. Research on population dynamics, competition, habitat preference, and carrying capacity would enable resource managers to carefully manage to obtain specific results. Population in harmony with available habitat, etc.
- 2) Visitor. May result in increases or decreases in population based on research findings and subsequent management action. May decrease sightings.

PROJECT STATEMENT:

CARNIVORES MANAGEMENT

THRO-N-0023

NEED FOR PROGRAM: Increase data base for management of carnivores.

ALTERNATIVE ACTIONS:RESOURCES AFFECTED:

A. No Action.

- 1) Mammalian Carnivores. Current management plan continued. Informal monitoring. Management of other animals and plants used to maintain carnivore habitat. No impact to the environment or species involved.
- 2) Visitors. Most mammalian carnivores are secretive and few visitors ever sight them. No change in observation opportunity is expected.

B. Limited Action.

- 1) Mammalian Carnivores. Current management plan continued. Informal monitoring. Management of other animals and plants used to maintain carnivore habitat. Increase park library files with scientific literature on carnivores, to increase management capability.
- 2) Visitors. Same as in A.

C. Mountain Lion
Management Plan.

- 1) Mammalian Carnivores. Current management plan for other carnivores continued as in Alternative A or B. Intensive mountain lion census, den location. Assessment of recruitment and reproduction. Develop a program to encourage and maintain mountain lion population in the park.
- 2) Visitors. Same as in A.

PROJECT STATEMENT:

AVIAN MANAGEMENT

THRO-N-0024

NEED FOR PROGRAM: To provide for habitat protection.

ALTERNATIVE ACTIONS:RESOURCES AFFECTED:

A. No Action.

- 1) Birds. Continuance of no system of monitoring impacts to habitat.
- 2) Visitor. Provide visitors ample opportunity to view and learn about bird life.

B. Limited Action.

- 1) Birds. All park activities which could have a negative impact on habitat would be assessed; efforts to curtail such activity or mitigate the impacts will be initiated.
- 2) Visitors. Provides visitors ample opportunity to view and learn about bird life.

C. Avian Management Plan.

- 1) Birds. Data gathering on population dynamics, habitat needs and restoration, species specific requirements. Plans formulated for management of optimum numbers, habitat protection or modification.
- 2) Visitors. May cause population levels of some species to change, otherwise ample opportunity should exist.

PROJECT STATEMENT: SMALL MAMMAL, AMPHIBIAN, AND THRO-N-0025
 REPTILE MANAGEMENT

NEED FOR PROGRAM: Upgrade monitoring efforts, define ecosystem roles, identify needs for management.

ALTERNATIVE ACTIONS:

A. No Action.

RESOURCES AFFECTED:

1) Small Mammals.

2) Amphibians.

3) Reptiles. Current efforts using informal monitoring would be sustained. Apparently stable populations have resulted in the past. Impacts to critical habitats may be unnoticed causing local extinction.

B. Limited Action.

1) Small Mammals.

2) Amphibians.

3) Reptiles. A more intensive monitoring of these groups would be initiated. Also, collection of technical and scientific literature will help initiate management, by providing basic species ecology data.

C. Small Vertebrate Research.

1) Small Mammals.

2) Amphibians.

3) Reptiles. To be used in conjunction with alternative B, to identify ecosystem roles, feeding ecology, population density, and critical habitat. Would result in a more complete management scheme for these species within the park environment.

CUMULATIVE IMPACTS FROM THE RESOURCE MANAGEMENT PLAN

Those adverse impacts from threats to park resources are discussed in the Air Quality Management, Exotic Plant Management, Acid Deposition Management, and External Aesthetic Threats problem statements. The remaining project statements are secondary, though they require appropriate attention, since solving or mitigating them will add to the park's attractiveness, and allow for proper resource management.

The implementation of this plan should result in restoration and protection of park resources. There are no anticipated cumulative negative impacts from this plan.

VII. LIST OF AGENCIES CONSULTED

AGENCIES:

USDA Forest Service
Custer National Forest
Medora Ranger District
Dickinson, N.D.

USDA Forest Service
Custer National Forest
McKenzie Ranger District
Watford City, N.D.

Bureau of Land Management
Dickinson Area Office
Dickinson, N.D.

North Dakota Department of Game and Fish
Bismarck, N.D.

U.S. Fish and Wildlife Service
Bismarck, N.D.

National Park Service
Rocky Mountain Regional Office
Science and Resource Preservation
Denver, CO

National Park Service
Wind Cave National Park
Hot Springs, S.D.

National Park Service
Theodore Roosevelt National Park
Medora, N.D.

CONSULTATION AND COORDINATION

The Natural Resource Management Plan resulted largely from the efforts of Superintendent Harvey D. Wickware and his staff. Henry McCutchen, of the Regional Office, assisted in developing this plan. The above listed agencies were consulted during preparation of the plan for their knowledge of the subjects and recommendations.

VII. APPENDICES

APPENDIX I

Information Baseline List

1. Topography: There is a U.S.G.S. map No. N4652.5 - W10317.5/10x20, dated 1974 for the South Unit, and No. 4732-W10313.5/6.5x15.5 for the North Unit, also dated 1974. Both are on a 1:24,000 scale, and available at Park Headquarters in each unit.
2. Geology: Survey research papers, study reports, and books are available at Park Headquarters.
3. Land Use and Ownership: Land status plats and boundary maps which denote status of lands within the park boundaries are available at Park Headquarters.
4. Soils: General soils maps to the association level are available for McKenzie and Billings Counties, North Dakota. the survey of McKenzie County including what is now the North Unit of the park was conducted in 1933, with the maps and report issued in 1942. The Billings County survey includes the South and Elkhorn Ranch Units, and was completed in 1934, with maps and the report issued in 1944. These surveys were conducted jointly by the U.S. Department of Agriculture and the North Dakota Agricultural Experiment Station.
5. Hydrology: Most of the hydrological features of the park can be discerned from any of the several maps mentioned previously. Natural water sources are plotted on the park topographic maps. Water depth in the Little Missouri River is monitored regularly in the North Unit, and during critical high water periods in the South Unit.
6. Vegetation: Vegetation types are described in a number of research reports. A vegetation map is currently being prepared.
7. Wildlife: There are no overall wildlife range maps of Theodore Roosevelt National Park. Several schematic maps of various portions of the park have been prepared in conjunction with research reports for individual species and groups of species.
8. Cultural: An Archeological Base Map for the South Unit has been prepared by the Rocky Mountain Regional Office. Several research reports concerning cultural resources are available at Park Headquarters. There has been no complete archeological survey of the park.
9. Recreation, Development, and Support Facilities: Maps and schematic diagrams of these areas are available in the files at Park Headquarters.
10. Climate: Detailed weather information including rainfall, snowfall, and temperature is available at Park Headquarters. Summary sheets are available to interested persons on request.

APPENDIX II

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