

ENVIRONMENTAL ASSESSMENT

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AFFECTED ENVIRONMENT

This section provides the information necessary to understand the issues, the proposed action, and the alternatives of this document and to help assess environmental effects. Existing environments and conditions in the park, including natural and cultural resources, visitor use, and requirements for park management, are described. A facility analysis of the type, number, and condition of all park facilities and improvements is also included.

NATURAL RESOURCES

Geology/Terrain

Theodore Roosevelt National Park provides an outstanding representation of the North Dakota badlands, formed by the Little Missouri River. Much of the park is a maze of canyons, buttes, and coulees. Elevations in the park range from 1,958 feet along the river in the north unit to 2,850 feet at Buck Hill in the south unit. Erosion has produced an infinite variety of landforms interspersed by buttes and ridges, with rolling prairies extending outward from the rim of the badlands.

Rock formations of three ages are found in the park; however, fossil remains of ancient flora and fauna are almost exclusively representative of the Paleocene epoch. Fossils are rare, but occasional shells of freshwater clams and snails and the skeletal remains of archaic alligators have been found in the North Dakota badlands. Petrified stumps of ancient coniferous trees are more common; a concentration of these is found in the western portion of the south unit. These remains were formed in the silica-rich environment of volcanic ash which covered the trees; silica replaced the cellulose content.

Trees and other plants that died and were buried by alluvial sediments were transformed by pressure into seams of lignite coal, which are found throughout the badlands. Lignite seams ignited by natural sources baked overlying sediments to form a brick-like, red stone known locally as scoria.

Vegetation/Soils

Soils found within the park are regosols, developed from excessively drained, medium-textured, and calcareous parent material. Textures range from loams to clay loams. These soils can cause problems when water is present. The saturated soils tend to slump and slip, which can result in difficulties with road construction and maintenance, such as at Buck Hill, and cliff and hillside stability, such as at Painted Canyon.

The vegetation is adapted to the soil types and the semiarid climate and varies according to slope, aspect, soil, and moisture availability. The

vegetation can be grouped into six physiographic/vegetational classes including upland grasslands, dry breaks, wooded draws, sagebrush and grassland bottoms, floodplain forests, and a riparian class (see table 9 for vegetation composition in park areas).

The distribution and abundance of the natural vegetation have been changed by activities such as grazing, cultivation, and protection from fire. Leafy spurge, Canada thistle, yellow sweet-clover, bromegrasses, and other exotic plants are widespread.

Sites with deep, well-drained soils on moderately to gently rolling areas make up the upland grasslands. Wheatgrasses, needlegrasses, blue grama, and upland sedges dominate these areas. A variety of forbs make up about 10 percent of the herbage, while shrubs such as snowberry and prairie rose are less abundant.

The dry breaks are characterized by bare, eroded soils or scoria surfaces. Plant life is limited with sparse stands of little bluestem, blue grama, sideoats grama, and red threeawn. Shrubs such as creeping juniper, saltbush, and greasewood are scattered.

Wooded draws are dominated by Rocky Mountain juniper, green ash, and chokecherry. Common understory species include snowberry, skunkbush sumac, sedges, wildrye, ricegrass, mosses, and lichens. In the Achenbach Hills, some upland draws are dominated by quaking aspen.

The sagebrush and grassland bottoms are formed by alluvial deposits from the river and its larger tributaries. These higher floodplains and river terraces are dominated by silver sagebrush, western wheatgrass, needle and thread, and blue grama. Fringed sage, prairie rose, and snowberry are minor, woody components.

Floodplain forests are found along perennial watercourses and are dominated by plains cottonwood. Other important species include Rocky Mountain juniper, green ash, chokecherry, wildrye, wheatgrasses, and sedges. Large expanses in the north unit are devoid of woody understory and instead have a dense cover of grasses and forbs.

Riparian vegetation is generally a narrow band between the floodplain forest and a perennial stream. A variety of willows are the dominant vegetative species. Wildrye and sometimes prairie cordgrass or rushes may be found. The willows are generally low growing and bushy in appearance, as they are periodically flooded or scoured by the seasonal actions of the river and streams.

There are no prime or unique agricultural lands within the park.

Wildlife

Large mammals found within the park include white-tailed deer, mule deer, bison, elk, pronghorn, wild horses, longhorn steers, and a small

Table 9: General Vegetation Composition at Existing and Proposed Development Areas

<u>Location</u>	<u>Common Plants</u>	<u>Physiographic/Vegetation Class</u>
<u>North Unit</u>		
CCC camp-tender residence	Wheatgrasses, needlegrasses, silver sagebrush, fringed sage	Sagebrush-grassland bottom
Bison corral (proposed relocation)	Wheatgrasses, needlegrasses, sedges, snowberry	Upland grassland
Squaw Creek picnic area and campground	Cottonwood, green ash, wheatgrasses, wildrye, juniper	Floodplain forest
Proposed group horse camp (bison corral, Wright/Baye property, and east of Squaw Creek locations)	Wheatgrasses, needlegrasses, silver sagebrush, fringed sage	Sagebrush-grassland bottom
Proposed canoe/snowmobile access site	Cottonwood, green ash, wheatgrasses, needlegrasses, wildrye, silver sagebrush, fringed sage	Sagebrush-grassland bottom/floodplain forest
Squaw Creek nature trail	Cottonwood, green ash, wheatgrasses, needlegrasses, wildrye, silver sagebrush, fringed sage	Sagebrush-grassland bottom/floodplain forest
District headquarters-entrance area	Wheatgrasses, needlegrasses, sedges, maintained lawn	Upland grassland/lawn
District headquarters-housing area	Wheatgrasses, needlegrasses, sedges, silver sagebrush, snowberry, lawns	Upland grassland/sagebrush-grassland bottom/lawn
District headquarters-maintenance area	Wheatgrasses, needlegrasses, sedges, silver sagebrush, snowberry, lawns, cottonwood	Upland grassland/sagebrush-grassland bottom/lawn
Sewage lagoon area	Wheatgrasses, wildrye, silver sagebrush, chemically controlled weeds and brush	Sagebrush-grassland bottom
Overhead power lines	Wheatgrasses, needlegrasses, wildrye, fringed sage, little bluestem, sideoats grama, saltbush, cottonwood	Upland grassland/dry breaks/sagebrush-grassland bottom/floodplain forest
<u>Elkhorn Unit</u>		
Proposed unit access road	Silver sagebrush, juniper, ash, wheatgrasses, needlegrasses, snowberry, cottonwood	Sagebrush-grassland bottom
Historic structure locations	Cottonwood, wheatgrasses, prairie sandreed, wildrye, fringed sage, juniper	Floodplain forest
Proposed picnic area and restrooms	Juniper, green ash, wheatgrasses, silver sagebrush, chokecherry	Floodplain forest
Proposed trails	Cottonwood, juniper, green ash, chokecherry, wheatgrasses, prairie sandreed, fringed sage	Floodplain forest
Proposed storage building and tent platforms	Juniper, green ash, wheatgrasses, wildrye, ricegrass, snowberry	Wooded draw/floodplain forest

<u>Location</u>	<u>Common Plants</u>	<u>Physiographic/Vegetation Class</u>
<u>South Unit</u>		
Maltese Cross cabin	Smooth brome, lawn, cottonwood	Floodplain forest/lawn
East entrance station (existing)	Prairie dog weed, blue grama, threeawn, wheatgrasses, needlegrasses	Dry breaks/upland grassland
East entrance station (proposed relocation)	Green ash, chokecherry, wheatgrasses, needlegrasses, sedges	Wooded draw/upland grassland
Painted Canyon visitor center	Maintained lawn, seeded exotic and native grasses	Lawn
Bison corral (existing)	Wheatgrasses, needlegrasses, green ash, chokecherry silver sagebrush, little bluestem	Upland grassland/wooded draw
Horse corral (proposed additional bison corral)	Wheatgrasses, needlegrasses, sedges silver sagebrush, snowberry	Upland grassland
Cottonwood campground	Cottonwood, juniper, green ash, wildrye, wheatgrasses, sedges, silver sagebrush	Floodplain forest/sagebrush-grassland bottom
Proposed canoe access site (State Historical Society lands)	Mowed grass, willows, wildrye, prairie cordgrass	Sagebrush-grassland bottom/riparian
Proposed westside loop trail	Cottonwood, juniper, green ash, silver sagebrush, wheatgrasses, snowberry, buffaloberry	Floodplain forest/sagebrush-grassland bottom/dry breaks/upland grassland
Proposed Painted Canyon nature trail	Wheatgrasses, little bluestem, sideoats, grama, silver sagebrush rabbitbrush, saltbush, juniper	Dry breaks
Proposed Medora Overlook trail	Wheatgrasses, sideoats grama, saltbush, willow, snowberry, rose, wildrye	Dry breaks/upland grassland/sagebrush-grassland bottom/riparian
Skyline trail	Smooth brome, western wheatgrass	Upland grassland
Peaceful Valley picnic area	Green ash, cottonwood, chokecherry, wheatgrasses, wildrye, snowberry	Woody draw
Buck Hill	Wheatgrasses, needlegrasses, sideoats grama, little bluestem, creeping juniper, juniper	Upland grassland/dry breaks
Painted Canyon sewage lagoon	Wheatgrasses, prairie junegrass, fringed sage, needlegrasses	Upland grassland
Peaceful Valley ranch	Cottonwood, juniper, mowed lawn, silver sagebrush, wheatgrasses	Floodplain forest/sagebrush-grassland bottom/lawn
Headquarters area	Seeded/sodded, mowed lawns, cottonwood	Sagebrush-grassland bottom/lawn

band of bighorn sheep. A program to supplement the bighorn band is being developed, while the elk reintroduction is still considered to be in an experimental stage.

Mammalian predators found in the area include coyote, bobcat, red fox, badger, and weasel. Sightings of mountain lion have been reported. Many other mammals inhabit the park, including small rodents, skunks, beavers, porcupine, and prairie dogs.

Many birds of prey nest in the park. Those that nest on steep-sided buttes or in large trees include golden eagles, prairie falcons, kestrels, turkey vultures, great-horned owls, screech owls, and red-tailed and rough-legged hawks. Marsh hawks and burrowing owls are ground nesters. A great variety of passerine and four gallinaceous birds also nest within the park.

Threatened and Endangered Species

- There are no plant species in the park that are currently included or proposed for inclusion on the federal endangered or threatened species lists. However, two species--bursage (Ambrosia acanthicarpa) and desert wire lettuce (Stephenomeria runcinata) both occur in the park, and are listed as endangered by the North Dakota Natural Heritage Program. Three other species found in the park--alkali sacaton (Sporobolus airoides), squirreltail (Sitanion hystrix), and double bladderpod (Physaria brassicoides)--are considered threatened by the state.
- Currently there are no wildlife species that inhabit or could inhabit the park that are considered as threatened on the federal list. The federally endangered black-footed ferret (Mustela nigripes), which is associated with prairie dog towns, could possibly inhabit the park, but its occurrence is unknown. The peregrine falcon (Falco peregrinus) formerly nested in the badlands, but nesting has not been recorded recently. Two winter sightings have been reported, but subsequent nesting has not been observed. Recently listed as federally endangered is the interior least tern (Sterna antillarum athalassos); little is known of this species, but the park may serve as habitat. The piping plover (Charodrius melodus) has recently been listed as federally threatened, but this species has not been sighted in the park.

The endangered gray wolf (Canis lupus) has been extirpated from the area, and because livestock production is a major economic base for the region, its reintroduction or reinhabitation is unlikely. The endangered bald eagle (Haliaeetus leucocephalus) is commonly seen along the river during spring and fall migration, while the endangered whooping crane (Grus americana) is rarely spotted. Within the park, both species use riparian habitat along the river only briefly while migrating.

In addition, two federal category 2 species have been sighted in the park. (Category 2 means that information indicates the possible appropriateness of listing these species as threatened or endangered;

however, further research and field study are needed.) The ferruginous hawk (Buteo regalis) and Swainson's hawk (Buteo swainsoni) probably nest in the vicinity of the park. Other category 2 species for which the park may serve as habitat include the pallid sturgeon (Scaphirhynchus albus), long-billed curlew (Numenius americanus), and swift fox (Vulpes velox). The lynx (Felis lynx), also on this list, may have been in the area in the past but is not at the present time.

Species listed as endangered by the North Dakota Natural Heritage Program and of interest to western North Dakota include the black bear (Ursus americanus), fisher (Martes pennanti), and river otter (Lutra canadensis). None of these has been recently recorded in the park. Two state-listed threatened species, the golden eagle (Aguila chrysaetos) and prairie falcon (Falco mexicanus), are commonly seen and nest in the park; little is known regarding the occurrence, distribution, and use of the park by the mountain lion (Felis concolor) or merlin (Falco columbarius).

Because overlapping of these sensitive species between federal and state lists is common, they have been recorded here only once under the most protective classification. Little is known about many of these species' relationship to the park environment, although efforts are being made to gather more data. Aerial surveys were made in 1983 and 1984 and are scheduled every two to three years to locate raptor nest sites; ground surveys will be made annually to monitor reproductive success. Over the past several years, park staff and university researchers have surveyed, collected, and identified plant specimens and have located rare flora within the park. Occasional seining is conducted in the perennial streams to collect specimens of common fishes and to locate rare species.

Water Resources

The major surface water resource in the park is the wild and free-flowing Little Missouri River and its tributaries. The river flows through the north and south units and along the eastern boundary of the Elkhorn unit. Because of its designation as a scenic river by the state of North Dakota, diversions and impoundments on the main stem are prohibited. There are 13 developed springs and 18 wells in the park. Data on flow rates and chemical characteristics from these sources and the river are incomplete. The primary concern regarding water resources relates to potential pollution of streams and underground aquifers from oil and gas development and chemical transportation. Oil and gas development includes waste salt water injection wells, storage and treatment facilities, and gas pipelines, including pipelines buried under the Little Missouri River bed. Seepage of crude oil into a major Little Missouri tributary upstream from the park has been reported.

Floodplains and Wetlands

In 1984 the U.S. Geological Survey located the 100- and 500-year floodplains of the Little Missouri River in the Medora, Cottonwood campground, Peaceful Valley, Elkhorn ranch, Squaw Creek campground, and north unit headquarters areas. Permanent survey markers were installed in appropriate locations. The National Park Service then mapped these floodplains for use in future planning. A large portion of Medora, including the park headquarters, the Medora visitor center, Maltese Cross cabin, and most of the park housing area, are within the 100-year floodplain, as are the Cottonwood campground, the Peaceful Valley area, and all the historic remains in the Elkhorn ranch unit. In addition, the Squaw Creek campground/picnic area (including all historic structures) and approximately one-half of the north unit bison corral are in the 100-year floodplain.

The Peaceful Valley ranch and picnic area are in the Paddock Creek 100-year flash-flood area, and the Squaw Creek campground/picnic area is within the Squaw Creek 100-year flash-flood area. Flash floods could also be experienced in the Knutson Creek drainage, but no developments other than trails are located or proposed along this stream. Within these three flash-flood areas are segments of several trails, short portions of which cross Squaw, Paddock, and Knutson creeks. (Refer to DCP maps for Squaw Creek campground and Peaceful Valley, and the General Development Plan/Flood Data maps for location of these drainages and trails.)

Above the Little Missouri bottomlands, the tributary streams, prone to flash floods, have narrow channels in steep-sided canyons where flash floods would be quite destructive and dangerous. No facilities except trails are located in or proposed for these areas. Close to the river, where they pass through developed visitor use areas, the tributary stream floodplains become rather broad. However, USGS calculations for depths and velocities during 100-year flash floods at these locations indicate there would be a hazard to persons and property.

There is the extremely remote possibility that a 100-year flash flood could occur in these three creek drainages at the same time that a 100-year flood occurred in the Little Missouri River floodplain. Should this happen, flash-flood damage would be mitigated greatly in the developed areas because of the deeper slack water from the river flood, which would dissipate much of the destructive force of the flash flood (see Squaw Creek campground and Peaceful Valley DCP maps for more information).

The danger in flash flood and other high hazard areas is extremely difficult to assess because of the many variables involved. This highlights the importance of having adequate information and analysis on each flash-flood area in question so that rational decisions can be made about what developments, if any, will be permitted.

In 1980 a report concerning potential flood hazards was prepared for the National Park Service by Linsley, Kraeger Associates. Table 10 contains information from that report concerning the effects of water depths and velocities, which may be useful in assessing flood hazards.

Table 10: Physical Impact of Floodwaters
 (Based on the Force in Pounds Exerted on a Cylinder
 1 Foot in Diameter When Immersed in Flowing Water)

Velocity of Flow in Feet Per Second (fps)	Depth of Immersion in Feet					
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	
2	4	8	12	16	20	TOLERABLE
3	9	17	26	35	44	UNSAFE
5	24	48	73	97	121	
10	97	194	291	388	485	
15	218	436	655	873	1,091	
20	412	825	1,237	1,649	2,062	

Table Notes and Explanation

The table presents values of the force (in pounds) exerted on a circular cylinder immersed in water depths from 1 to 5 feet flowing at velocities from 2 to 20 fps. Assuming that the cylinder approximates a human body, a healthy adult might be able to stand in water 5 feet deep with velocity of 2 fps resisting a force of 20 pounds. However, the effective weight of this person would be very small because of bouyancy. Quite probably this person would be pushed or floated downstream, but at 2 fps might be able to swim to safety. With a velocity of 3 fps, an adult could withstand depths of 3 feet and at 5 fps a depth of possibly 2 feet. At greater depths or velocities as indicated by table entries below the line, chances of survival would rapidly approach zero. A rough rule of thumb is that a healthy human adult can withstand a combination of velocity and depth whose product is 10; i.e., 2 fps and 5 feet deep or 5 fps and 2 feet deep.

Children, because of their small weight and height, would have serious difficulty at depths or velocities much lower than those an adult might withstand. Handicapped persons or persons trapped in sleeping bags on the ground could experience great difficulty in a depth of 1 foot within relatively low velocities. It should be noted that the discussion above applies largely to sediment-free water. If the flow is carrying very large sediment loads, chances of survival are sharply reduced.

Forces exerted on cars, trailers, and other structures are much greater than those indicated above because of the much greater area exposed to the flow combined with the fact that the drag force on a large flat plate would be nearly double that on a cylinder of the same projected area. Bouyant forces at depths of 2 or 3 feet are usually sufficient to float an automobile or trailer.

NPS final procedures for implementing EO 11988 and EO 11990 (see appendix F) exempt picnic and camping facilities and their associated sanitary facilities from compliance with the orders, provided that floodproofing is a consideration in their design or construction. All entrance, access, and internal roads to or within existing developments are also exempt from compliance with the floodplain orders.

The U.S. Army Corps of Engineers, through the Remote Sensing Lab at the University of Nebraska-Omaha, has mapped the wetlands along the Little Missouri River using high altitude LANDSAT satellite imagery. A very broad classification was used, which separated open water, marsh, and riparian habitats. The last two are most important for wetland classification, and the data showed that about 66 acres of widely scattered riparian wetlands occur in the north unit, and 57 acres occur in the south unit. No marsh wetlands were recorded along the river or elsewhere in either unit. The riparian wetlands would nearly correspond to the riparian physiographic/vegetational class discussed previously.

An informal aerial reconnaissance along the river by the U.S. Fish and Wildlife Service resulted in an opinion that some palustrine forested wetlands occurred in the park, but that they are probably insignificant in total area and value as wetlands habitat.

Neither this survey nor the LANDSAT photography was ground-truthed. Wetlands will be preserved in accordance with EO 11990 and by the normal park procedures of environmental assessment for any major management activity or proposed development.

Air Quality

As far as can be determined, the historical quality of the air flowing over the park has been excellent until recently. Natural transient pollution from wildfires, blowing dust, and burning coal veins occurred with no significant long-lasting impacts on the environment. However, with the demand for fossil fuels and electricity increasing and the potential for the production of both in the Williston Basin, the basin has become a major energy development area, with great potential for negative impacts on aesthetic and natural environments.

The park's first air pollution monitoring equipment--a high volume, total suspended particulates sampler--was installed in the south unit in 1974. In 1977, the park prepared its first documentation of air quality and related values, including historical quality and significant vistas. Also, in accordance with the 1977 Clean Air Act amendments, all three units of the park were designated a mandatory class I area for purposes of preventing significant deterioration of air quality.

In 1979, a monitoring facility to sample sulfur dioxide, hydrogen sulfide, total suspended particulates, and fine particulates was placed in the north unit, and the park was issued a teleradiometer to measure visual range reduction in the south unit.

Following enactment of the 1977 Clean Air Act amendments, the Environmental Protection Agency published visibility protection regulations. Those regulations gave the secretary of the interior an opportunity to identify scenic views from class I areas of specific landmarks or panoramas located outside the class I areas that were important or integral to the park visitor's visual experience. Identification of the integral vistas would not have assured protection of air quality in those vistas. However, it would have required states such as North Dakota to include vistas identified by the secretary in their state implementation plans and to consider the costs and benefits of preventing visibility degradation that might affect those vistas before deciding to permit new air pollution sources.

Using draft guidelines developed by the National Park Service's Air Quality Division, the park prepared a list of integral vistas in 1980. This list included viewpoints such as Badlands Overlook, Bentonitic Clay, Boicourt, Buck Hill, Elkhorn Ranch, Johnson's Plateau, Little Missouri, Man and Grass, Medora Overlook, Oxbow, Painted Canyon, and Ridgeline Nature Trail. The vistas included Badland Terrain, Kildeer Mountains, Bullion Buttes, Sentinel Butte, South River Bluffs, DeMores Chateau, Custer National Grassland Plateau, Stock Butte, Maltese Cross Cabin, Little Missouri Town Site, West River Crossing (Kellogg Ranch), and Little Missouri National Grassland. The draft guidelines and preliminary list of integral vistas were published in the Federal Register in January 1981 (46 CFR 3646) and April 1981 (46 FR 23389). The list of vistas was also given to the state of North Dakota.

Following completion of a detailed regulatory impact analysis, the secretary of the interior on October 25, 1985, decided not to publish a final regulation officially designating integral vistas. The secretary emphasized that his decision did not reflect a judgment that integral vistas are not worthy of protection. He also made it clear that the Park Service will continue to have the responsibility to participate in individual state permitting and regulatory decisions, and through this participation, have an opportunity to raise concerns regarding protection of scenic views. The secretary believes that parks can work cooperatively with states and private interests under existing regulatory programs to resolve air quality related resource conflicts.

To date, approximately 1,500 producing oil and gas wells have been drilled in the two counties, which include the three park units. Sources of air pollution from this development include hydrogen sulfide and sulfur dioxide from gas flaring, hydrogen sulfide associated with escaping natural gas, and smoke and particulates from reserve pit burning and construction.

From 1982 through 1984 the Park Service responded to seven PSD (prevention of significant deterioration) permit applications for energy conversion and natural gas sweetening facilities within a 125-mile radius of the park. NPS computer modeling of emissions predicted that some class I air quality standards (increments) within the park would be exceeded, although the standards at the source areas would not

necessarily be violated. However, since the Park Service also determined that visibility and pollution-sensitive plant species would not be significantly affected, the Department of the Interior issued a certification of no unacceptable adverse impact on the park for these facilities (1984). As a result, the state has granted construction permits for six of the seven plants (one had withdrawn its application).

Air quality activities in the park are numerous. They include monitoring visibility and air quality, researching plant effects, mapping and photographing visual intrusions and new energy developments near the park, reporting violations of state air pollution standards, responding to public inquiries regarding air pollution in the park, contacting news media and the public, coordinating with the State Industrial Commission regarding reduction of visual and other impacts of energy development, and cooperating with the Forest Service and Bureau of Land Management regarding oil and gas permit stipulations and review of planning documents. In addition, the park staff, in cooperation with the NPS Rocky Mountain Region and Denver-based Air Quality Division, will continue to review air quality permit applications submitted to the North Dakota Department of Health to identify potential air quality problems.

CULTURAL RESOURCES

Archeological Resources

Only a small portion of the park has been surveyed for archeological resources. In 1968 James Sperry of the North Dakota State Historical Society surveyed parts of the north and south units. He located 37 prehistoric Indian sites but filed no report. Another 8 prehistoric Indian sites were found by Ralph Hartley of the Midwest Archeological Center in the 1979-80 period during a survey for the realignment right-of-way of 6 miles of the north unit (NPS 1981). Approximately 30 to 40 homestead sites have been documented by park personnel, but none of these areas has been surveyed. Basically, the Elkhorn unit has received the greatest archeological attention.

Because of the lack of a comprehensive archeological survey, the park is not in compliance with section 110(a)(2) of the National Historic Preservation Act, as amended in 1980, which dictates that such a survey must be accomplished. This completed survey of the park would allow an evaluation to be made of the eligibility of cultural sites for inclusion on the National Register of Historic Places. Also, it would provide a valuable interpretive tool to address aboriginal and homesteading use of the park as well as provide valuable information on which to base improvements or construction, which could otherwise result in costly delays until mitigation was completed on a previously unknown site encountered during such work.

The recorded Indian and homestead sites are not located within any of the areas proposed by the action alternatives that would have earth disturbances.

Historic Resources

The park was originally established for its historical association with Theodore Roosevelt and the open range cattle industry. The principal Roosevelt-related historic site is the Elkhorn ranch location, which has no surviving structures and only minimal archeological remains, including those of the ranch house, stable, blacksmith shop, dugout, well, chicken pen, shed, and corral. Shallow ground indentations exist where the structures' foundations were situated. For a few structures, some rough foundation stones remain. Some posts, pieces of wood, stone pillars (ranch house), etc. have been removed. Elkhorn served as the headquarters for Roosevelt's second ranch from late 1884 to 1890. The Long X cattle trail, which crosses a portion of the north unit, was used to drive Texas longhorn cattle into McKenzie County, particularly to the Long X ranch operated by the Reynolds brothers. A third site in the south unit was purportedly used by the Marquis de Mores as a corral (generally known as the beef corral).

The Peaceful Valley ranch in the south unit also represents the ranching era and dates to 1885. By 1920 it was operating as a dude ranch, which was when the ranch received its name. Currently, the ranch consists of a ranch house, bunk house, and a barn-equestrian center, and serves as the base for the horse concession.

The Maltese Cross cabin, located near the Medora visitor center, still remains from the first Roosevelt ranch, south of Medora.

The other historic theme connected with the park involves the federal relief programs and their projects during the depression years of the 1930s. The sites of CCC camps are in both the north and south units of the park. From 1934 to 1941 the CCC built the following north unit structures: the camp-tender cabin, two picnic shelters (made of stone and heavy timbers) at the Squaw Creek campground/picnic area, and the Little Missouri River overlook shelter. The CCC obtained some of their building material from a stone quarry, which is located in the north unit. The ERA constructed the south unit's old east entrance station, its stone privy, and the stone pylon, which was relocated to the Painted Canyon area in 1968.

Of all the above-named areas and structures, only the Elkhorn ranch site, Maltese Cross cabin, CCC camp-tender residence, and old east entrance station would be affected by the current planning effort.

Collections

The park museum collections, which are housed in both the Medora visitor center and the Maltese Cross cabin, reflect the natural and human history themes of the park. These objects represent an ongoing effort to assemble acquisitions to successfully interpret both themes. In addition, a small library collection is stored in the visitor center. These books, which cover a range of natural and historical subjects, are for use by the

staff, Theodore Roosevelt Nature and History Association members, very interested visitors, and researchers. Provisions have been made in this plan to provide for protection of these collections and books from flood, fire, and theft.

RECREATION/VISITOR USE

Regional Recreation Resources and Uses

Most campers who stay in the vicinity of the north unit use Squaw Creek campground. There are no Forest Service or state campgrounds in the area. There are motels in nearby Watford City and a dude ranch immediately east of the unit. The access road for the dude ranch lies just south of and across US 85 from the entrance to the north unit.

When water conditions permit, some river canoeing occurs. Canoes can be rented from a private supplier just outside the north unit, although many users bring their own. Most trips begin upstream, and many canoeists do not take out until they have passed through the unit. In the winter, snowmobilers using the river also pass through the unit. The north unit is a destination for quite a few horse user groups. Hunting is not permitted in the park, but deer, elk, and small game hunting occurs on lands surrounding the north unit.

The Elkhorn unit is relatively isolated. There are no significant recreational developments anywhere near the unit. The closest campgrounds and motels are along I-94 and in Medora. As in the north unit, some river canoeing occurs when water conditions permit, while snowmobiling occurs on the river during the winter. Virtually all trips begin upstream, and many canoeists do not take out until they have passed through the unit. There is little horse use and only a minimum of small game hunting in the area surrounding this unit.

A significant amount of summer use occurs in the vicinity of Medora, gateway to the south unit. In addition to the Cottonwood campground, there are private campgrounds at Medora. A Forest Service campground with 37 units is located off I-94, 7 miles west of Medora. Sullys Creek State Primitive Park with 12 camping/picnicking sites lies to the south of Medora. There are several motels near the park headquarters and entrance in Medora.

Medora has a number of other attractions for visitors, including the Chimney Park State Historic Site/Picnic Area and the Chateau DeMores Historic Site.

As in the other two park units, some river canoeing occurs when water conditions permit. Canoes can be rented in the area, although many bring their own. Most trips begin immediately upstream, and most canoeists do not take out until they have passed beyond the south unit. In the winter, snowmobilers using the river pass through the park.

The south unit is also a destination for a number of horse user groups. There is no hunting in the park, but big and small game hunting is the principal recreational use of lands surrounding the unit.

Park Use Patterns and Trends

The principal activity of visitors to the park is sight-seeing by motor vehicle. Excluding those who stop only at the Painted Canyon area, most visitors drive at least a portion of the scenic park road in either the south or the north unit of the park.

Visitor Use Counts. Visitor counts have been recorded at the park since it was first opened in 1948, although the method of recording visitation has changed several times. Originally, entrance station employees made actual counts of both vehicles and visitors. When stations were not manned, counts were estimated.

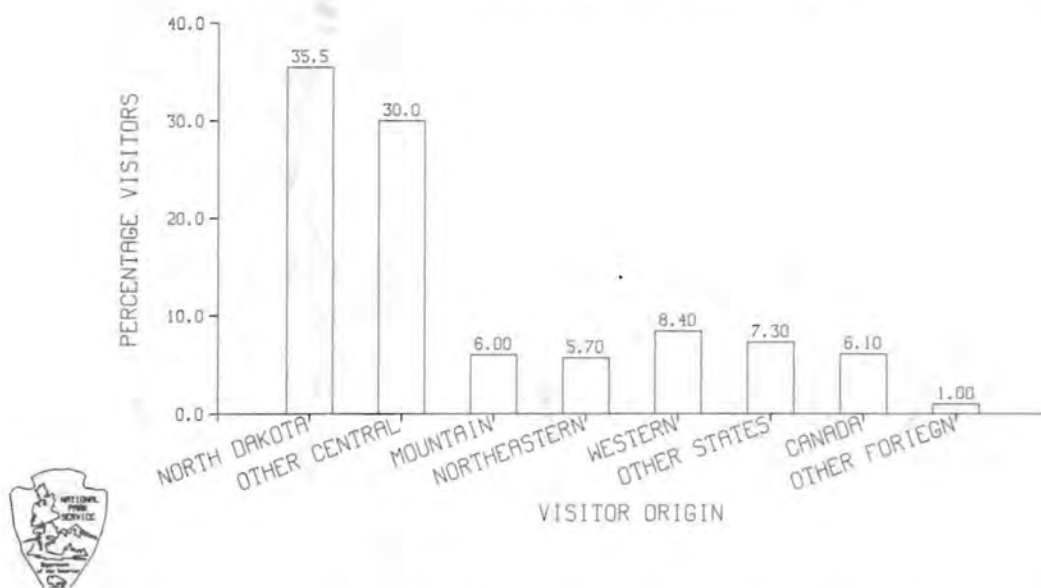
In recent years, traffic counters have been used to measure the number of vehicles. The early models provided unreliable counts because they used pneumatic tubes. Magnetic induction counters have now been installed and are providing much more reliable counts. Traffic counters are located on the incoming lanes at the north unit entrance station and the south unit entrance station, and on the entrance road to the Painted Canyon overlook/rest area.

Park visitation is currently measured in terms of number of visits. Theoretically, a visit is the entry of one visitor into the park one time. Thus, a family of four that visits the north unit once and the south unit twice has made 12 visits to the park. Visits are determined by multiplying traffic counts times the average number of visitors per vehicle. This average is revised occasionally, resulting in recorded changes in number of visits.

The last major change of vehicle occupancy multiplier was in 1983. Traffic counts that year decreased 16.1 percent from 1982 levels. However, the reported number of visits decreased by 38.3 percent because of the adjustment in the multiplier.

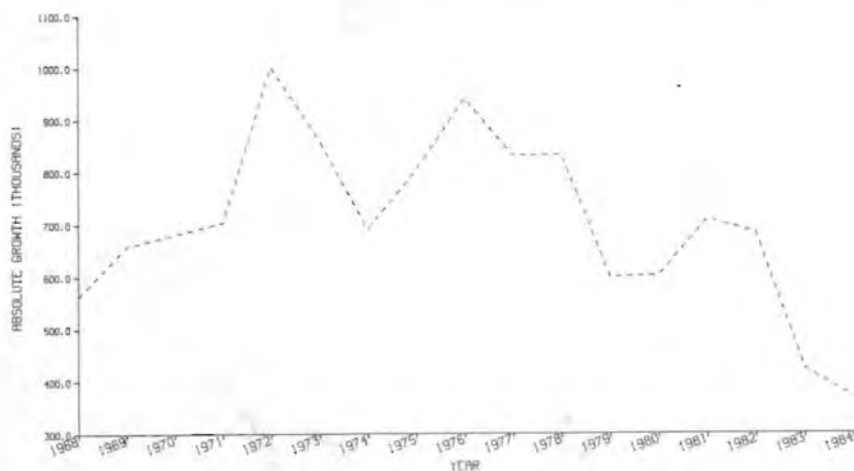
Visitor Origin and Length of Stay. As illustrated in the following graph, about one-third of the park visitors come from within the state; another third of the visitors are from other north-central states, especially Minnesota. The average length of stay at Painted Canyon is 18 minutes; in the south unit, 2.2 hours; and in the north unit, 2 hours.

VISITOR ORIGIN



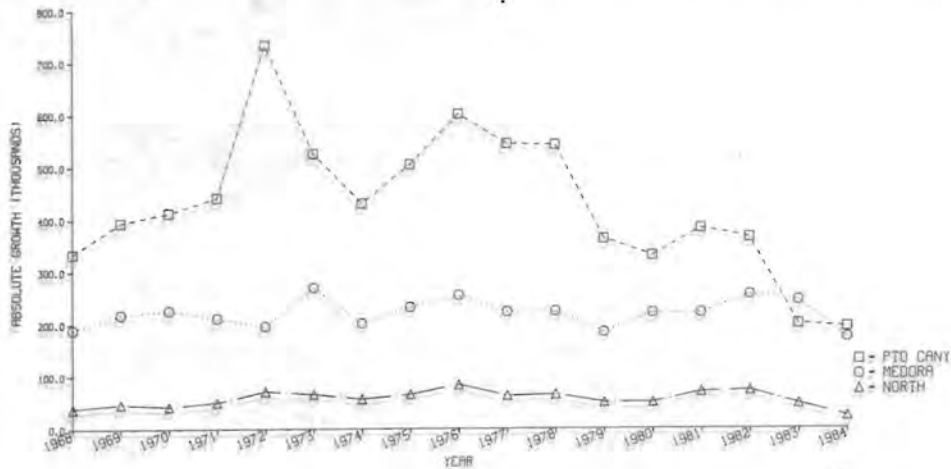
Past Use Levels. Up until I-94 opened in 1966, visitation in the park had been averaging about 250,000 visits per year. With the new interstate and the counts taken at the Painted Canyon rest area, visitation steadily increased until the first oil embargo in 1973. The peak year for visitation occurred in 1972 when 1,001,767 visits were recorded (see following graph). From 1973 through 1982, visitation averaged about 750,000 visits per year. Visitation dropped steeply in 1983 and 1984. As discussed above, the vehicle occupancy rate had been decreasing for several years. This rate was adjusted in 1983. Because of this adjustment, it is likely that over half of the reported 1983 drop actually occurred in previous years.

TOTAL RECREATION VISITS



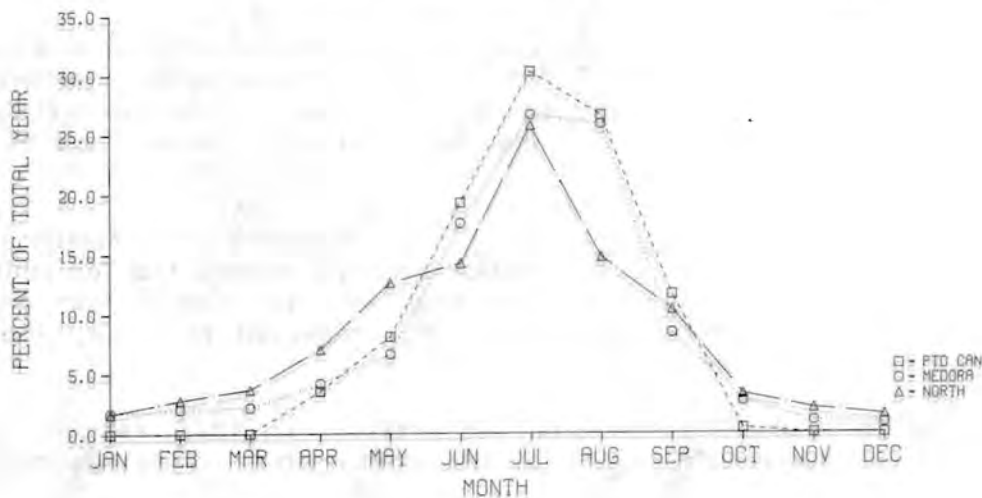
Use Levels by Area. As illustrated in the following graph, Painted Canyon accounted for 52 percent of the 1981-1983 visits, the south unit 37 percent, and the north unit 11 percent. However, when visitation is measured by visitor days, Painted Canyon accounted for only 12 percent, while 70 percent occurred at the south unit and 18 percent occurred at the north unit. The 1984 use levels for each of the three areas were lower than at any time in the previous 17 years.

ABSOLUTE CHANGE IN RECREATION VISITS



Peak Use Periods. A review of the visitor use records for the last 10 years shows July to be the peak visitation month. Since December 1982, the Painted Canyon area has been closed during the winter months. This closure has reduced recorded park visitation by approximately two-thirds from December through March. The following graph illustrates visitation for the 1983 season.

1983 SEASONAL USE



The peak visitation day of the week varies somewhat by location. At the south unit this usually occurs on a Saturday. At the north unit the peak day generally occurs on a Sunday due to heavy local use. At the Painted Canyon overlook, the peak day typically occurs on a weekday when interstate highway traffic is highest.

In 1984 the peak day at the south unit was September 2, when 1,920 visits were recorded (57 percent above the average daily use for the June through August period). The 1984 peak day at Painted Canyon was September 3, when 2,040 visitors stopped there (30 percent above the average summer day). The 1983 peak day for the north unit was August 22, when 662 visits were recorded (135 percent above the average summer day).

Projected Growth in Use. In computing present growth rate, data collected prior to 1968 cannot be used. The following events occurred in the three previous years:

- I-94 was opened and the old east entrance was closed.
- Entrance fees were imposed.
- Painted Canyon was opened and then temporarily closed due to slumping of the nearby slope.
- The south unit scenic loop road and the Buck Hill viewpoint were opened.
- The Burning Coal Vein had become a major attraction.

Linear regression analysis was performed on growth from 1968 through 1984. For the Painted Canyon overlook, this indicated a long-term decrease of 12,000 visits per year (equivalent to 6 percent of 1984 visits). Medora is experiencing a decrease of 1,000 visits per year (1 percent of 1984 visits).

Due to major road construction, 1984 visitation was excluded in analyzing visitation to the north unit. The long-term growth rate at that unit is 1,000 visits annually (equivalent to 2 percent of 1983 visits).

The reasons for the decreases in visitation at Painted Canyon and Medora are not fully understood. For future planning purposes, perhaps the best assumption is that visitation will continue at approximately the present levels. The north unit use may well continue to grow about 2 percent a year.

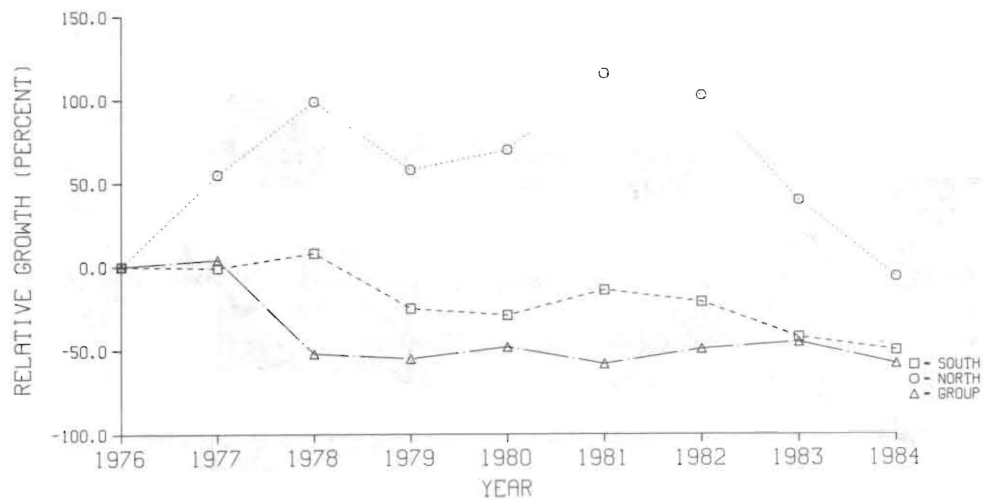
Campground Use and Future Growth. The numbers of campers are determined from campground registration records during the fee collection season and by actual counts during the off-season when fees are not collected. Although group camping is not reported by area, about 70 percent occurs in the south unit.

Camping is a major recreational activity. In 1977 camper nights represented 13 percent of visits to the north unit. This has remained

fairly stable and was 14 percent in 1983. In contrast, equivalent statistics for the south unit reflect a decrease from 15 percent in 1977 to 11 percent in 1984. This decrease may have been due to the development of commercial campgrounds adjacent to the park or to the increase in park camping fees.

As shown in the following graph, south unit camping and group camping have dropped 50 percent and 58 percent, respectively. In contrast, north unit camping use grew 40 percent through 1983.

RELATIVE CHANGE IN CAMPGROUND VISITS

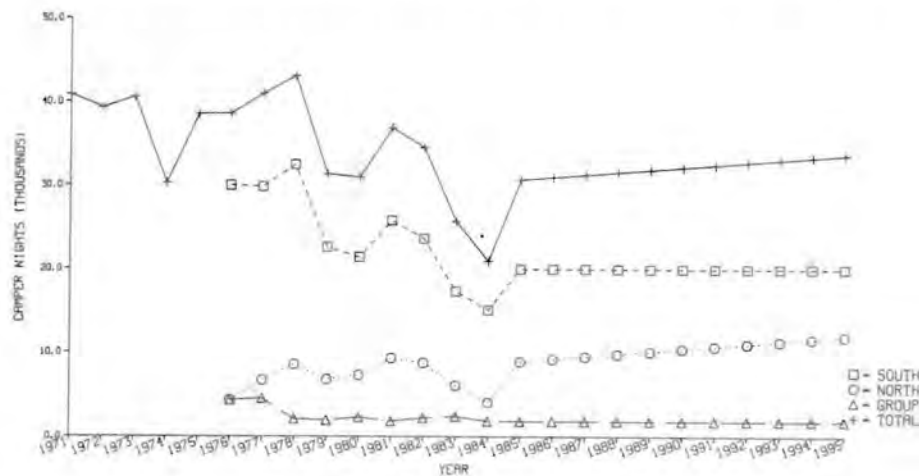


Linear regression analysis was used to determine long-term (1976 through 1984) growth rates. Group camping is currently decreasing somewhat (16 percent of 1984 use). Individual camping in the south unit is decreasing by about 2,000 camper nights annually (2 percent of 1984 use). As with total visitation, the safest assumption is that future camping will continue at present levels.

Due to major road construction, 1984 visitation was excluded in analyzing camping in the north unit. The long-term growth rate at that unit is 300 camper nights annually (5 percent of 1983 visits). This growth rate is more than double that of the growth rate of total visitation to the north unit. This may reflect an increase in nonlocal use.

Backcountry campers are required to obtain a permit, and use counts are taken from those permits. Day hikers are not recorded or reported. The concessioner maintains records of use on the guided trail rides, and use is reported in the annual concession report.

PROJECTED GROWTH IN CAMPGROUND VISITS



Interpretive Resources and Programs

The north unit is approached via US 85. As the road descends into the deep valley of the Little Missouri River from both the north and south, pulloffs provide the opportunity for travelers to view the badlands, canyons, and buttes. One pulloff north and another one south of the park entrance are signed with identical plaques that interpret the badlands but do not mention the park. Despite two other signs that mention the distance to the park entrance, highway travelers may pass the unit's entrance without any knowledge of the park or the opportunities it provides.

Upon entering the north unit, there is an entrance fee kiosk, a small frame ranger station, a trailer that serves as an interim, seasonal visitor center, and a small parking area. Most of the trailer space is devoted to visitor use. It is furnished with old exhibits (ca. 1959), an audiovisual unit, and an information desk, all salvaged from the Medora visitor center when it was remodeled. There is no orientation exhibit specific to the north unit. The remainder of the trailer space contains the district library, district herbarium, cooperating association stock storage, and a small work space for the interpreters.

In early September each year, the district interpreter must move to the (rather poorly) heated ranger station, where there is no space for visitor use, as well as no information desk, exhibits, AV program, or publications sales area. Thus, for nine months of the year there is no visitor center at the north unit.

The ranger station is cramped for protection functions and totally inadequate to accommodate interpretive functions. All supplies and files

must be left in the trailer. Projects requiring a larger, heated space demand use of the interpreter's residence. Both the trailer and the ranger station lack adequate interpretive storage space.

Other interpretive facilities at the north unit include a rear screen projection amphitheater at Squaw Creek campground, which is used for summer evening campfire programs; two self-guiding nature trails; and the wayside exhibits along the 13 miles of park road. The wayside exhibits are old, worn out, and slightly out-of-date. Only 6 miles of the road are open during the winter months. There is no auto tour guide for the north unit at this time. Trailhead access to the Squaw Creek nature trail is through the group campground.

The Elkhorn unit is isolated, undeveloped, and marked only by NPS boundary signs. Most visitors approach from the east and must ford the Little Missouri River to reach the site. When the water level permits, some visitors come to the unit by canoe.

The Elkhorn ranch site is the most important in the park for understanding the significance of Theodore Roosevelt's experiences in the badlands. Yet, few visitors attempt a visit because of the difficult access. Those who do inquire are given a handout with directions and a brief history of the ranch. Building locations are marked with posts, but there is no on-site interpretation.

Access to the south unit is via I-94. Westbound visitors make their first park contact at Painted Canyon, and eastbound visitors make their first park contact at Medora.

The Painted Canyon overlook and rest area on I-94 is the most heavily visited area of the park; for many, it is their only contact with the park. Interstate signs identify Painted Canyon as a rest area and visitor center only. While there is no vehicular access to the south unit road system from Painted Canyon, the rest area is part of the park and provides one of the best, if not the best, views of the south unit. Despite the NPS arrowhead on the visitor center and the stone pylon bearing the name of the park, travelers do not readily recognize this as a national park. Once visitors view the badlands, they want more information and will enter the visitor center. It is here that most visitors learn that this is a part of the park.

The Painted Canyon facilities were originally operated year-round and designed to allow the restrooms to remain open regardless of visitor center operating hours. Extensive vandalism of the restrooms and the need to reduce operating costs resulted in closure of the facilities from mid-November to mid-April. Winter weather conditions and limited visitation have also been factors. A locked gate prevents vehicular access, so if visitors wish to enjoy the view from the overlook, they must climb the gate and walk nearly $\frac{1}{4}$ mile.

The visitor center contains an information desk with a built-in, rear screen, random access, slide projection system; a three-sided,

free-standing exhibit that includes a basic orientation map and two panels on wildlife; a cooperating association publication sales area; a sectional sofa; a free-standing, rear screen projection AV unit that shows a three-minute slide program on the badlands environment; and a beautiful, uninterpreted view of Painted Canyon and the park through the large north wall windows. Much of the interior space is poorly utilized, and there is virtually no interpretation of the park and its significance, geology, or air quality.

Visitors to Painted Canyon are instantly drawn to the canyon rim to view its depth and its expanse. Many even attempt the descent into the canyon, although there are no developed or marked trails. Visitor traffic has created several trails; but the trails are unimproved and sections are steep. When staffing permits, primarily on weekends, well-attended ranger-guided walks are offered into the canyon. Existing wayside exhibits touch lightly on the story of the area but offer no in-depth information about the park and its opportunities. In short, Painted Canyon lacks the quality interpretive devices necessary to adequately serve the large number of visitors and provide appropriate information about the park and its opportunities.

The entrance to the south unit is at Medora, 7 miles west of Painted Canyon. A year-round visitor center houses a museum exhibit area, a theater that regularly shows a 13-minute film titled "T.R. Country," a cooperating association publications sales area, and the standard NPS information desk. In addition, the building houses the park library, park curatorial storage, and work areas for the district interpreters and rangers. These relatively new facilities were constructed under the guidance of the existing interpretive prospectus; thus, they dwell heavily on Theodore Roosevelt and the era in which he ranched here. Natural history themes are mostly lacking.

The south unit may be traveled via a 36-mile loop drive that begins and ends at the Medora visitor center. Wayside exhibits along the drive are old, worn out, out-of-date, and not sufficiently comprehensive. Also, there are not enough pulloffs along the south unit road; cars parked on the road shoulder often pose a safety problem. A self-guiding auto tour brochure for the south unit drive is sold by the cooperating association and is extremely popular. It is useful only from spring through fall, as 20 miles of the scenic drive are closed in the winter.

Buck Hill, the highest point in the south unit, lies about halfway along the scenic drive and is accessed by road and foot trail. The top of Buck Hill offers a breathtaking 360° view of the badlands, including Painted Canyon. There is no interpretation of any kind at Buck Hill.

Along the south unit drive are two self-guiding trails and two other short trails for which publications are being developed. However, there are no self-guiding trails near the Medora visitor center or Cottonwood campground. At the campground, a rear-screen projection amphitheater is used by the interpretive staff to provide campfire programs during the summer.

FACILITY ANALYSIS

Roads, Trails, and Parking

There are 55 miles of primary paved roads in the park--39 miles need reconstruction or overlay and are in fair to poor condition, narrow, and have no shoulders; 16 miles must be kept open during bad weather and are in good condition. The 9 miles of secondary gravel-improved roads all need widening, resurfacing, and drainage work to be brought up to standards.

There are three bridges in the park; all are new or less than five years old and in good condition.

The 5 miles of paved trails need major repairs and adaptation for use by the handicapped. There are 85 miles of horseback riding and hiking trails in the park--all 85 miles need repair work, new signing, marking, and general improvement to stop erosion and make them easier for visitor use.

There are five primary parking areas around the visitor centers, campgrounds, and picnic areas, and five secondary parking areas at trailheads, pullouts, and overlooks. All are currently in fair condition and capacity is adequate. There are 12 scenic pullouts in the park for one to five cars. More pullouts and some vault toilets are needed around the loop road.

Buildings and Facilities

There are about 69 buildings in the park, including two visitor centers, which are new or remodeled and in good condition, and one visitor center trailer, which is inadequate. There are seven modern comfort stations and two amphitheaters in the campgrounds. These structures are in good, sound condition except for the paint and seating.

The other buildings and facilities are used for visitor purposes, administration, and concession employee quarters, or will remain as historic structures. The Peaceful Valley ranch house is rented to the horse concessioner. The barn and bunkhouse are used under terms of the concession permit. Except for the historic structures, the buildings are in fair condition with some maintenance repairs needed to bring them up to park standards.

The 12 structures below are on the List of Classified Structures, and all need minor to major repair or rehabilitation work in the near future.

Medora visitor center area - one (Maltese Cross) log cabin

Peaceful Valley ranch - one log barn, one log-and-frame bunkhouse,
and one log-and-frame ranch house

Painted Canyon overlook - one stone masonry pylon

North unit entrance - two stone masonry pylons

North unit headquarters - frame, board-and-batten camp-tender cabin

Old east entrance - stone masonry check station, walls, and pit privy

North unit, Squaw Creek picnic area - two picnic shelters (built with logs and stone fireplaces)

North unit overlook - one shelter (built with logs with stone corners and walls)

There are two family campgrounds totaling 130 units and two picnic areas in the park. Some revisions and repairs are needed to adapt the campgrounds to accommodate needed visitor services.

Since the Rough Rider campground access was destroyed during a 1978 high water period, the small Halliday Wells camping area in the south unit is being used to accommodate group campers and horse groups.

The Painted Canyon visitor center was constructed in 1978, with solar power as a primary source of heat. The solar system will not work because of the design and poor quality heat absorption panels. Therefore, the center and comfort stations must be closed during the colder months.

Utility and Park Operations Systems

The park has a new 60-kilowatt emergency generator, which supplies the Medora headquarters with water and sewer system power when commercial power is off.

The park owns and operates 12 domestic water systems; six of these systems have been rehabilitated and chlorinators added for treatment. In addition, the distribution system of one has been replaced. The Medora headquarters water system needs to be improved by drilling a new well and replacing the treatment system.

There are about 20 wildlife watering systems in the park. These consist of wells or springs with concrete, plastic, or fiberglass dish tanks to water buffalo, horses, longhorn steers, and other wildlife. All of these systems need major repairs, some need new wells drilled, and all need dish tank repairs or replacement.

The park has three lagoon sewage systems. The Medora headquarters sewer system is connected to the city system; however, the city is having trouble with proper operation of their lagoons and therefore difficulty

disposing of its waste. There are other sewage facilities in the park that involve septic tanks or pit or vault toilets.

The park has a radio system that consists of 4 repeater stations with 2 towers, 3 base stations, 37 mobile units, and approximately 35 portable radios. The system was recently redesigned and renovated and is generally in very good condition. Repeater links that will tie together Theodore Roosevelt National Park, Fort Union Trading Post National Historic Site, and Knife River Indian Villages National Historic Site are proposed for the future.

The park has two road oil storage facilities, and both are in good condition. The south unit facility will hold 12,000 gallons of road oil and the north unit will hold 4,000 gallons.

All south unit headquarters buildings have separate fuel oil storage facilities, and the north unit has two larger propane storage facilities. All quarters have separate fuel storage tanks. Some of the tanks have been replaced; other will be replaced within three years pending the availability of funding.

ENVIRONMENTAL CONSEQUENCES

This section describes the environmental and visitor use impacts that would be expected with implementation of the proposed actions and the alternatives of both the "General Management Plan" and the "Land Protection Plan." Except for natural resource proposals that have been definitively expanded upon and so identified in this document, impacts associated with proposals from the 1984 Natural Resources Management Plan are not included here; however, they may be found in that plan. A summary comparison of impacts by alternative can be found at the conclusion of this section.

IMPACTS ON NATURAL ENVIRONMENT

Impacts on Geology, Soils, and Vegetation

Continuation of Existing Conditions. Under a no-action situation, the park would have no specific land protection plan of action for responding to incompatible uses of land, including impending development of subsurface (mineral) resources from outside the park or on private or park surface lands overlying nonfederal subsurface rights within the park. In such areas, it would be potentially difficult to prevent adverse uses and disturbances by oil, gas, and other mineral exploration or extraction activities; removal or erosion of soil and damage to or removal of vegetation could result. Buildings, roads, pipelines, and other facilities necessary to support the exploratory or extraction operations would have similar impacts.

Under this alternative, no interests in nonfederal lands would be acquired in fee or through scenic easements, and current uses of the private lands east of US 85 in the north unit would continue. The limited cattle and occasional horse grazing that has been occurring would continue, along with resulting minor adverse impacts on soils and vegetation. Serious future damage to soils and vegetation through overgrazing would be a potential but unlikely possibility.

Users of Cottonwood campground currently have little opportunity to use any trails. As a result, the steep bluff east of the campground would continue to be used informally by hikers. This would perpetuate the establishment of unplanned and often steep paths, with resultant damage to ground vegetation and soils. A similar situation would continue below the rim at the Painted Canyon overlook, where even greater temptation exists to use the existing steep, informal trails and the soils are even more subject to erosion and slumping.

Action Alternatives - General Impacts. Under the action alternatives, the likelihood of the impacts that could result from the park's having no specific plan of action to respond to incompatible land uses would be greatly reduced. This would result from acquisition of fee or scenic easement interests for all private (surface) lands, from acquisition of

private and state/county owned mineral interests, and through enforcing compatibility standards for privately owned lands and federal regulations dealing with mineral leasing and development. The latter would apply particularly to situations in which acquisition of an interest in land or minerals had not been accomplished.

Grazing would continue on the fenced portions of the privately owned lands east of US 85 in the north unit. The minor adverse impacts on soil and vegetation would also continue. The use of and the impacts from grazing would be allowed because the area is not used by visitors and does not contain any significant natural or known cultural resources. Because of grazing, the appearance of the area would continue to be slightly different from the federally owned portion of the unit, which is only lightly grazed by park herbivores. However, the grazing use of the area would be contained to approximately the current level, and any chance of serious overgrazing with resultant soil and vegetation damage would be prevented through enforcement of the compatible/incompatible use criteria or scenic easement provisions proposed in the "Land Protection Plan."

Implementation of land protection acquisition proposals, which accompany all of the action proposals, would eliminate any potential for additional private development (e.g., buildings and access roads) of the lands to be acquired in fee. On lands proposed for scenic easements, limited surface developments, such as residences, access roads, and agricultural structures, would still have potential for causing erosion or removal of soil and damage to or removal of vegetation in localized areas.

Under the action alternatives, the construction or upgrading of roads, trails, parking areas, and structures associated with the proposals would require removal of vegetation, cause changes in soil structure, and reduce percolation of water into soils. Grading and paving would compact soil. Site leveling for roads, trails, parking areas, and proposed structures and development of dikes and elevated areas of earth for flood protection of existing structures would remove or add soil, thereby altering land profiles and natural processes of soil development and drainage. Topsoil removed from areas to be covered by pavement, buildings, or dikes would be used to make up any shortage incurred in installing other facilities, thus minimizing the overall loss of organic matter. Nevertheless, the organic content of topsoils would be reduced by mixing. All disturbed areas not covered by development would be reseeded with native species to speed the rate of recovery and to minimize the encroachment of invading species.

Construction sites would undergo accelerated erosion until vegetation was reestablished in cleared areas. To the extent possible, buildings, roads, and other impervious structures would be designed to collect and channel runoff into natural drainages. Runoff in these areas might cause localized increases in erosion and changes in soil nutrient transport. Runoff would escape into adjacent vegetated areas, which could result in more mesic conditions and altered vegetation composition. Altered vegetative composition could also cause slight changes in soil chemistry.



Looking North

Path of a recently installed natural gas pipeline that passes through the private tracts east of US 85 in the north unit. If scenic easements were obtained for these tracts, as proposed, this type of development would probably be precluded due to the soils, vegetation, and visual damage that results.



Looking south

Areas in and around campgrounds, picnic areas, trailheads, boat-launching sites, administration/visitor and maintenance buildings, and scenic and interpretive facilities would be affected by foot traffic. The primary impact on soils would be compaction, which would decrease permeability, locally alter soil moisture, and diminish the water storage capacity. The change in soil moisture might alter the relative abundance of some species and affect germination. Plants that invade disturbed areas would become more common. Where compaction occurred, increased runoff on the surface would increase erosion. This might lead to exposure of root systems and mortality of more mesic plants. The impacts of trampling would range from complete exclusion of vegetation to slight alterations in species composition. Similar impacts would occur along road shoulders, where cars would crush vegetation and compact soil.

To minimize the soil erosion caused by foot traffic, developments would generally be constructed on slopes less than 15 percent. Trails would be well-defined where heavy foot traffic was anticipated, and visitors would be asked to stay on the treadways. Trail construction would include special design methods in areas with steep slopes and easily erodible soils.

No significant impacts on geologic resources or processes are anticipated from any of the alternatives.

Action Alternatives - Specific Impacts. A detailed breakdown of the estimated acres of soil and vegetation that would be disturbed by proposed developments of the three action alternatives is shown in table 11. (There would be no disturbance to soil and vegetation under the continuation of existing conditions alternative.)

Under the preferred and the minimum requirements alternatives, the use of vegetative screening between the CCC camp-tender residence and the relocated section of the north unit access road would lessen visual impacts for the users of both the residence and the road. Native species such as Rocky Mountain juniper, green ash, and a native understory would be planted. The area occupied by the present ranger station, visitor contact trailer, and parking that would not be a part of the proposed replacement facilities would be restored to a natural condition or landscaped, as appropriate.

Development of a new bison corral at the north boundary of the north unit, proposed in each of the action alternatives, would result in trampling of vegetation and compaction of soil in a different area, while the present area of concentrated impact would return largely to a natural rangeland/pasture condition. The same would be true for the proposed bison corral in the south unit.

Although the Elkhorn ranch is to be zoned cultural, vegetation management for a natural scene would be emphasized in each of the action alternatives, using prescribed grazing and fire. Proper range management techniques would be used to avoid overgrazing and trampling effects, while maintaining appropriate species diversity and composition, as well as the appearance of a historic rangeland.

Table 11: Estimated Acreages of Soil and Vegetation Disturbance by Alternative

<u>Facility/ Location</u>	<u>Preferred Alternative</u>	<u>Minimum Requirements Alternative</u>	<u>Other Practicable Alternative</u>
<u>NORTH UNIT</u>			
Headquarters	1.8	1.8	1.9
Squaw Creek nature trail	0.4	0.4	0.4
Canoe/snowmobile access	0.6	0.6	0.6
Group horse camp	7.4	0	7.4
Squaw Creek picnic area/ campground	0.5	0.5	55.1
Bison corral relocation	33.2	33.2	33.2
CCC camp-tender residence	0.1	0.1	0.1
Undergrounding of power line	0.3	0.3	0.3
<u>ELKHORN UNIT</u>			
Access road/parking	2.4	2.4	13.0
Historic structures	0.2	0.2	0.4
Picnic area	1.5	0	1.5
Trails	1.3	1.3	1.3
Administrative facilities	0.6	0.6	0.6
<u>SOUTH UNIT</u>			
Headquarters	2.1	2.1	4.2
East entrance station (relocation)	4.4	2.1	4.4
Painted Canyon	1.5	1.5	1.5
Bison corral	0.1	<0.1	0.1
Cottonwood campground	2.0	2.0	2.0
Trails	16.8	1.2	16.8
Peaceful Valley picnic area	1.0	1.0	11.0
Loop road	<0.1	<0.1	<0.1
Peaceful Valley ranch	<u>0.2</u>	<u>0.2</u>	<u>7.4</u>
TOTALS	78.5	51.7	163.3

For comparison, existing acreage in development is 1,606.5.

Under the preferred and other practicable alternatives, relocation of the old east entrance station would be followed by restoration of the existing site to a natural vegetative condition. Planting would be limited to native species. The relocation under these conditions would be accompanied by construction of a temporary access road. Vegetation and soil along this route would be crushed or compacted temporarily, requiring minor landscaping and possibly reseeding to help return it to a natural condition. Under the minimum requirements alternative, reestablishment of a permanent access road to the site would eliminate existing vegetation and possibly require some minor cut-and-fill work (changing the natural or restored appearance) along the entire route.

Impacts on Wildlife

Continuation of Existing Conditions. Under this alternative, there would be no new impacts on wildlife beyond those cited in the approved 1984 Natural Resources Management Plan. Under a continuation of existing conditions, the bison corral would remain in its present, though impractical, location and continue to be used. This would perpetuate the failure to capture and contain a number of the animals being herded, especially as the bison enter rough or forested areas, such as at Squaw Creek. The result of this would be a continued difficulty in maintaining a healthy, productive herd.

Action Alternatives - General Impacts. Land protection proposals involving the private lands east of US 85 in the north unit, if carried out, would have minor yet positive effects on wildlife in this area. Management of these lands by the owners in concert with the proposed compatible and incompatible uses or under terms of proposed scenic easements would tend to perpetuate the mostly natural (or previously disturbed but recovering) condition of these tracts. This would continue to favor use of this area by wildlife, especially deer, small mammals, and birds. The positive effects would be related to preservation and protection of soil and plant life, as well as solitude, which supply feed, cover, and reproductive habitat.

Except for displacement and some destruction of resident invertebrates and small vertebrates due to construction activities, there would be no significant long-term impacts on wildlife under any of the action alternatives. However, there would be minor adverse impacts. The following small additional areas of wildlife habitat would be eliminated or significantly affected by proposed developments: preferred alternative - 75 acres, minimum requirements alternative - 50 acres, other practicable alternative - 81 acres.

Action Alternatives - Specific Impacts. The proposal to develop a canoe/snowmobile access site in the north unit and an additional access site just outside the south unit at Medora, called for in each of the three action alternatives, would probably result in a slight to moderate increase in that use as well as other human use in the wooded areas adjacent to the river. At present, white-tailed deer and other animals residing in

the areas adjacent to the riverbed can be startled by the sight or sound of the snowmobiles and will often dash away. This impact, as well as a similar impact on deer and other animals caused by visitor use of the canoe/snowmobile access sites, would increase somewhat with the proposed development, assuming that the existing federal regulation prohibiting snowmobile ingress and egress within the park can be changed. Currently, the snowmobiles are not allowed to leave the riverbed and since cooperation has been good, the deer are not pursued. By fleeing the riverbed area, the deer experience protection and are not exposed to harassment. However, there is a small degree of energy depletion for those deer startled by the snowmobiles or the snowmobile operators at the time of year most stressful for wildlife.

The recreation and administrative improvements proposed for the currently undeveloped Elkhorn unit would permanently remove a small amount of wildlife habitat, primarily for small animals such as ground squirrels and mice, and would disturb some wildlife during the main use season in an area that has experienced only occasional human disturbance in the past. Aside from the habitat that would be eliminated in favor of developments, however, the wildlife (including deer) that would move to adjacent areas would tend to reoccupy the area following the main use season. Because of the relatively light use and development and the nature of some animals and birds, significant wildlife use would also occur during the peak season of use. Wildlife displaced from this area would use nearby areas where there is an abundance of such habitat and little or no disturbance.

Floodproofing of sewage systems would require extending the sewer force mains and relocating septic tanks and leach fields above the 100-year floodplain for the Cottonwood campground and Peaceful Valley areas. This would disturb 2 to 3 acres of previously undisturbed general wildlife habitat and would cause mostly temporary displacement of use until these areas could be restored to a natural condition. At Peaceful Valley, a special effort would be made to avoid disturbing any prairie dog towns or areas where the prairie dogs would be likely to inhabit.

Impacts on Threatened and Endangered Species

Continuation of Existing Conditions. There would be no impacts on threatened and endangered species under this alternative.

General Impacts - Action Alternatives. None of the action alternatives should have impacts on endangered or threatened wildlife species except for the minor adverse impacts on black-footed ferrets (if present), golden eagles, and prairie falcons that could occur. The Fish and Wildlife Service will be consulted, in accordance with section 7 of the Endangered Species Act, prior to any development that could affect these species. All species that could be affected by plan proposals and/or would require special precautions to avoid possible adverse effects are discussed below.

The potential effects of the alternatives on several threatened and endangered plant species that may be found in the park is unknown. However, all previously undisturbed areas would be surveyed for these plants prior to construction. If any threatened or endangered species were found, the development would be relocated if at all possible.

Specific Impacts - Action Alternatives. No black-footed ferret populations have been discovered, but systematic park surveys have not been conducted. Because prairie dog towns are potential habitat for the federally endangered ferret and the old east entrance station is located within a prairie dog town, implementation of any of the action alternatives would require a ferret survey to determine potential impacts and mitigation required, if any. If appropriate, the same would be done for the proposed relocation of the Peaceful Valley area septic tank and leach field. If ferrets are found at the old east entrance location, some negative impact on them would be likely. This would probably involve some damage to or destruction of habitat.

The other federally listed species include the endangered bald eagle and whooping crane. There should be no impacts on bald eagles because they migrate through the park for periods of only about one week in the spring and fall. Construction can be timed to avoid these periods. Maintenance of a tall cottonwood overstory along the river and its tributaries for eagle roosting is important; however, none of the proposals would require clearing more than a few trees that are part of the overstory vegetation. If possible, none of the older and more massive cottonwoods would be removed.

Whooping cranes, which sometimes accompany flocks of sandhill cranes on their migrations, are seen only infrequently and then only during the spring and fall when visitor use is very light. River sandbars are used as staging and layover areas. There would be no impact on this species because the birds would either ignore or move around/beyond any construction activity or new development area along the river.

Riverine habitat, including sandbars, constitute potential nesting and feeding habitat for the threatened piping plover and the endangered interior least tern. Information indicates it may be "possibly appropriate" to propose to list the long-billed curlew as threatened or endangered, but further research and field study are needed (category 2). Little is known about these birds because they are seldom or rarely seen in or near the park. There should be no impacts on these species from any of the proposals, although site surveys would be made prior to development, and appropriate precautions would be taken if the birds or their nests were identified near any proposed construction site. The pallid sturgeon and lynx are category 2 species for which suitable habitat exists; however, these species are not believed to be in the park at this time. Should any future sightings be confirmed, there would still be no significant impacts on these species from any of the plan proposals.

Two federal category 2 species, the ferruginous hawk and Swainson's hawk, possibly nest within the park. No impacts on these two species

are anticipated; however, precautions, including development relocation if necessary, would be taken should a nest be found near any proposed construction site.

Two state-listed threatened species, the golden eagle and the prairie falcon, definitely nest within the park. These species use cliff and butte faces for nesting and lone cottonwoods for resting; golden eagles also use lone cottonwoods for nesting. The cottonwoods are found near the Little Missouri River and in tributary drainages, and several developments or improvements are proposed within these areas.

The greatest concern is that there be a minimum of disturbance to these species and their nests during the mid-March to mid-June prenesting/nesting period. Depending on the season, site surveys would be made to determine if any eagle or falcon nests were within the vicinity of development locations; construction would be delayed (or relocated) if necessary. Despite these precautions, it is likely that proposed development or early-season visitor use could cause a limited amount of disturbance to eagle or falcon nests, nesting birds, or resting birds. A few birds could be displaced to adjacent areas; at the worst, there would be a small, probably temporary reduction in the surviving hatch.

Impacts on Water Resources

Continuation of Existing Conditions. Continued use of the pit toilets in the Peaceful Valley area and the existing undersized sewage lagoon at the north unit headquarters area would perpetuate the possibility of groundwater contamination from sewage. There is also potential for sewage contamination of the Little Missouri River from existing sanitary systems along the Little Missouri River in the south unit in the event of a 100-year flood. In the absence of an approved general management plan, the floodproofing proposals in the action alternatives involving toilets and sewage systems might also be implemented under a continuation of existing conditions alternative.

General Impacts - Action Alternatives. The action alternatives call for sanitary improvements that would virtually eliminate the potential for any groundwater contamination from sewage. Both the preferred and the minimum requirements alternatives contain a number of floodproofing proposals for the Cottonwood, Peaceful Valley, and Squaw Creek recreation sites. These proposals would minimize the chance of contamination of the river (and its tributaries) from toilets and sewage systems in a 100-year flood. The other practicable alternative, which calls for relocation of all flood-prone NPS facilities, would totally eliminate the possibility of river contamination.

Specific Impacts - Action Alternatives. The preferred and other practicable alternatives for the Elkhorn ranch call for drilling a well on site. Because use would be seasonal, relatively limited, and because of the high availability of water on the river plain, no impacts on groundwater supplies would be anticipated. Under the minimum

requirements alternative, water would be trucked to the Elkhorn ranch and the old east entrance station. Use of south unit wells for this purpose would increase only during the summer months with no significant impact on groundwater supplies.

New septic tanks/leach fields would be provided above the 100-year floodplain at Cottonwood campground and for the Peaceful Valley ranch and picnic area under the preferred and minimum requirements alternatives. (The other practicable alternative would relocate the three developed areas out of the floodplain). Because soil percolation would be used in the final phase of treatment at the relocated leach fields, which are within the river valley, an unknown quantity of wastewater would be injected into the ground each year. Some of the nutrients in the wastewater (nitrates, sulfates, phosphates) would eventually reach surface streams, but in unknown amounts. However, the amount and type of wastewater would be similar to that now discharged, and because all sewage treatment systems would be designed to meet state and federal regulations for environmental and public safety, the potential for contamination of groundwater and surface streams would be minimized.

Impacts on Floodplains and Wetlands

General Impacts. The National Park Service has developed final procedures for implementing EO 11988 and EO 11990 (see appendix F). These floodplain procedures were followed in this planning effort, and alternatives were developed that would avoid or mitigate the adverse impacts associated with location of facilities in floodplains.

Current park developments and facilities have no significant impacts on natural flooding processes, but, to a small degree, all of the alternatives would affect water quality or the soils, vegetation, or wildlife habitat qualities of floodplains and wetlands.

A possible adverse impact of the flood-related proposals is that they are based on calculated risks of flooding that might never be realized within the expected lifetimes of present park improvements. Because the proposals would involve significant costs in time and materials, greater obtrusiveness of and some loss of handicap access to the raised structures, temporary disruptions due to construction, and no real increase in facility quality or area capacity, the result could be termed an overreaction to the threats involved with the potential for an excessive amount of the park's funding appropriated to meet the flood threat. The bottom line, however, is that the flood-related proposals must be carried out, subject to congressional funding to accomplish them. The legislation requiring this is a reflection of federal policy that visitors will not be invited to use an area with a significant 100-year flood potential unless there is no alternative. Steps must be taken to reduce potential loss of life and property and stream contamination to an acceptable level of risk.

The flood-warning systems and evacuation plans, which would be developed by the park staff for dealing with all flood-prone areas of the park, would reduce the risk of loss of life and property to visitors.

Continuation of Existing Conditions. Under this alternative, serious consequences from flooding would eventually be experienced in the north and south units. Less problems would be experienced in the Elkhorn unit because the unit is undeveloped. A flood of the Little Missouri River would do the most damage to Medora and its immediate vicinity than to any other development area within the park.

The highest flood level on record at Medora occurred in March 1947 before the park was established. Almost a 100-year flood, the water level reached an elevation of 2,267.25 feet. The 1947 flood caused \$120,000 worth of damage, which, using 1984 values, would be about \$575,000. In March 1972, flooding of a lesser degree occurred. Damage was estimated at \$45,000, which included the cost of a hastily constructed earthen levee that prevented more damage. Repairs would have totaled about \$112,000 if a similar flood had occurred in 1984. The 1972 flood crested at 2,265.43 feet, a 20-year flood.

Damage to Medora begins when the flood elevation exceeds 2,262 feet, a 10-year flood. The river overflows its east bank at 2,259 feet, a 5-year flood. The 100-year flood elevation is 2,268 feet.

A 100-year flood in the Medora area would create havoc within a 406-acre area bounded by I-94 to the north, the Burlington Northern Railroad tracks to the south and west, and the gentle sloping topography to the east that contains most of Medora. About half, 200 acres, is in the park. The flow of the river would be restricted to a narrow 400-foot-wide gap at the southern portion of this area by abutments for the railroad and bypass highway bridges, which are above the 100-year floodplain. East of the river, where most of Medora and all of the park headquarters are located, 90 acres would be flooded, of which 23 acres (26 percent) are in the park. (See Medora Headquarters DCP and South Unit General Development Plan/Flood Data maps for more information on flooding.)

Cleanup and damage repair to the land and development in this area would cost an estimated \$750,000 for the National Park Service alone. A 100-year flood at Medora would flood all NPS headquarters facilities, with the exception of the maintenance and storage area, one seasonal apartment, and one residence. Important museum collections and books could also be damaged, and park management activities would be disrupted.

At Cottonwood campground, a 100-year event would flood everything except a short segment of the entrance road. The floor of the camp-tender residence would be covered with about 2 feet of water and the four comfort stations with 4 to 7 feet of water (see Cottonwood Campground DCP map for more flood information). Damage would begin when the river overflows its east bank at an elevation of about 2,251 feet. The 100-year flood elevation is about 2,257 feet. Repairs would cost about \$400,000.

At Peaceful Valley ranch and picnic area, a 100-year event would flood to a depth of about 4 feet at all of the ranch buildings and would cover the

new Paddock Creek bridge with about 2 feet of water. Most of the picnic area except parking and a small portion of the group picnic area would be flooded (see Peaceful Valley DCP map for more flood information). Damage would begin when the river overflows its east bank at an elevation of about 2,241 feet. The 100-year flood elevation is about 2,253 feet. Damage to the ranch would be about \$400,000 and to the picnic area about \$100,000.

In addition, a 100-year flood would damage about 6 miles of road at other locations in the south unit; repairs would cost an estimated \$1,000,000 (see South Unit General Development Plan/Flood Data map for road locations).

At the Elkhorn unit, a 100-year flood of the Little Missouri River would completely flood the historic ranch site. The foundations of the historic structures would be under about 3 feet of water (see Elkhorn Unit DCP map for more flood information). Damage would begin when the river overflows its west bank at an elevation of about 2,128 feet. The 100-year flood elevation is about 2,131 feet. The cost to repair the damage would be about \$50,000, and would consist of fence and trail repair and general cleanup of debris and silt.

At the Squaw Creek campground and picnic area in the north unit, all development would be inundated by a 100-year flood except the sewage lagoon. The floor of the camp-tender residence and the road bridges over Squaw Creek would be covered with about 4 feet of water. The floors for the three comfort stations would be under 3 to 5 feet of water and the two CCC picnic shelters under 6 to 9 feet of water (see Squaw Creek Campground DCP map for more flood information). Damage would begin when the river overflows its east bank at an elevation of about 1,947 feet. The 100-year flood elevation is about 1,965 feet. Repairs would cost about \$500,000.

At the north unit's bison corral, a 100-year event would flood the tack building, over half of the corral, two-thirds of the pasture and all of the material stockpile area (see Bison Corral DCP map for more flood information). Damage would begin when the river overflows its east bank at an elevation of about 1,951 feet. The 100-year flood elevation is about 1,959 feet. Repairs would cost about \$100,000.

At the north unit district headquarters, a 100-year event would not flood any NPS improvements. However, some REC power lines and a private residence would be flooded (see District Headquarters DCP map for more flood information). The 100-year flood elevation is about 1,952 feet.

In addition, a 100-year flood would damage about a 3/4 mile segment of road at other locations in the north unit at an estimated repair cost of \$100,000 (see North Unit General Development Plan/Flood Data map for road locations).

Three creek drainages--Knutson Creek and Paddock Creek in the south unit and Squaw Creek in the north unit--have been identified by the

U.S. Geological Survey as appearing to have the greatest threat for personal injury or loss of life in the event of a flash flood.

Knutson Creek has the largest drainage with 64 square miles. A 100-year flash flood would change this intermittent stream to a river with water up to about 18 feet deep $\frac{1}{2}$ mile upstream from its confluence with the Little Missouri River. The depth would decrease as it approached the river due to a much wider floodplain (see South Unit General Development Plan/Flood Data and External Conditions maps for more flood information). The cost to repair the damage would be about \$50,000, and would consist of fence and trail replacement and debris removal.

Paddock Creek has a 28-square-mile drainage area. A 100-year flash flood would change this intermittent stream into a river with water up to about 10 feet deep $\frac{1}{2}$ mile upstream from its confluence with the Little Missouri River. The depth would decrease to about $1\frac{1}{2}$ feet by the time it reached the Peaceful Valley ranch buildings due to the much wider and flatter floodplain (see External Conditions, South Unit General Development Plan/Flood Data, and Peaceful Valley DCP maps for more flood information). The cost to repair the damage would be about \$200,000, and could include replacement of the ranch buildings, corral and fencing, trails, extensive road repairs, and replacement of the Halliday Well group camping area and most of the Peaceful Valley picnic area. It would take about five hours for the flood peak to reach the ranch buildings.

Squaw Creek has the smallest drainage of the three creeks with $26\frac{1}{2}$ square miles. This intermittent stream would change into a river during a 100-year flash flood, with water up to about 15 feet deep $\frac{1}{2}$ mile upstream from its confluence with the Little Missouri River. Its depth would decrease to about 2 feet with a velocity of about 7 fps by the time it reached the camp-tender residence due to the much wider and flatter floodplain (see External Conditions, North Unit General Development Plan/Flood Data, and Squaw Creek Campground DCP maps for more flood information). Damage repairs would cost up to \$600,000, and could include replacement of the camp-tender residence, three comfort stations, two historic picnic shelters, and an amphitheater and extensive road and trail reconstruction. It would take about six hours for the flood peak to reach the camp-tender residence.

Ice-jam flooding has principally been a problem at Medora and park headquarters. While late winter ice jams could cause damage and disruption at the other areas named above along the Little Missouri River, they have more often affected the south unit than the north unit. Without action, ice-jam flooding can be expected to be much more of a problem than the other types of flooding in terms of frequency.

Under the continuation of existing conditions alternative, natural moderation of floodwaters would be affected at Medora only by construction of temporary dikes. The effectiveness of a temporary dike would depend on the seriousness of the flood, as well as the amount of advance notice and availability of materials. However, construction of a

temporary dike capable of protection against a 100-year flood would be well beyond the capabilities of local resources. For example, the March 1978 flood (a 15-year event) was held in check from flooding Medora by an all-out effort to build a 4-foot-high temporary dike that taxed local resources to the limit. A 100-year flood would require a temporary dike that would average 7 feet in height.

The existing conditions alternative of constructing a temporary dike would have little, if any, impact on floodplain water resource values in a 100-year flood. The river would flow over it, quickly sweeping away any fill material that had been placed. There would then be a natural moderation of flooding, water quality maintenance, groundwater recharge, as well as continuation of living resource values and cultural and cultivated resource values.

No effects are expected from a no-action approach to wetlands.

Action Alternatives. Only the other practicable alternative proposes to relocate developed areas out of the river floodplain. The preferred and minimum requirements alternatives propose to implement evacuation plans, allowing for repair of historic structures from flood damage and repair or replacement of lost equipment such as trash cans, tables, or grates. The historic structures at Peaceful Valley ranch are in good condition, but in a 100-year flood would be inundated with 4 feet of water moving at about 2 fps. A flash flood from Paddock Creek would flood the buildings with 1.5 feet of water moving at about 1 fps.

These low velocities would not likely cause significant damage to building foundations; however, interior walls, electrical work, and furnishings would be damaged.

Under the other practicable alternative, the permanent dike proposed along the riverbank (extending 2,200 feet at an average height of 12 feet) would require a permit from the Army Corps of Engineers and concurrence from the North Dakota State Historical Society on whose property it would be located. Because of yearly high water, a riverbank dike would require constant maintenance.

Under the preferred and minimum requirements alternatives, the permanent dike proposed at the west edge of the NPS property at Medora would be 400 feet shorter and average 5 feet lower than the riverbank dike and located mostly on park property. It would be less visually obtrusive and, because the entrance area is already landscaped, similar landscaping of the dike would be complementary.

Floodplain water resource values would be adversely affected in varying degrees by the three alternatives. At Medora, the other practicable alternative with its permanent riverbank dike would affect the natural moderation of floods, water quality maintenance and groundwater recharge, living resource values, cultural resource values, and cultivated resource values to the greatest extent of the alternatives. It would prevent these floodplain values from continuing over an 127-acre area to

the east of the river, which would be protected from events through 100-year floods. To the west, 320 acres would have these values modified to an indeterminate degree due to the dike's presence, which would cause floodwaters to flow by faster and higher, deposit more sediment, and erode away soil more than if the dike were not there. The existing restriction by the abutments of the railroad and bypass highway bridges would be increased somewhat by the proposed high dike, causing a 100-year flood to be a little higher and to cover a little more than 320 acres to the west.

The preferred and minimum requirements alternatives both call for a lower dike set farther back from the river than the dike proposed in the other practicable alternative. The impacts would be similar but considerably less severe. Floodplain water resource values would be prevented from continuing over a 49-acre area to the east. To the west, 357 acres would have these values modified slightly due to the water from a 100-year flood flowing by somewhat faster, covering more than 357 acres, depositing slightly more sediment, and eroding away slightly more soil than at present.

The construction of small hills to elevate existing buildings at Cottonwood campground and Squaw Creek campground/picnic area and the proposed comfort station at Peaceful Valley ranch would have such an insignificant impact on floodplain values and the action of floodwaters that it would be difficult if not impossible to determine. The total area of the existing structures to be raised is less than 6,000 square feet and for the proposed comfort station less than 500 square feet. The small area for these 10 buildings including the hills upon which they would be placed would total less than 1 acre. The impact of these 10 buildings on floodplain values and floodwater actions within the 100-year floodplain of the Little Missouri River is too small to calculate.

Although access roads are considered excepted actions from compliance with the floodplain regulations, 100-year floods could result in major road damage at Cottonwood campground, Peaceful Valley ranch and picnic area, and Squaw Creek campground and picnic area. The danger to visitors from road washouts and subsequent stranding would be minimized by the development of the flood-warning system and evacuation plan.

The use of the existing Cottonwood and Squaw Creek campgrounds in the 100-year floodplain or flash-flood area would expose visitors to the possibility of loss of life and property in a flood. Because flooding can be monitored, is seasonally predictable, and occurs at a rate allowing evacuation, the risk at existing campgrounds could be greatly reduced under three of the alternatives. Relocation of these campgrounds was considered impractical because of the destruction of natural resources at relocation sites, substantial capital investment in existing developments and the lack of suitable alternate sites. Alternate sites are generally in arid open areas that are unattractive to visitors and difficult to use, and establishing shade cover would require costly installation and long-term maintenance of irrigation systems. Roads to the sites would also be quite expensive. All sewage treatment facilities would be moved out of the 100-year floodplain in all action alternatives.

Chemicals such as chlorine might be introduced into the floodwaters from damage to existing water treatment facilities at Medora, Cottonwood and Squaw Creek campgrounds, and Peaceful Valley ranch, but the immediate dilution would render this impact negligible.

The eventual acquisition of surface and mineral ownerships in the park would protect those containing floodplains and wetlands from adverse impacts of private development.

No structures or facilities exist in or are proposed for a high-hazard area subject to flooding events that would be so unexpected, violent, or otherwise devastating that human lives would be placed in immediate or grave danger. This is on the assumption that adequate flood warning systems and evacuation plans are in effect. As previously described, there is advance flood warning of at least 22 hours for the Little Missouri River and about five to six hours for flash flooding of Paddock and Squaw creeks.

Impacts on Visual Quality

Continuation of Existing Conditions. With nonimplementation of the land protection proposals, gradual development and changes in land use could occur on the private lands in the north unit, degrading the view from US 85 and the entrance area of the unit. Also, the electric power lines in the headquarters area at the east end of the unit would continue to be visually obtrusive.

After the new county access road is built, residential/commercial or oil and gas developments could occur close enough to the Elkhorn unit to create significant visual, olfactory, and/or auditory impacts for visitors.

If the NPS development proposals in this plan were not implemented, there would be a small amount of additional man-made visual impact that would not occur.

General Impacts - Action Alternatives. With implementation of land protection proposals, viewsheds on either side of US 85 in the north unit would be protected from inappropriate development, while lands in the park containing private mineral rights would be protected from any form of development. New visually obtrusive energy development along park boundaries would be limited. Except for the potential for development of existing oil and gas leases, the Elkhorn ranch would receive protection from private development that could border or be easily visible from the ranch site.

Specific Impacts - Action Alternatives. The only proposed park developments that would have any significant impact on visual quality would be the dike at Medora (all action alternatives) and the structures that would need to be raised in the flood-prone recreation sites along the Little Missouri River (preferred and minimum requirements alternatives). These structures would be more visually prominent and less harmonious

with their settings than is now the case. The Medora dike would be grassed but would still be fairly prominent, and the area occupied by it would be less natural appearing than now. However, the dike mostly within NPS ownership, proposed under the preferred and minimum requirements alternatives, would be significantly less obtrusive than the higher riverside dike proposed under the other practicable alternative.

The relocated Little Missouri River recreation sites proposed under the other practicable alternative would add several areas of significant visual intrusion by superimposing major developments on higher, easily visible areas with few trees or higher shrubs to absorb or soften the visual impact.

Visual impacts at the Elkhorn ranch would vary depending on the route selected by Billings and Golden Valley counties for a new road in the area. The other practicable alternative involves selection of the northern route, which would require a much longer, more expensive access road to be constructed over private and other public lands. A new county bridge would not be constructed immediately south of and within the viewshed of part of the unit. If the southern route is selected, which appears more likely, a short access road would be required, since the county road and bridge over the Little Missouri River would be situated immediately south of the unit. The road from the south would bring greater visitation to the unit and, because of its shorter length, probably generate slightly less road dust than would be the case for the road from the north.

Under each of the action alternatives, vegetation management at the Elkhorn ranch by use of prescribed fire would create a temporary degradation of visual quality from smoke and particulate matter. This impact would be temporary because the burning would last several hours or less and would occur only once or twice a year at most and then only prior to or following the high visitor use season. Burning would most often take place immediately prior to or during the active plant growing periods so that recovery from a charred condition could occur before the start of the visitor use season.

Construction of a small picnic area and tent platforms proposed for the Elkhorn ranch under the preferred and other practicable alternatives, and the addition of a multipurpose building, restrooms, primitive shower, and trail under each of the action alternatives would change the visual scene from the present undeveloped character. However, this change would include only a small portion of the unit, and the developments would be screened from the area where the former ranch buildings were situated.

The establishment of new trails in the south unit as planned in the three action alternatives would create a visual impression upon the landscape. Those trails located in natural areas would resemble paths formed by the trailing of bison and wild horses to and from watering and feeding areas. The footbridge crossing the river at Peaceful Valley, as proposed in the other practicable alternative, could be considered a visual intrusion by some visitors. The preferred alternative, however, calls for a river ford at this location.

Aboveground power lines in the eastern part of the north unit are proposed for relocation outside the park or undergrounding in each of the action alternatives. Visual quality would be improved by burying the local REC power lines and by encouraging the WAPA to relocate their power line to the east of the unit. The acquisition of tract 01-121 adjacent to the north unit headquarters area would result in a small improvement in visual quality, as several man-made developments on this tract would be removed.

IMPACTS ON CULTURAL ENVIRONMENT

Impacts on Archeological Resources

The only archeological resources addressed by the general management and land protection plans are the minimal historic ranch remains in the Elkhorn unit. Under the continuation of existing conditions alternative, there would be no change in the present method of managing these remains and no adverse impacts.

The preferred and minimum requirements alternatives call for marking the former foundations of the ranch house, stable, blacksmith shop, and well. This would not involve any excavation or disturbance of the former structure sites themselves. Impacts, if any, would be minimal.

Under the other practicable alternative, the exteriors of the house and stable would be reconstructed. This would disturb these two archeological sites, although previous investigations may or may not have recovered or noted everything of value. As stated previously, reconstruction could violate NPS policies and a congressional expenditures limitation on reconstruction work.

Impacts on Historic Resources

With the continuation of existing conditions alternative, there would be no change in the current approach to management and protection of the CCC camp-tender residence, the Maltese Cross cabin, and the old east entrance station. Only minor cyclical maintenance, preceded by section 106 clearance, would be performed on the structures, which are deteriorating gradually.

Under the preferred and minimum requirements alternatives, the CCC camp-tender residence would remain in its historic location. Vegetative screening would mitigate the problem of its proximity to the north unit access road. Renovating the interior for a residence or storage would have no effect on its exterior appearance, which is the most important aspect of the structure (the interior has been changed over time).

Under the preferred alternative, the Maltese Cross cabin would have some historic fabric destroyed by the installation of the fire suppression system. However, the protection offered by this system would more than

offset this loss because the risk of damage from fire would be minimal. The old east entrance station in the south unit would be moved to a new location. Transferring the station and stone privy to another part of the unit would lessen their historical value since they would be removed from their original location. The conversion of the stone privy to a vault toilet, however, would not harm the building's integrity, and the public would have increased opportunity to see the two structures.

Under minimum requirements alternative, a fire suppression system would be installed in the Medora visitor center but not in the Maltese Cross cabin. Fire could cause damage to the cabin's interior and contents before being extinguished. The actions of adaptively using the old east entrance station for researcher or seasonal ranger quarters and converting the stone privy to a vault toilet would have no adverse effects on the historical value of the structures. The proposed gravel road to the station would cause only minor adverse impacts if it followed the course of the former highway.

With the other practicable alternative, the impacts on the Maltese Cross cabin and the old east entrance station would be the same as for the preferred alternative. The proposed relocation of the CCC camp-tender residence would have the effect of reducing its historical value because the structure would be removed from its original location.

Impacts on Collections

Numerous natural and historic objects as well as library materials are currently housed in the Medora visitor center and Maltese Cross cabin with only limited protection from fire. Under the continuation of existing conditions alternative, the museum collections, stored artifacts, library, and historic furnishings in the cabin would be treated in the current manner and the risk of loss from fire would continue. Such a loss would be a major deprivation to the park's interpretive and research programs because most of the items are irreplaceable.

The action alternatives call for the protection of the collections through installation of fire suppression systems. With this system installed, the chance of loss would be quite minimal.

General Compliance Considerations

All archeological, historic, or architectural resources included on the National Register of Historic Places, or potentially eligible for inclusion, are entitled to protection afforded by section 106 of the National Historic Preservation Act as amended and its implementing regulations promulgated by the Advisory Council on Historic Preservation (36 CFR 800). Pursuant to those regulations, the council, the National Park Service, and the National Conference of State Historic Preservation Officers have executed a programmatic memorandum of agreement on the NPS planning process. In accordance with that memorandum of agreement, the council

and the North Dakota historic preservation officer have participated in the development of this plan through informal consultations and reviews. Those consultations and reviews will continue throughout the planning process, and both parties will be given an opportunity to formally review and comment on the proposed plan before it is approved by the regional director. Evidence of compliance with section 106, as applicable to this plan, will be included in its final NEPA document.

All new or relocated campgrounds, trails, roads, parking areas, dikes, canoe access points, and other earth-disturbing activity addressed in each of the alternatives would require archeological surveys before construction.

All historic structures in the park are to remain and receive cyclical maintenance as directed and prescribed by historic structure preservation guides or other professional recommendations.

IMPACTS ON SOCIOECONOMIC ENVIRONMENT

Impacts on Landownership

Impacts or potential impacts of land protection plan proposals on owners of private land within the park would vary. For the Sickler properties in the south unit, there would be virtually no negative impact because the tracts are not now being used and probably cannot be used by the owner; the opportunity to sell those properties to the National Park Service could represent a positive impact for the owner because of the payment that would be received and the relief from annual payment of taxes. The portions of private tracts in the north unit that have been proposed for fee acquisition (west of US 85) are currently receiving little use, except for tract 01-121, which is currently held by Mrs. Ruth Baye who resides on the portion of the tract proposed for acquisition. Under most circumstances, a life estate could be offered; however, vacating the property is a necessary eventuality because the property has already been sold under a contract for deed. The acquisition of the portions of three parcels west of US 85 would preclude other potential private uses of the land. The main impact would probably be experienced by the owners of tract 01-121 because this approximately 95-acre area is the most desirable and strategically located of the portions of those tracts west of US 85.

The private tracts and portions of private tracts to the east of US 85 in the north unit are also receiving little use. The acquisition of scenic easements for these properties should result in very little, if any, negative impacts for the owners because present uses could continue. Single residences could also be built on the tracts, and the owners would receive compensation for any additional property rights given up.

To the extent that private subsurface rights are acquired by the Park Service, these rights will not be able to be exploited for their mineral potential. This could result in some unknown amount of loss of owner

profit and minerals (most likely oil and gas) that might otherwise be removed and added to the nation's supplies of such material. From a practical standpoint, however, in most areas of the park where private subsurface interests are found, the potential for profitable mineral extraction is limited. This observation is based on the lack in these areas of nearby producing oil and gas wells and known (productive) geological structures. In the areas where profitable oil and gas resources may be found, it appears likely that they can be captured through drainage or directional drilling. In the south unit, the potentially most productive area has already been leased for directional drilling.

In any event, owners of subsurface rights will be compensated for the value of their rights. Thus, no significant negative impacts on owners are foreseen as a result of implementing the land protection plan proposals, assuming that reasonable subsurface rights values can be established and agreed upon.

Impacts on Land Use

Implementation of the general management and land protection plan proposals and their alternatives would have little effect on land uses in the park. Portions of the park that are now in a natural condition and which would be developed to some degree would involve an almost negligible acreage. Several trails would be developed through natural zones of the park, but the basic character of these natural areas would not be changed.

Implementation of land protection proposals that address private lands within the park would not change current uses of these lands, except possibly for the area west of the highway and north of the river in the north unit, where a canoe access site is proposed and a group horse camp is suggested (alternate sites are shown for this camp). However, future uses of the private lands to the east of US 85 would be limited to those compatible with maintenance of visual qualities from the highway and the park entrance/headquarters area.

The proposals and alternative proposals of this document would not directly affect land use outside the park, except to attempt to limit the number and undesirable environmental effects of additional oil and gas development near the park boundaries.

Other Impacts

The visitor use and other proposals of this document should have a slightly beneficial impact (i.e., greater profit) on those providing visitor services, including motels, restaurants, grocery stores, and gas stations to park users who obtain these services outside the park. This would result from a slight increase in visitor satisfaction and opportunity, which should result in slightly longer stays and greater interest in the park and what it has to offer. Basically, Theodore Roosevelt National Park,

including its resources and facilities, has been underused so most of the time it offers relatively uncrowded conditions, along with good recreation and sight-seeing opportunities.

The various visitor use proposals and other action alternatives would also result in safer and more efficient conditions for recreational use. Increased visitor use and satisfaction should also benefit the horse use concessioner at Peaceful Valley ranch.

The aforementioned benefits would be somewhat greater under the preferred and other practicable alternatives than under the minimum requirements alternative.

IMPACTS ON VISITOR USE AND INTERPRETATION

With a continuation of existing conditions, there would be little change in present opportunities for or patterns of visitor use or the several shortcomings in facilities and opportunities that exist.

The overall thrust of the proposals and alternatives of both the general management and land protection plans is to provide additional and enhanced opportunities for visitors, under safer and more comfortable conditions. The plans do not propose any significant expansion of visitor facilities, such as campgrounds, picnic areas, and roads, and with two exceptions, none of the proposals or their alternatives would have any adverse impacts on visitors and visitor use. The first exception is that proposed floodproofing of comfort stations in recreation sites along the Little Missouri River would raise the structures and make them more difficult to use by the handicapped.

The second exception is that relocation of flood-prone Little Missouri River recreation sites, proposed under the other practicable alternative, would replace these sites in much less attractive and much less shady locations, well-removed from the popular river.

The greatest benefits to visitor use should result from the following improvements and programs proposed under the preferred, other practicable, and (in most cases) minimum requirements alternatives:

- floodproofing of visitor facilities and utilities and provision of warning systems and evacuation plans for all flood-prone recreation sites (includes diking at Medora)

- improvements in existing parking, utilities, and comfort stations

- provision of new facilities to aid horseback, canoe, and river snowmobile use; recreation and interpretive use of the Elkhorn and north units; and comfort station needs at locations where such facilities are inadequate or lacking, such as on the south unit loop road

addition and improvement of trails in areas of highest demand and greatest recreational opportunity, including redesign and improvement of selected existing trails for use by the handicapped

improvement of existing and provision of new information/interpretive facilities and programs, including redesign of the interior of the Painted Canyon visitor center, development of new visitor/office space and displays at the north unit headquarters area, and marking and interpretation of the historic ranch remains at the Elkhorn unit

provision of additional park personnel and operational facilities to meet a variety of park protection, visitor service and protection, and general operational needs

implementation of land protection proposals to protect privately owned park lands, areas containing nonfederally owned mineral rights, and the small Elkhorn unit from undesired encroachment of incompatible developments and land uses

Except as noted earlier, visitor benefits under the preferred and other practicable alternatives would be virtually identical. Under the minimum requirements alternative, one canoe access site would be foregone, the north unit group horse camp would not be developed by the Park Service, Elkhorn unit picnic facilities would not be developed, two toilets would not be provided along the south unit loop road, and no new hiking trails would be constructed. The result would be about a 33 percent reduction in additional recreational opportunities and facilities.

The small increase in riverbed snowmobiling that would result from the proposed improvement of access sites would have little impact on other park resources or on park visitors. The park, including the river area, is occasionally used by cross-country skiers and snowshoers who are likely to find the presence and noise of the snowmobiles irritating; however, such contact has been quite limited and there is little other visitor use of the park in the wintertime.

All of the action alternatives would have short-term adverse effects on park visitors due to necessary construction activities. The areas that would be most affected include the north unit district headquarters area, Squaw Creek campground, Peaceful Valley ranch and picnic area, Cottonwood campground, the Buck Hill area, the Painted Canyon visitor center, and the area in the vicinity of the Medora visitor center and Maltese Cross cabin. The effects would consist of short-term closure of all or portions of these areas; visible and disruptive work going on in portions of the areas while the areas are being used by visitors; a temporary loss in user capacity or conveniences at some areas; and construction equipment, ongoing work, and dust in areas visible from park roads, trails, and scenic vistas. As is possible, construction would be done during nonpeak season months.

SUMMARY, the proposals, and to a lesser extent the alternative proposals of this document, should promote greater satisfaction, safety,

and convenience for park visitors. In addition, the improvements could in time attract some additional visitor use, encourage longer stays and more use of the Elkhorn and/or north units, increase off-season use, and promote greater environmental knowledge among those who visit the park.

IMPACTS ON PARK MANAGEMENT AND OPERATIONS

Continuation of Existing Conditions

Under the continuation of existing conditions alternative, the current level and type of park management and operation functions would continue. Staffing for resource management, visitor protection, and visitor services would generally remain inadequate. With this situation, proposed utility floodproofing would probably not be done, and systems in recreation sites could be contaminated and damaged, and sewage contaminants could be released into the river. Because of difficulty in meeting federal floodplain requirements, it would be necessary to close, under certain season or weather conditions, campgrounds and other recreation sites along the Little Missouri River to public use. Since a permanent dike at Medora would not be built, temporary sandbag dikes would continue to be erected by park staff on a hurried, last-minute basis. With a 100-year flood, however, the visitor center, Maltese Cross cabin, a number of residences, and other park improvements would be damaged, fouled, and probably made temporarily unusable. Park management activities could be seriously hampered for a period of time.

Under this alternative, the improvements proposed for the bison corrals in the north and south units would not be made; thus, roundup operations would remain difficult, less safe, and inefficient.

The new multipurpose (visitor center/office) building or buildings, employees' quarters, and vehicle storage and expanded maintenance building and sewage lagoon proposed for the north unit entrance and headquarters area would not be built. The staff would continue to operate as best they can with the present cramped space and short season of operation for the present visitor center, and staffing would continue to be inadequate for patrols, visitor contact, etc. However, vehicle response to emergencies and problems and appropriate space for first-aid activities are also concerns. Given the right set of circumstances, it is possible that the response to victims of accidents or serious illness might be delayed because of inability to get underway with NPS vehicular equipment.

The relatively simple administrative facilities and increased staffing proposed for the Elkhorn unit could not be provided; thus, none of the improvements and interpretation would be implemented. With this condition and improved access, resource damage, including digging in the sites of the former ranch improvements, might occur.

In the south unit, the present limited season operation of the Painted Canyon visitor center, along with the threat of increased vandalism,

would continue, as no changes would be made in the building's heating system, and the building would remain closed most of the year. At the Medora visitor center, as discussed earlier, a fire could cause serious damage to irreplaceable documents or objects in the building due to lack of a fire suppression system.

General Impacts - Action Alternatives

With implementation of the various park operation proposals or alternatives, most concerns related to public and staff safety, public property, and NPS facilities and collections housed in the Medora visitor center would be either eliminated or reduced to an acceptable level. Resource protection would be increased, public contact and other services would be improved, park management activities would be made more efficient, especially at the north unit headquarters and Painted Canyon areas, and employee morale and creativeness should be raised.

Specific Impacts - Action Alternatives

Implementation of the land protection plan would benefit park management in several ways--most importantly, in providing positive direction for both protective management of private land and mineral interests as appropriate and opportunity permitted. The plan would also provide additional direction for addressing several external problems that do or could impact the park.

A negative impact of the land protection plan proposals involves the requirement for enforcement of compatible/incompatible use criteria for the private tracts and for enforcement of the conditions and requirements of the scenic easements proposed for the private lands east of US 85 in the north unit. These criteria and conditions could be difficult for park staff to monitor and enforce, and undue amounts of administrative time might be required if problem situations arose.

The principal difference between park operation action (development) alternatives is that under the other practicable alternative separate administration and maintenance structures would be built at the north unit headquarters area, rather than building one visitor center/administration structure and adding to the present maintenance building. Also, proposed housing here would use on-site construction. The result would be higher costs and perhaps delays in the park's ability to proceed with and fund these several improvements.

SUMMARY OF IMPACTS

Following is a simplified comparison summary of impacts based on the expected effects of each alternative, in terms of beneficial (+), no effect or no net effect (0), adverse (-), and uncertain (U). In some cases, there would be both beneficial and adverse effects, but the net effect is what is shown.

	<u>Continuation of Existing Conditions</u>	<u>Preferred</u>	<u>Minimum Requirements</u>	<u>Other Practicable</u>	<u>Land Protection Plan</u>
Natural Environment					
Geology/soils/vegetation	-	-	-	-	+
Wildlife	0	-	-	-	+
Threatened/endangered species	0	U	U	U	+
Water resources	-	+	+	+	+
Floodplains/wetlands (all effects, including those on park visitors)	-	+	+	+	0
Visual quality	0	+	+	+	+
Cultural Resources					
Archeological resources	0	0	0	-	0
Historic resources	0	0	0	-	+
Collections	-	+	+	+	0
Socioeconomic Environment					
Landownership and use	+	0	0	0	-
Other (misc. visitor services)	0	+	+	+	0
Visitor Use/Interpretation	0	+	+	+	+
Park Management/Operations	-	+	+	+	+

CONSULTATION AND COORDINATION

AGENCIES CONTACTED

Federal

Advisory Council on Historic Preservation
Department of the Army
 Omaha District Corps of Engineers
Department of Agriculture
 Forest Service, Custer National Forest
 Medora Ranger District
 McKenzie Ranger District
Department of the Interior
 Bureau of Land Management
 Dickinson, North Dakota, Area Office
 Bureau of Reclamation
 Office of Surface Mining
 Fish and Wildlife Service
 Regional Office, Denver
 Endangered Species Office, Denver
 Bismarck, North Dakota, Field Office
 Pierre, South Dakota, Field Office
 Geological Survey
 Water Resources Division, Bismarck
Environmental Protection Agency
 Regional Office, Denver
National Flood Insurance Headquarters

State of North Dakota

Department of Health
Public Service Commission
Geologist
Industrial Commission
Game and Fish Department
Parks and Recreation Department
Highway Department
Historic Preservation Officer
Aeronautics Commission
Roosevelt-Custer Regional Council for Development

COUNTY

Billings County Commissioners
McKenzie County Commissioners

CITY

Medora
Watford City

OTHER

University of Nebraska at Omaha
Remote Sensing Applications Laboratory

SUMMARY OF PUBLIC INVOLVEMENT

On February 7 and 24, 1984, news releases announced the initiation of planning for a general management plan for Theodore Roosevelt National Park, and that public scoping meetings would be held that March in Watford City and Medora, North Dakota. Interested persons were invited to hear an explanation of the planning process, and to express their views on issues to be considered.

The first meeting, held at the Civic Center in Watford City on March 6, was attended by 14 people. The second, held at the Community Building in Medora on March 7, was attended by nine people. The participants' discussion of many issues of concern to them was of help to the planning team.

A scoping brochure was released that June notifying the public of progress on the study since the February meetings, issues to be addressed, public participation opportunities, and an invitation to provide more issues for consideration. At the same time three questionnaires were prepared to find out what facilities and services the public thought were appropriate for the north unit, the Painted Canyon area in the south unit, and the remainder of the south unit. These three questionnaires and the scoping brochure have been made available to the public at entrance stations and the Medora visitor center on a continuing basis so as to receive year-round information. In addition, individuals who own land in the park have been contacted to the extent practicable.