



CHAPTER 5: Environmental Consequences

INTRODUCTION

The *National Environmental Policy Act* of 1969 (40 CFR 1500–1508) (NEPA) mandates that environmental impact statements disclose the environmental effects of a proposed federal action. In this case, the proposed federal action is the adoption of the *South Unit General Management Plan / Environmental Impact Statement* (South Unit GMP/EIS). The alternatives in this plan provide broad management direction for the park. Thus, this environmental impact statement should be considered a programmatic document. Before undertaking specific actions to implement the approved plan, National Park Service (NPS) and/or the Oglala Sioux Tribe (OST) will need to determine if more detailed environmental documents must be prepared, consistent with the provisions of NEPA.

The first two parts cover policy and terminology related to cumulative impacts at the South Unit of Badlands National Park (South Unit). The third part discusses the relationship of the impact analyses to requirements of Section 106 of the *National Historic Preservation Act*. The next part of this chapter discusses terms and assumptions used in the discussions of impacts. Finally, the impacts of the alternatives are analyzed in this order: alternative A (the No-Action Alternative); alternative B (expand interpretive opportunities); alternative C (focus on resource protection/preservation); and alternative D, the preferred alternative (protect resources while expanding interpretive experience). Each impact topic includes a description of the impacts of the alternative, a discussion of cumulative effects, and a conclusion. At the end of the discussion for each alternative there is a required brief discussion of unavoidable adverse impacts, irreversible and irretrievable commitments of resources, and effects on short-term uses and long-term productivity.

CUMULATIVE IMPACTS

Council on Environmental Quality regulations, which implement NEPA, require assessment of

cumulative impacts in the decision-making process for federal projects. Cumulative impacts result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions, regardless of who undertakes such other actions. Cumulative impacts can result from individually minor but collectively important actions taking place over a period of time.

Cumulative impacts are considered for both the no-action and the action alternatives. These impacts were determined by combining the impacts of the alternatives proposed in this document with the impacts of other past, present, and reasonably foreseeable future actions. To do this, it was necessary to identify other such projects or actions at the South Unit and in the surrounding area. For the purposes of most impact topics in this analysis, the cumulative impact analysis area was the 15-mile area surrounding Badlands National Park, including 15 miles south and east of the Palmer Creek Unit. This cumulative impacts area includes the communities of Interior, Wall, Quinn, Scenic, Red Shirt, Kyle and Sharps Corner. The area includes the North Unit of Badlands National Park, parts of Buffalo Gap National Grassland, and the Pine Ridge Indian Reservation, and parts of Jackson, Pennington, Custer and Shannon counties. The time horizon for the cumulative impacts analysis depends on the impact topic under consideration but in most cases was plus or minus five years.

The following sections outline ongoing projects or projects planned for the near future were identified for the purposes of conducting the cumulative effects analysis (see the “Ongoing NPS Projects and Projects Planned for the Near Future” section in “Chapter 1: Purpose of and Need for the Plan” for more information on these actions).

Actions and Projects Inside the South Unit

The primary projects and actions that could contribute to cumulative effects are summarized

below. These include ongoing and planned actions and projects in the park, reservation, communities, and adjacent counties.

Bombing Range

The cleanup of the Bombing Range located on the Pine Ridge Indian Reservation is an ongoing effort by the U.S. Army Corps of Engineers (USACE) and the OST to identify and mitigate public safety concerns relating to the former military use of these lands. The Bombing Range was divided in twenty-eight sectors to facilitate the characterization of ordnance and explosives concentrations, identify safety problems, and study risk management alternatives. A vast majority of the South Unit is located within the Bombing Range. The areas cleared to date include pieces on top of Cuny Table (Engelbart, pers. comm., 2010). The South Unit will probably never be cleared of unexploded ordnance with today's technology, but some of the more used and passable roads within the South Unit should be cleared in the next few years pending available funding and right of entry from the OST (Engelbart, pers. comm., 2010). The USACE recommended the implementation of institutional controls for the entire former Bombing Range. Institutional controls include elements that inform the public of the sites former use and the potential for unexploded ordnance. Primary populations affected by the former Bombing Range include members of the OST who work, live and use the land for ranching or recreation and visitors to the Pine Ridge Indian Reservation and Badlands National Park.

Actions and Projects Outside of the South Unit

2006 North Unit General Management Plan

The *2006 North Unit General Management Plan* was developed to provide general future guidance and direction for the management of the North Unit of Badlands National Park for the next 15 to 20 years. The plan provides a framework for making decisions about ways to ensure the preservation of natural and cultural resources and provide for a high-quality visitor

experience in the North Unit of the park. The completed plan will establish a basis for decision making in accordance with defined long-term goals. The *2006 North Unit General Management Plan* provides broad direction for resource management and visitor experiences and in most cases does not propose specific actions.

Prairie Dog Management Plan

The *Black-tailed Prairie Dog Management Plan* was completed for the North Unit in 2007. The principal objectives of the management plan are to ensure that the black-tailed prairie dog is maintained in its role as a keystone species in the mixed-grass prairie ecosystem on the North Unit, while providing strategies to effectively manage instances of prairie dog encroachment onto adjacent private lands (NPS 2007b). Plague was detected in the North Unit black-tailed prairie dog population for the first time in 2009. Deltamethrin dusting efforts have been ongoing in the North Unit to protect existing populations of black-tailed prairie dogs, as well as black-footed ferrets (NPS 2009b).

Air Tour Management Plan

Air tours are authorized to fly over Badlands National Park and NPS is preparing an air tour management plan pursuant to the NPS Air Tour Management Act of 2000 to address the noise and other impacts associated with air tours. The NPS Natural Sounds Program provides park managers with technical assistance and national policy development and guidance for a consistent approach to managing acoustic environments. In 2006, the Natural Sounds Program assisted 39 parks with data collection and analysis, monitoring, and planning. Developing soundscape goals, objectives, and standards and identifying appropriate measures for mitigating noise impacts are part of the planning process. Badlands National Park is one of several parks currently developing an air tour management program. Badlands National Park is one of several parks currently developing an air tour management program.

Fire Management Plan

Badlands National Park Fire Management Plan was established in 2004. This plan is a detailed program of action, providing specific guidance and procedures for accomplishing park fire management objectives. The plan defines levels of protection necessary to ensure safety and protection of facilities and resources; minimizes undesirable environmental impacts of fire management, and defines levels of fire use to restore and perpetuate natural processes given current understanding of the complex relationships in natural ecosystems.

The South Unit is included in the “Boundary Unit” of the *Badlands National Park Fire Management Plan*.

Buffalo Gap National Grassland (Nebraska National Forest and Grasslands) Land and Resource Management Plan

In 2009, the U.S. Forest Service prepared an update to the 2005 *Nebraska National Forest Land and Resource Management Plan* to provide overall management direction for the National Forest, including the Buffalo Gap National Grassland. This Land and Resource Management Plan offers guidance for all resource management activities on the Nebraska National Forest. It suggests management standards and guidelines, it describes resource management practices, levels of resource production, user capacities, and the availability and suitability of lands for resource management (www.usda.fs.gov). The plan was updated to reflect changes in acreage and priorities.

The plan calls for several objectives and/or standards within the Wall Ranger District that could affect the South Unit, including the following:

- The recommendation of Indian Creek as a wilderness area and the development of primitive campground/trailhead and hiking/horseback trails in Indian Creek Wilderness Area (based on public interest).
- The management of the southwest part of the Wall District to promote prairie

dog expansion (primarily adjacent to the park) and black-footed ferret reintroduction habitat.

- The development of trailhead and hiking/horseback trails in the Rake Creek backcountry nonmotorized area.
- The development of watchable wildlife interpretive trail around Kadoka Lake.
- The development of a primitive campground southwest of Wall as dictated by public interest.
- The recommendation of Red Shirt to be designated as a wilderness area and the recommended development of trailheads and trails near Red Shirt Bridge off Highway 40.

Other actions that may be taken in the grassland in the future that could affect the park are making changes in public access (such as limiting or closing public access in areas adjacent to the park), changing livestock stocking rates, and changing fuel treatments (such as prescribed burning).

Proposed Tony Dean Cheyenne River Valley Conservation Act of 2010

On May 5, 2010, U.S. Senator Tim Johnson (D-SD) introduced the *Tony Dean Cheyenne River Valley Conservation Act* of 2010 to include a portion of the Buffalo Gap National Grassland in the National Wilderness Preservation System. This Act has not yet been enacted as a law and still requires Congressional and Presidential approval. The proposed bill is based on an earlier recommendation by the U.S. Forest Service for wilderness protection in the areas of Indian Creek and Red Shirt. The bill includes approximately 48,000 acres within the National Grassland, covering land in the Indian Creek, Red Shirt, and Chalk Hills areas. The act would leave the six-mile long Indian Creek Road open to vehicles by excluding it from the wilderness boundaries. Hunting would continue, as would recreational rock collecting. Johnson named this legislation after the late Tony Dean, a longtime South Dakotan and advocate for

hunting and protecting South Dakota's open spaces (proposed Senate Bill 3310).

Nebraska National Forest Travel Management Plan

A Record of Decision was signed in April 2010 on the *Nebraska National Forest Travel Management Plan Final Environmental Impact Statement*. The purpose of this action is to improve management of motorized vehicle use on National Forest System lands within the Nebraska National Forest in accordance with regulations at 36 CFR Parts 212, 251, 261, and 295, and as described in *Travel Management; Designated Routes and Areas for Motor Vehicle Use; Final Rule* (*Federal Register*, Vol. 70 No. 216; the 2005 Travel Management Rule, or, the Rule). The Record of Decision documents the decision authorized under the U.S. Department of Agriculture Forest Service 2005 Travel Management Rule. The decision implements a motorized vehicle system for the Nebraska National Forest units on the Pine Ridge and Bessey Ranger Districts, the Samuel R. McKelvie National Forest, the Oglala National Grassland, and the Fall River Ranger District portion of the Buffalo Gap National Grassland. The plan decreases the miles of motorized roads, increases the miles of motorized trails, and reduces the number of cross country use areas in order to provide users a variety of experiences. This decision will require an amendment to the *Land and Resource Management Plan* to implement the proposed action.

South Dakota National Guard Training Sites (2010–2015) Environmental Assessment

An environmental assessment is being prepared for a special use management permit authorizing the South Dakota Army National Guard to use portions of the Buffalo Gap National Grassland as a training site (www.fs.usda.gov – Nebraska National Forest, Schedule of Proposed Action, 3/31/2010).

Proposed Crazy Horse Scenic Byway

The Oglala Sioux Parks and Recreation Authority (OSPRA) is pursuing Federal

Highway Administration approval for the 215-mile Crazy Horse Scenic Byway. As described in an article by Tom Katus in the Lakota Country Times on October 13, 2009,

The 215-mile Crazy Horse Scenic Byway will begin at the eastern gates of Interstate 90 at Kadoka (Exit 150) and Cactus Flats (Exit 131) and will continue through the Badlands, Pine Ridge Indian Reservation and Black Hills, terminating at Crazy Horse Memorial Mountain. The Byway will become the most culturally and naturally relevant interpretive byway in South Dakota and will: Link the Badlands Loop State Scenic Byway, the North and South Units of the Badlands National Park through the Pine Ridge Indian Reservation, Wind Cave National Park, the Wildlife Loop in Custer State Park, the Peter Norbeck National Scenic Byway, Mt. Rushmore National Memorial and the Crazy Horse Memorial Mountain; Double the visitors to the Badlands National Park from approximately 1 million to 2 million annually, within a decade; and encourage positive race relations between the descendants of the 1800s Oglala Lakota and the American settlers, predominantly white but also including African-, Asian- and Hispanic-Americans.

Mni Wiconi Water Project

The Mni Wiconi water project is a regional water distribution system being built to transport potable water from the Missouri River to the Pine Ridge Indian Reservation. The pipeline is being built along BIA 41, along the western edge of the park. The construction is primarily within the road prism of existing roads, thus reducing the adverse impacts of the project. The project, which has a statutory completion date of 2013, is expected to be approximately 88 percent complete by the end of fiscal year (FY) 2010. When complete, it will distribute water across 12,500 square miles and will provide a clean, safe, adequate supply of drinking water from the Missouri River to more than 52,000

beneficiaries on three American Indian reservations and within a large non-reservation rural water system embracing nine counties. Project sponsors are the OST, the Rosebud Sioux Tribe, the Lower Brule Sioux Tribe and West River/Lyman-Jones. The clean water supply will help prevent the many water-related health problems the beneficiaries currently suffer and will spur economic development in the region (U.S. House of Representatives FY 2011 Energy and Water funding).

Dakota, Minnesota, and Eastern Railroad Line

For 15 years Dakota, Minnesota, and Eastern (DM&E) Railroad Line has pushed a proposal to extend its railroad 278 miles to access surface coal mines in Wyoming's Powder River Basin. The line would be near the South Unit, near Red Shirt Table, and about 6 miles from the wilderness boundary in the North Unit. DM&E received regulatory approval from the U.S. Surface Transportation Board on January 30, 2002, to proceed with the \$1.5 billion project. Although the route has been approved, construction has been delayed by court challenges. If the rail line is built, emissions of soot from the diesel locomotives might cause perceptible deterioration of visibility in the park. Currently, the project is on hold. DM&E spokesman, Mike Lovecchio stated that the decision to proceed with expansion will be contingent upon several conditions such as access to a right of way land corridor, mine and utility contract and economic and regulatory environment (<http://journalstar.com>, August 27, 2009 article).

Solid Waste Management Facility

The OST operates a solid waste management facility at Red Shirt, near the south boundary of the South Unit, near BIA 41 and BIA Route 2. The 50-acre landfill facility accepts baled solid waste from the baler at Pine Ridge and from transfer stations located at various communities on the reservation. The landfill, which is lined in accordance with U.S. Environmental Protection Agency (EPA) regulations, uses a leachate collection system. Water quality is monitored through a series of monitoring wells.

Commercial Wind Power Development

On May 27, 2010, the OST Council voted to accept the charter of the OST Renewable Energy Development Authority. This new Authority oversees community and commercial scale renewable energy development on the Pine Ridge Indian Reservation. The Authority's initial focus is the development of commercial scale wind power, and it has already identified a number of large sites with outstanding Class 5 winds, including sites adjacent to the South Unit.

Paving BIA Route 2 South of South Unit

The OST, through direct funding from the Federal Lands Highway Program, Federal Highway Administration, has proposed to pave 18.5 miles of BIA Route 2 from the junction with BIA Route 27 at the White River Visitor Center west to a point along BIA Route 2. Because of direct funding to the OST, the BIA has no involvement in the project. The OST Transportation Department has indicated the project is in the planning phase and public scoping began in June 2010.

IMPAIRMENT OF PARK RESOURCES OR VALUES

In addition to determining the environmental consequences of implementing the preferred alternative, NPS *Management Policies 2006* (section 1.4) requires analysis of potential effects to determine whether or not proposed actions would *impair* South Unit resources and values.

The fundamental purpose of the national park system, established by the *Organic Act* and reaffirmed by the *General Authorities Act*, as amended, begins with a mandate to conserve park resources and values. NPS managers must always seek ways to avoid or minimize to the greatest degree practicable, adverse effects on park resources and values. However, the laws do give the NPS the management discretion to allow impacts on park resources and values when necessary and appropriate to fulfill the purposes of a park. That discretion is limited by the statutory requirement that the NPS must

leave park resources and values unimpaired unless a particular law directly and specifically provides otherwise.

The prohibited impairment is an impact that would, in the professional judgment of the responsible NPS manager, harm the integrity of park resources and or values and violate the 1916 NPS *Organic Act* mandate (NPS *Management Policies 2006* 1.4.5). An impact on a park resource or value may, but does not necessarily, constitute an impairment. An impact is more likely to constitute an impairment to the extent that it affects a resource or value whose conservation is

- Necessary to fulfill specific purposes identified in the park’s establishing legislation or proclamation, or
- Key to the natural or cultural integrity of the park or opportunities to enjoy it, or
- Identified as a goal in the park’s general management plan or other relevant NPS planning documents.

Impairment may result from NPS administrative activities; visitor activities; or activities undertaken by concessioners, contractors, and others operating in the park. Impairment may also result from sources or activities outside the park. A determination on impairment is included in appendix G for each impact topic related to the park’s cultural and natural resources. A determination of impairment is not required for impact topics such as visitor experience, socioeconomics, and NPS operations.

IMPACTS TO CULTURAL RESOURCES AND SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT

In the South Unit GMP/EIS, impacts on cultural resources are described according to the Advisory Council on Historic Preservation “Regulations for the Protection of Historic and Cultural Properties” (36 CFR 800) implementing Section 106 of the *National Historic Preservation Act* of 1966, as amended (16 USC 470(f)). This may include an overall

general adherence to NPS policies, regulations, guidelines, and laws; and Tribal law, policies and resolutions that could potentially alter the management actions and practices of the South Unit.

Section 106 requires federal agency officials to take into account the effects of their undertakings on historic properties and to afford the Advisory Council on Historic Preservation an opportunity to comment.

Unlike analyses under NEPA, under the Section 106 process, an “effect” is defined as “an alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register” (36 CFR 800.16i). According to the criteria of “adverse effect” in the regulations (36 CFR 800.5(a)(1)),

an adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association.

The regulations further specify,

consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property’s eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative.

The federal agency official consults with the Tribal Historic Preservation Officer and other consulting parties (possibly including the Advisory Council on Historic Preservation) regarding measures to avoid, minimize, or mitigate adverse effects on a historic property. These agreed-upon measures are memorialized in a memorandum of agreement that is signed by the agency, the Tribal Historic Preservation Officer, and other consulting parties.

Advisory Council on Historic Preservation regulations do not specify thresholds for effects and do not recognize adverse versus beneficial effects. Effects are determined relative to the integrity of the National Register of Historic Places listed or eligible property's location, design, setting, materials, workmanship, feeling, or association. Title 36 of the Code of Federal Regulations, section 800, does not define what constitutes mitigation, but it provides a process for determining appropriate mitigation in consultation with the Tribal Historic Preservation Officer and other parties. Cultural resources, including historic properties, are nonrenewable. Adverse effects generally consume, diminish, or destroy the original historic materials or form, resulting in a loss of integrity of the property that can never be recovered. Therefore, although actions to mitigate the adverse effect may be carried out in compliance with Section 106, the effect on a historic property remains adverse.

A determination of no adverse effect means there is an effect, but the effect would not meet the criteria of adverse effect (36 CFR 800.5(b)).

Finally, a determination of no historic properties affected would be appropriate if no properties eligible for the National Register of Historic Places were to be affected by the action.

The analyses of impacts through the use of impact thresholds in the South Unit GMP/EIS are primarily for the purposes of NEPA. They are intended to assist the NPS with coordinating its NEPA compliance with Section 106 of the *National Historic Preservation Act*, as amended. The NPS will use the document to consult with the Oglala Tribal Historic Preservation Officer on the actions within the scope of this GMP/EIS. A Section 106 summary is included for each of the cultural resource topics discussed.

However, it must be emphasized that the NPS does not intend to use the South Unit GMP/EIS to meet Section 106 compliance requirements for any individual actions mentioned as part of the alternatives. For all actions to take place following the completion of the GMP/EIS process, the NPS will comply with Section 106 in accordance with 36 CFR 800 as it continues land and resource planning with alternatives

analyses and specific proposals for individual properties. As is required under 36 CFR 800, the NPS will consult with the Oglala Tribal Historic Preservation Officer and other consulting parties to determine areas of potential effects; identify cultural resources and evaluate their National Register of Historic Places eligibility; determine effects on historic properties; and develop measures to avoid, minimize, or mitigate adverse effects on historic properties. Measures to avoid, minimize, or mitigate adverse effects would be outlined in a memorandum of agreement (or programmatic agreement).

IMPACTS TO MINORITY POPULATIONS AND LOW-INCOME POPULATIONS

Because environmental justice issues are inherent in each of the impact topics discussed in this chapter, the following provides a summary of the potential impacts to minority and low-income populations.

Shannon County clearly has minority and low-income populations present, with 94 percent of Shannon County residents identifying themselves as being American Indian or Alaska Native and 45% of county residents fall below the national poverty level. Because of these demographics, it is necessary to determine if these residents would be disproportionately affected by development and implementation of any proposed alternatives.

Alternative A would result in negligible and adverse socioeconomic impacts, while resulting in minor to moderate adverse effects on wildlife resources, archeological sites, and ethnographic resources. All of these resource topics and others addressed in this GMP/EIS are important to the local American Indians. As such, the NPS has worked collaboratively with OSPRA in developing the GMP/EIS and preferred alternative. Since the adverse impacts of these resource topics under alternative A would likely be felt and experienced by the local residents, the overwhelming portion of whom are minority and low-income populations, these people would be adversely affected by the continuing NPS management associated with the No-Action alternative.

However, alternatives B, C, and D would provide improvements in resource topic impacts in the longer term. Alternatives B, C, and D would provide beneficial socioeconomic impacts to local residents and communities with regard to park operations and visitor use; the minority and low-income population would therefore be the beneficial recipient of increased jobs and income opportunities associated with these

alternatives. Alternatives B, C, and D would result in beneficial effects on ethnographic resources and archaeology resources, and thus have generally beneficial impacts to American Indian populations.

METHODOLOGIES FOR ANALYZING EFFECTS

The analysis of effects and the conclusions in this chapter are based largely on information from NPS experts, park staff, and professional judgment, as well as on the review of existing literature and studies. The planning team's method of analyzing effects is further explained below. It is important to remember that it is assumed in the analyses that the mitigation measures described in "Chapter 3: Alternatives, Including the Preferred Alternative" would be applied to minimize or avoid impacts. If these measures were not applied, the potential for resource impacts and the magnitude of those impacts would increase.

BASIS FOR DEFINING ENVIRONMENTAL CONSEQUENCES

Terms and Assumptions

Each impact topic includes a discussion of impacts, including the type, intensity, context, and duration, of impact. The environmental consequences of each impact topic were defined on the basis of *type* of effect, *intensity*, *context*, and *duration*. Potential cumulative actions were provided previously in this chapter.

Type refers to an effect being either *adverse* or *beneficial* for the topic being analyzed.

Intensity describes the degree, level, or strength of an impact as negligible, minor, moderate, or major. Because definitions of intensity vary by resource topic, separate intensity definitions are provided for each impact topic.

Context refers to the setting within which an effect is analyzed, such as the affected region or locality. In this document, most effects would be either localized (site-specific) or parkwide. Cumulative effects are either parkwide or regional.

Duration considers whether the impact would occur over the short term or long term. The planning horizon for this plan is approximately 20 years. Unless otherwise

specified, the following terms are used to describe the duration of the impacts:

Short term: The effect would be temporary, lasting a year or less, such as effects associated with construction.

Long term: The effect would last more than one year and could be permanent; for example, the loss of soil due to the construction of a new facility.

The impact analyses for the action alternatives (alternatives B, C, and D) describe the difference between implementing the No-Action Alternative and implementing the action alternative. In other words, to understand the consequences of any action alternative, the reader must also consider what would happen if no action were taken. For all but the No-Action Alternative, all impact analysis assumes that the management of the South Unit will return to the OST. For the No-Action Alternative, this analysis assumes continuation of the current management direction — that is, the NPS continues to manage the South Unit.

Because of the general nature of the alternatives, the potential consequences of the alternatives are analyzed in similarly general terms using qualitative analyses. For many actions discussed in this document, subsequent environmental documents would be required; such documents would be completed following the development of detailed alternatives before the action would be implemented.

INTENSITY DEFINITIONS BY TOPIC

Natural Resources

The natural resource impact topics analyzed in this document are soundscapes, vegetation, and wildlife. Information about known resources was compiled and compared with the locations of proposed developments and other actions. The impact analysis was based on the knowledge and best professional judgment of planners, biologists, and paleontologists, data from park records, and studies of similar actions

and effects, when applicable. The planning team qualitatively evaluated the intensities of effects on all the natural resource impact topics.

The intensity of effects on **vegetation** and **wildlife** was rated as follows:

Negligible: The action might result in a change in vegetation or wildlife, but the change would not be measurable or would be at the lowest level of detection.

Minor: The action might result in a detectable change, but the change would be slight and have a local effect on a population. This could include changes in the abundance or distribution of individuals in a local area, but not changes that would affect the viability of local populations. Changes to local ecological processes would be minimal.

Moderate: The action would result in a clearly detectable change in a population and could have an appreciable effect. This could include changes in the abundance or distribution of local populations, but not changes that would affect the viability of regional populations. Changes to local ecological processes would be of limited extent.

Major: The action would be severely adverse or exceptionally beneficial to a population. The effects would be substantial and highly noticeable, and they could result in widespread change and be permanent. This could include changes in the abundance or distribution of a local or regional population to the extent that the population would not be likely to recover (adverse) or would return to a sustainable level (beneficial). Significant ecological processes would be altered, and “landscape-level” (regional) changes would be expected.

Paleontological Resources

The intensity of effects on **paleontological resources** was rated as follows:

Negligible: The activity would take place in an area devoid of fossil resources and the

chances of disturbing fossils would be extremely unlikely.

Minor: A few fossils might be lost through illegal collecting, or there would be a low probability of effects from a ground-disturbing activity because (a) the activity would be in a geologic layer not known to contain extensive fossils, and the volume of bedrock disturbance would be low or (b) the activity would be in a fossil-rich geologic layer, but the volume of bedrock disturbed would be nearly indiscernible. Monitoring would be likely to detect fossils and the loss of fossils and/or associated contextual information would be minimal.

Moderate: A number of fossils might be lost through illegal collecting, or there would be a moderate probability of effects from a ground-disturbing activity because (a) the activity would be in a geologic layer not known to contain extensive fossils, but the volume of bedrock disturbance would be large or (b) the activity would be in a fossil rich area, and the area of bedrock disturbance would be small. Most fossils uncovered probably would be found by monitoring, but some fossils and/or associated contextual information could be lost.

Major: Many fossils could be lost through illegal collecting, or there would be a high probability of effects from a ground-disturbing activity because the activity would be in a geologic layer of high fossil richness, and the volume of bedrock disturbance would be large. Even with monitoring, many fossils and/or associated contextual information probably would likely be lost.

Soundscapes

The intensity of effects on **soundscapes** was rated as follows:

Negligible: The natural sound environment might be affected, but the effects would be at or below the level of detection, or changes would be so slight they would not be of any measurable or perceptible

consequence to wildlife or the visitor experience.

Minor: There would be a detectable change in the natural sound environment, but the effects would be small, local, and of little consequence to wildlife or the visitor experience.

Moderate: A change in the natural sound environment would be readily detectable, affecting the behavior of wildlife or visitors in a large area.

Major: A severely adverse or exceptionally beneficial change in the natural sound environment would be obvious and would affect the health of wildlife or visitors or cause a substantial, highly noticeable change in the behavior of wildlife or visitors in a local or regional area.

Cultural Resources

Archeological Resources

The intensity of effects on *archeological resources* was rated as follows:

Negligible: Impact is at the lowest levels of detection – barely measurable with no perceptible consequences, either adverse or beneficial. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Minor: Disturbance of a site(s) results in little, if any, loss of significance or integrity and the National Register eligibility of the site(s) is unaffected. For Section 106 purposes, the determination of effect would be *no adverse effect*.

Moderate: Disturbance of a site(s) results in a change in the site's significance and integrity but may not directly affect the site's eligibility for the National Register. A memorandum of agreement is executed between NPS and the Tribal Historic Preservation Officer and, if necessary, the Advisory Council, in accordance with 36 CFR 800.6(b). For Section 106 purposes, the determination of effect would be *adverse effect*.

Major: Disturbance of a site(s) results in a change in the site's significance and integrity, and directly affects the site's National Register eligibility, such that the site and its context may be lost. For Section 106 purposes, the determination would be *adverse effect*. A memorandum of agreement is executed between NPS and Tribal Historic Preservation Officer and, if necessary, the Advisory Council in accordance with 36 CFR 800.6(b).

Museum Collections

Museum collections (prehistoric and historic objects, artifacts, archival documents, manuscripts, and natural history specimens such as fossils) may be threatened by fire, theft, vandalism, natural disasters, and careless acts. The preservation of museum collections is an ongoing process of preventive conservation, supplemented by conservation treatment when necessary. The primary goal is preservation of artifacts and natural history specimens in as stable condition as possible to prevent damage and minimize deterioration. For purposes of analyzing potential impacts, the thresholds of change for the intensity of an impact to museum collections used in the South Unit GMP/EIS are defined as follows:

Negligible: There would be no loss or deterioration of museum specimens or the loss or deterioration would be at the lowest level of detection: barely measurable, with no perceptible consequences, either adverse or beneficial. The use of the collections for research and public education would not change appreciably.

Minor: There would be an effect to the integrity of few items in the museum collection but the effect would not degrade the usefulness of the collection for future research and interpretation. The use of the collections for research and public education would change but in a very small way, which would be noticeable to researchers and the public.

Moderate: The actions would affect the integrity of many items in the museum collection and may diminish the usefulness of the

collection for future research and interpretation, but the effect would not be permanent and the overall condition of the collection would be preserved. The use of the collections for research and public education would change appreciably, and researchers and the public would be immediately aware of the changes.

Major: The actions would affect the integrity of most items in the museum collection and destroy the usefulness of the collection for future research and interpretation; the effects would be permanent and could result in a permanent loss. The use of the collections for research and public education would change.

Ethnographic Resources

The NPS defines *ethnographic resources* as any site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it. The decision to call resources ethnographic depends on whether associated peoples perceive them as traditionally meaningful to their identity as a group and the survival of their lifeways. A traditional cultural property is an ethnographic resource eligible to be listed in the National Register because of its association with the cultural practices or beliefs of a living community that are rooted in that community's history, and are important in maintaining the continuing cultural identity of the community (National Register Bulletin 38, *Guidelines for Evaluating and Documenting Traditional Cultural Properties*).

For ethnographic resources, certain important questions about human culture and history can be answered only by gathering information about the cultural material of cultural resources. Ethnographic resources have the potential to address questions about contemporary peoples or groups and their identity and heritage. The ethnographic link is vested in specific places of traditional use with cultural meaning. Ethnographic resources can be eligible for inclusion in the National Register if they meet its criteria for traditional cultural properties. To

those for whom the resources hold cultural meaning, effects on ethnographic resources range from barely perceptible, slight but noticeable, apparent, and strikingly obvious. Those effects correlate respectively with the terms negligible, minor, moderate, and major.

The intensity of effects on *ethnographic resources* was rated as follows:

Negligible: The effects would be barely perceptible, and the action would not alter resource conditions such as traditional access or site preservation or the relationship between the resource and the affiliated group's body of beliefs and practices; there would be no change to a group's body of beliefs and practices.

For Section 106 purposes, the determination of effect on traditional cultural practices would be *no adverse effect*.

Minor: The effects would be slight but noticeable; the action would not appreciably alter resource conditions such as traditional access or site preservation or the relationship between the resource and the affiliated group's body of beliefs and practices.

For Section 106 purposes, the determination of effect on traditional cultural practices would be *no adverse effect*.

Moderate: Effects would be apparent, and the action would alter resource conditions such as traditional access, site preservation, or the relationship between the resource and the affiliated group's beliefs and practices, but the group's beliefs and/or practices would survive. For Section 106 purposes, the determination of effect on traditional cultural practices would be *adverse effect*.

Major: The action would alter resource conditions such as traditional access, site preservation, or the relationship between the resource and the affiliated group's beliefs and practices to the extent that the survival of a group's beliefs and/or practices would be jeopardized. For Section

106 purposes, the determination of effect on traditional cultural practices would be *adverse effect*.

Scenic Resources

Information on scenic resources was compiled from other planning documents, research reports, and consultation with park resource specialist. Impacts were evaluated by comparing projected changes resulting from alternatives to existing conditions or the No-Action Alternative, as appropriate. These evaluations were based on consideration of the parks resources and values, information about what typically contributes or detracts from scenic and visual quality in and around the park and based on professional judgment.

The intensity of effects on *scenic resources* was rated as follows:

Negligible: Impact is at the lowest levels of detection, barely measurable with no perceptible consequences to the visual resources.

Minor: Neither adverse nor beneficial impact(s) would alter a character defining pattern(s) or feature(s) of the visual resources because of scale and size of changes, or by placement of new features in less critical viewsheds. Most park visitors and staff would be unaware of any changes to the visual resources.

Moderate: Adverse impact(s) would alter a character defining pattern(s) or feature(s) of the visual resources but not affect the integrity of the scenic values by providing simple mitigation measures such as vegetative screening, or by placement of features in locations where they would be less noticeable (e.g., adjacent to other similar features or adjacent to larger features on the landscape where mass and scale can be diminished).

Major: Adverse impact(s) would alter a character defining pattern(s) or feature(s) of the visual resource, diminishing the integrity of the visual resource by adding features of uncommon size or scale or by

removing important characteristics of the visual scene.

Visitor Experience

Three factors determine the effects of actions on the visitor experience: access, availability of information, and the range and enjoyment of visitor activity. Changes in available parking spaces, the availability of trailheads, and closure or opening of roads might affect *access* to the primary activity areas of the park. The *availability of information*, orientation, and interpretation can affect visitors' enjoyment of the park, as can the *range of visitor activity*.

The following definitions describe the *types* of effects on the visitor experience:

Visitor Access — beneficial indicates there would be an increase in accessibility to a specific area or a reduction in congestion; **adverse** indicates that the accessibility to a specific area would be reduced or congestion increased.

Availability of Information — beneficial indicates an improvement in opportunities for visitors to obtain information, orientation, and interpretation; adverse indicates a reduction in opportunities for visitors to obtain information, orientation, and interpretation.

Range of Visitor Activity — beneficial indicates more opportunities for recreational activities like those mentioned above; adverse indicates a reduction in such opportunities.

The intensity of effects on the *visitor experience* was rated as follows:

Negligible: The effect would not be detectable by visitors or would be barely perceptible to most visitors; therefore, it would have no discernible effect.

Minor: The action might result in a slightly detectable effect that would result in little detraction or improvement in the quality of the visitor experience. There would not be an overall effect on the visitor experience.

Moderate: There would be a change in the experiences of a large number of visitors, resulting in a noticeable decrease or improvement in the quality of the experience. A decrease in quality would be indicated by a change in the frustration level or in the inconvenience for a period of time.

Major: A substantial improvement or a severe drop in the quality of many peoples' experience would result from an action such as the addition or elimination of a recreation opportunity or a permanent change in access to a popular area that would be clearly detectable. A substantial, highly noticeable influence could have an appreciable effect on the visitor experience by permanently altering access to and the availability of various aspects of the visitor experience.

Socioeconomics

The South Unit is located within the regional social and economic environment of Jackson, Pennington, and Shannon counties. Effects on the social and economic condition within these counties due to the action alternatives are of concern to the NPS, park managers, local communities and individuals, local governments, and the public.

The South Unit is located entirely within Shannon County. However, Badlands National Park (North and South Units) are one of the many visitor attractions in southwestern South Dakota. It follows that developments proposed by the action alternatives could have a direct effect on some parts of the social and economic environment of the region. Planning team members applied logic, experience, professional expertise, and professional judgment to analyze the impacts of each alternative on the social and economic setting.

Socioeconomic data, expected future visitor use, and future developments in the park all were considered in identifying and discussing the potential effects. A simplistic analysis of the direct effects of each alternative was completed. The identification of these impacts is sufficient for the comparison of alternatives for decision-

making purposes. For the most part, impacts from the action alternatives would be linked to the three-county regional area.

In the socioeconomic analysis, the duration of effects is as follows: short-term effects would last less than three years; long-term effects would last more than three years (and could be considered a permanent change in conditions).

Intensity thresholds were developed to assess the magnitude of socioeconomic impacts resulting from the alternatives under consideration. In the development of these thresholds, it was assumed that beneficial impacts are those that many individuals or groups would accept or recognize as improving economic conditions, either in general or for a specific group of people, businesses, organizations, or institutions. Examples of beneficial effects include lower unemployment, higher personal income, increases in economic diversity and sustainability. Adverse impacts are those that most individuals or groups would generally recognize as diminishing economic welfare, either in general or for a specific group of people, businesses, organizations, or institutions. Examples of adverse effects include fewer job opportunities and increases in cost of living without matching increases in higher income.

The intensity of effects on the **regional and local economy** was rated as follows:

Negligible: Very few individuals, businesses, or government entities are impacted. Impacts are nonexistent, barely detectable, or detectable only through indirect means and with no discernable impact on regional economic conditions.

Minor: A few individuals, businesses, or government entities are impacted. Impacts are small but detectable, limited to a small geographic area, comparable in scale to typical year-to-year or seasonal variations, and not expected to substantively alter economic conditions over the long term.

Moderate: Many individuals, businesses, or government entities are impacted. Impacts are readily apparent and detectable across a wider geographic area and may have a

noticeable effect on economic conditions over the long term.

Major: A large number of individuals, businesses, or government entities are impacted. Impacts are readily detectable and observed, extend across much of the study area, and have a substantial influence on economic conditions over the long term.

Park Operations

Various aspects of park operations, including current staffing levels, funding, levels, partnerships, volunteers, and trends were reviewed. The actions in the alternatives were then analyzed for the impact that they would have upon operations and the availability to manage the park and meet its mission. The area of consideration for determining cumulative impacts encompasses trends throughout the entire National Park System. The intensity of impacts is defined as follows:

Negligible: Park operations would not be affected, or the effects would be at low

levels of detection and would not have an appreciable effect on park operations.

Minor: The effect would be detectable, but would be of a magnitude that it would not have an appreciable effect on park operations. The public would not notice a change. If mitigation were needed to offset the adverse effect, it would likely be successful.

Moderate: The effects would be readily apparent and would result in a substantial change in park operations in a manner noticeable to staff and the public. Mitigation measures would be necessary to offset adverse effects and would likely be successful.

Major: The effects would be readily apparent and would result in a substantial change in park operations in a manner markedly different to staff and the public. The public would likely complain. Mitigation measures to offset adverse effects would be needed, would be extensive, and their success could not be guaranteed.

IMPACTS OF ALTERNATIVE A: THE NO-ACTION ALTERNATIVE

NATURAL RESOURCES

Vegetation

Analysis. Under the No-Action Alternative, resource management within the South Unit would continue as needed. Vegetation surveys would be conducted as warranted and exotic species would be managed and/or native plant populations reintroduced as needed. Grazing leases would remain intact.

The park supports several rare plant species. However, these species occur in sparsely vegetated badlands that are not commonly visited. No impacts are known to be occurring to these populations from visitors at present, and no changes would be expected to occur to the populations under alternative A. The unintentional transport of exotic plants into and around the park by visitors and/or livestock would continue, although the magnitude of this is unknown.

Grazing in the South Unit would continue, altering the types and distribution of vegetation and slowing the restoration of the natural grassland ecosystem. Moderate grazing reduces mean annual aboveground production of mixed grass prairie only a little but can result in a shift in the relative composition of cool and warm season grasses (Plumb and Dodd 1993). Livestock grazing in the South Unit influence not only the grassland composition but also exotic species distribution. Whereas some nonnative species may actually increase under grazing pressure (e.g., Canada thistle), yellow sweetclover appears to be controlled by grazing. For example, yellow sweetclover occurs in greater abundance on ungrazed lands of the North Unit versus similar grazed lands in the South Unit. Conversely, blue grama/buffalo grass grasslands tend to be absent within the lightly grazed or ungrazed lands of the North Unit (Bureau of Reclamation 1999). The continuation of livestock grazing would potentially reduce the mean annual aboveground

production of mixed grass prairie, potentially resulting in a shift in the relative composition of the grasses.

Adverse effects on vegetation from visitors would continue under this alternative. Trampling would affect vegetation at the White River Visitor Center, with the effects ranging from complete absence of vegetation to slight alterations in species composition. Similar effects would be evident along road shoulders, where cars crush vegetation and compact soil, in areas where vehicles are driven off road in the South Unit (such as on Sheep Mountain Table), and in areas where “social” trails are formed. The long-term adverse effects of vegetation loss in local areas would be minor.

Most of the natural vegetation in Badlands National Park would not be affected under alternative A. However, minor long-term adverse effects on vegetation in local areas would continue to be caused by visitor activities and moderate long-term adverse effects could occur as a result of continued grazing.

Cumulative Effects. Other past, present, and anticipated future projects that would contribute both adverse and beneficial impacts on vegetation include (1) the cleanup of the former Bombing Range; (2) resource management actions under the North Unit GMP/EIS; (3) management of motorized vehicle use under the Nebraska National Forest Travel Management Plan; (4) the Mni Wiconi water project; (5) the proposed DM&E rail line; (6) the proposed Crazy Horse Scenic Byway; and (7) potential wind power development projects.

Short-term to long-term minor adverse impacts to vegetation would result from the loss or alteration of vegetation during construction activities in the South Unit, such as the Mni Wiconi water project, the proposed DM&E rail line, and the proposed Crazy Horse Scenic Byway. Work at the White River Visitor Center and cleanup efforts at the Bombing Range may cause the loss of natural vegetation and have the potential to contribute to cumulative adverse

impacts. Actions outside of the park, including the construction and operation of the DM&E rail line and the designation of the proposed Crazy Horse Scenic Byway, which could increase visitation to the park, and the construction of primitive campgrounds and trails in the national grassland adjacent to the park could alter or cause the loss of native plants. These other actions, and a likely increase in visitation, would result in a long-term minor adverse cumulative effect on the region's native vegetation. Some vegetation would be cut and removed during construction and operation of the roadway and rail line, potentially increasing invasive plant species until mitigation measures are employed. This would result in short-term negligible adverse impacts to vegetation. In addition, park maintenance operations along existing roads would continue to affect plants growing on road shoulders. The construction of the Mni Wiconi water pipeline probably would cause negligible effects on vegetation because it would be built along roads where native vegetation has been altered. The development of wind power projects outside of the park could result in localized long-term minor adverse impacts with the removal of vegetation.

In addition to cumulative actions that have negative effects on vegetation, there are also some actions that have beneficial effects. Long-term beneficial effects on the park's vegetation would result from the reintroduction of native vegetation and weed management efforts. A beneficial long-term effect on range condition would result from increases in prescribed burning in the adjacent Buffalo Gap National Grassland by reducing fire hazard fuel accumulations and aiding in fire suppression activities by reducing fire intensity and severity protecting existing native vegetation, as is delineated in the Land and Resource Management Plan for the Nebraska National Forest and Associated Units (USFS 2001). The resource management actions under the North Unit GMP/EIS identifies desired conditions including specific vegetation conditions for management areas, to help restore native plant communities. Additionally, the management of motorized vehicle use under the Nebraska National Forest Travel Management Plan could

have long-term beneficial impacts to vegetation by improving resource protection practices.

Overall, there would be long-term negligible to minor adverse cumulative effects impacts on vegetation. However, the actions of alternative A would add a minimal increment to the cumulative impact of this alternative.

Conclusion. Alternative A would have minor to moderate long-term adverse effects on vegetation due to grazing and visitor activities. The impacts of other past, present, and anticipated projects combined with alternative A would likely result in long-term negligible to moderate adverse impacts to vegetation.

Wildlife

Analysis. Wildlife is affected by the activities of visitors and park staff. The extent of the effect depends on many factors, including the type, predictability, frequency, and timing of the recreational activity (Knight and Cole 1995). Human actions also can result in the loss of wildlife habitat. For example, trampling or removing vegetation can reduce or eliminate cover for wildlife. The use of the park by visitors is concentrated mostly in the developed area at the White River Visitor Center. Animals sensitive to human activities would continue to avoid this area.

The effects of visitors on wildlife in the South Unit have not been documented. However, in trying to see wildlife better, hikers have been observed disturbing bighorn sheep and bison. It is possible that visitors might adversely affect sheep lambing in places. Aircraft overflights also might disturb bighorns and other wildlife in the park.

The South Unit is open to big game hunting by members of the OST with a valid Tribal hunting license with restrictions as agreed upon by both OSPRA and Badlands National Park (NPS 2009a). Big game includes mule deer, white-tail deer, and pronghorn antelope. These hunts, which are regulated by the OST and the NPS, are believed to have not adversely affected the populations of these animals. Hunting in the South Unit by Tribal members would continue. Although the harvest of deer, pronghorn

antelope, and small mammals might result in a temporary negligible to minor adverse effects on the wildlife populations at the South Unit, there would be a beneficial long-term effect on some species from keeping those numbers in check.

The occasional injury or death of wildlife from motor vehicles on roads would continue. However, the adverse effects on wildlife from these activities would be local and negligible to minor.

Maintenance activities in the park would continue to disturb some animals temporarily.

Cumulative Effects. Past, present, and anticipated projects that would contribute to impacts on wildlife include (1) resource management actions under the North Unit GMP/EIS; (2) resource management actions under the Buffalo Gap National Grassland Land and Resource Management Plan; (3) modifications to motorized travel under the Nebraska National Forest Travel Management Plan FEIS; (4) wilderness designation under the proposed *Tony Dean Cheyenne River Valley Conservation Act* of 2010; (5) Prairie Dog Management Plan activities and plague efforts; (6) training activities of the South Dakota National Guard; (7) construction activities associated with the Mni Wiconi water project; (8) the proposed DM&E rail line; (9) the proposed Crazy Horse Scenic Byway; (10) potential wind power development projects; and (11) paving of BIA Route 2. These actions would likely have short- and long-term minor adverse impacts on wildlife due to land disturbance activities from construction and other human uses, resulting in some mortality to wildlife, increased fragmentation of wildlife habitats, increased potential for wildlife to be displaced and reduced number of areas where wildlife could exist without people or facilities. These actions would also have long-term beneficial impacts on wildlife from improved resource management, additional protections from designation of wilderness area, and decreased impacts from motorized vehicles. Management efforts to expand prairie dogs at Buffalo Gap National Grassland and plague dusting efforts in the North Unit would have beneficial effects on the species. When the

beneficial and adverse impacts of other past, present, and anticipated projects are considered with the impacts of alternative A, there would be long-term minor adverse impacts on wildlife.

Conclusion. Negligible to minor short-term adverse effects on wildlife populations would continue under alternative A in local areas from the presence of visitors and staff. Minor long-term adverse cumulative effects would be expected on wildlife populations at the South Unit.

PALEONTOLOGICAL RESOURCES

Analysis. Because of the Oglala Sioux Tribal moratorium on fossil collecting, no paleontological inventories, excavation, or legal collecting have occurred within the South Unit since 2002. If the current situation continued, little to no fossil resource discovery would occur in the future. The NPS has data indicating fossils are currently being affected by intensive illegal collecting, foot traffic, and vehicle traffic (NPS 1999). Livestock trampling, natural weathering, and mass wasting (landslides) also degrades and destroys exposed fossils in the White River Group very quickly (Rom and Potapova 2009).

Illegal fossil collecting occurs throughout the infrequently patrolled South Unit. Amateur and commercial collectors also take fossils from the South Unit.

The extent of all of the above impacts would likely have a long-term moderate adverse impact on the park's resources. Under this alternative no change in current management would occur. Therefore, these long-term moderate adverse impacts would continue unchecked into the foreseeable future under alternative A.

Cumulative Effects. The primary projects and actions that could contribute to cumulative effects include (1) the cleanup of the former Bombing Range; (2) resource management actions under the North Unit GMP/EIS; (3) actions on the Buffalo Gap National Grassland; (4) the Mni Wiconi water project; (5) the proposed DM&E rail line; (6) the proposed Crazy Horse Scenic Byway; (7) a fossil resources protection ordinance planned by the OST. The impacts of other past, present, and

anticipated projects on paleontological resources, when considered with the impacts of alternative A, would be short- and long-term moderate adverse.

The *2006 North Unit General Management Plan* provides for paleontological inventories, collection and excavation to protect fossil resources. It also provides for a strong law enforcement presence to minimize illegal collection activities.

The *Nebraska National Forest Land and Resource Management Plan* would not affect the paleontological resources at the South Unit. Other actions that may be taken in the grassland in the future that could affect the South Unit are changes in public access (such as limiting or closing public access in areas adjacent to the park) and changing livestock stocking rates. These actions would likely reduce damage or destruction to fossils through reduced opportunities for illegal collection, reduced livestock trampling, and reduced vehicle damage. These should result in a minor beneficial impact for paleontological resources.

The Mni Wiconi water project carried out paleontological resources inventories and implemented measures to protect fossils. It should have a minor beneficial impact.

The proposed DM&E rail line, if constructed, may have a minor impact on fossil resources. However, paleontological inventories were carried out and appropriate protection measures are expected to be implemented. In most cases, if important fossil resources are within the DM&E project corridor they will need to be collected and preserved to protect them.

The OSPRA is pursuing Federal Highway Administration approval for the proposed 215-mile Crazy Horse Scenic Byway (Lakota Country Times, October 13, 2009, Article by Tom Katus). The byway is likely to increase visitation within the South Unit, potentially increasing fossil loss through increased theft and pedestrian traffic trampling.

Conclusion. Alternative A would have the potential to result in continued moderate long-term adverse effects on paleontological resources. This would be caused primarily by

the continued illegal removal of fossils from the South Unit by visitors and collectors, continued livestock trampling of fossils, and continued weathering and mass wasting (landslides). Added to this, other actions in and outside of the park could result in a long-term cumulative moderate beneficial impact. Most impacts to fossil resources outside of the South Unit are being addressed and mitigated through actions such as law enforcement, inventory of planned projects, and collection for study and preservation.

Long-term moderate adverse effects would be anticipated on paleontological resources under alternative A. Despite the loss of some fossil resources, the NPS would not be prevented from fulfilling the purposes for which Badlands National Park was established. The loss of resources would not destroy the integrity of the park relative to paleontological resources—fossils would continue to be present throughout the park, and the park staff would continue to protect paleontological resources. People still could come to the South Unit and enjoy its values, including its fossils.

SOUNDSCAPES

Analysis. No new actions would be taken under alternative A that would result in changes to noise levels. Possible increases in visitation to the South Unit could result in a slight increase in vehicle traffic and associated noise, causing a long-term negligible adverse effect. Low visitor levels would continue to generate noise, most of which would continue to be confined to developed visitor and administrative areas, including the White River Visitor Center, as well as areas outside the South Unit, such as the adjacent BIA Routes 27 and 2, and BIA 41.

Cumulative Effects. At different times, short-term minor to moderate adverse effects from noise would be caused by park construction machinery within the South Unit, including construction of the Lakota Heritage and Education Center (LHEC). Cleanup operations of the former Bombing Range would also likely cause short-term minor to moderate adverse effects on soundscapes within the South Unit. Outside the South Unit, the construction of the

Mni Wiconi water project, construction and operations of wind power projects, and paving of BIA Route 2 would generate noise that would potentially be audible in places in the South Unit. Traffic along BIA Routes 27 and 2, and BIA 41, as well as traffic leading to the solid waste management facility at Red Shirt would continue to generate noise intrusions in the South Unit, resulting in long-term negligible to minor adverse impacts on soundscapes within the South Unit. The potential extension of the DM&E rail line and the construction of the proposed Crazy Horse Scenic Byway could also have short-term negligible to minor adverse impacts on soundscapes within the South Unit. The development of an air tour management plan would include the development of soundscape goals, objectives, and standards and identifying appropriate measures for mitigating noise impacts. These effects, added to noise caused by visitors and park operations under alternative A, would result in short- and long-term minor to moderate cumulative adverse noise effects in local areas. When these noises are combined with the sounds of visitor and administrative use in the South Unit, there could be negligible to minor, long term, adverse cumulative impacts on soundscapes.

Conclusion. Most of the South Unit would continue to be relatively quiet under alternative A. However, there would continue to be long-term negligible to minor adverse effects on the park's soundscape in local areas, largely from visitation and administrative activities under developed areas. Noise from activities in alternative A added to noise from other actions within and outside the South Unit could result in short-and long-term, negligible to minor adverse cumulative effects in local areas.

CULTURAL RESOURCES

Archeological Sites

Analysis. No cultural resources inventory is currently being conducted to comply with the *National Historic Preservation Act*. There are no ongoing archeological inventories, excavation, or legal collecting within the South Unit because there are currently no planned projects that

would necessitate such inventory and other actions other than the LHEC, discussed below. However, recent inventories have occurred to support Bombing Range cleanup activities (Rom 2010). It is likely that archeological sites and artifacts are being adversely affected by activities, such as theft, vehicle use, and livestock trampling, because these impacts have been documented nearby, but the magnitude of these activities and potential effects are not known. Current and future livestock trampling, natural weathering, and mass wasting (landslides) can adversely affect archeological sites very quickly as recent studies for Bombing Range cleanup activities and other observations have shown (Rom 2010).

Most illegal collecting probably occurs relatively close to roads where park visitors likely could take artifacts illegally, either knowingly or unknowingly. Illegal collecting is not well documented, but can be a problem.

The NPS has Section 110 responsibilities under the *National Historic Preservation Act* to inventory all of its lands to identify and protect archeological sites. These inventories are not currently being carried out and they are not planned under the No-Action Alternative.

The extent of all of the above impacts likely would be a short- and long-term moderate adverse effect on the park's archeological resources.

Cumulative Effects. Past, present, and anticipated projects that would contribute to impacts on archeological resources include (1) the cleanup of the former Bombing Range; (2) resource management under the North Unit GMP/EIS; (3) actions on the Buffalo Gap National Grassland; (4) potential construction projects, including the Mni Wiconi water project, the proposed DM&E rail line, the proposed Crazy Horse Scenic Byway, wind power projects, and paving of BIA Route 2. These combined actions would likely have beneficial impacts on archeological resources as long as they provide for appropriate inventory, protection, avoidance, and preservation of cultural resources. The impacts of other past, present, and anticipated projects, when considered with the impacts of alternative A,

would result in short- and long-term minor adverse impacts on archeological resources.

The 2006 North Unit General Management Plan provides for archeological inventories, collection and excavation to protect cultural resources. It also provides for a strong law enforcement presence to minimize illegal collection activities. These should result in a beneficial impact for archeological resources.

A Nebraska National Forest Land and Resource Management Plan would not affect the South Unit's archeological resources. Other actions that may be taken in the grassland in the future that could affect the South Unit are changes in public access (such as limiting or closing public access in areas adjacent to the park) and changing livestock stocking rates. These actions would likely reduce damage or destruction to fossils through reduced opportunities for illegal collection, reduced livestock trampling, and reduced vehicle damage. These should result in a beneficial impact for archeological resources.

All proposed construction projects should include archeological resources inventories and implemented measures to protect them. If so, these projects should have a beneficial impact on archeological resources as additional surveying would occur.

The OSPRA is pursuing Federal Highway Administration approval for the proposed 215-mile Crazy Horse Scenic Byway (Lakota Country Times, October 13, 2009 Article by Tom Katus). The byway is likely to increase visitation within the South Unit, potentially increasing cultural resource loss through increased theft and pedestrian traffic trampling.

Conclusion. Alternative A would have the potential to result in continued minor to moderate short to long-term adverse effects on archeological resources. This would be caused primarily by the continued illegal removal of cultural resources from the South Unit by visitors and collectors, continued livestock trampling, and continued weathering and mass wasting (landslides). These impacts could be mitigated by continuing efforts to educate visitors about archeological sites and efforts to allocate existing law enforcement resources

towards fossil protection. Added to this, other actions in and outside of the park could result in a cumulative beneficial impact. Most impacts to cultural resources outside of the South Unit are being addressed and mitigated through actions such as law enforcement, inventory of planned projects, and collection for study and preservation.

The effects on archeological resources under alternative A are anticipated to be moderately adverse. For Section 106 purposes, the determination would be *adverse effect*.

Museum Collections

Analysis. Under alternative A, collections would remain at the South Dakota Archaeological Research Center, South Dakota School of Mines Museum of Geology; the Oglala Sioux Tribal Historic Preservation Office; Badlands National Park Collections Storage Unit in the North Unit; the Midwest Archeological Center in Lincoln, Nebraska; and at other unknown facilities worldwide. Some objects, including fossils that were removed from the area before the South Unit became part of Badlands National Park in 1968, are housed in curatorial facilities that are not under the direct control of the NPS. It is assumed that those objects housed in known curatorial facilities meet or exceed minimum standards for museum storage as described in 36 CFR 79 (Curation of Federally-Owned and Administered Archeological Collections). The unknown curatorial facilities likely provide various storage conditions. With the known curatorial facilities, there is some space for collections research. In addition, there are limited museum display conditions for public education. The LHEC would provide curatorial space to modern standards, but it may or may not be of sufficient size to accommodate all of the collection in known curatorial facilities. There would be a minor impact on the museum collections.

Cumulative Effects. Numerous museums and private parties holding archeological and fossil collections from the badlands of South Dakota exist throughout the world as a result of excavations by government agencies, universities, historical societies, and individuals

over the last approximately 150 years. Known collections at the facilities in South Dakota are extensive. The collections within the park make up a small but important portion of the whole collection. The collections would be expanded through donation, testing prior to development, excavations of sites inadvertently identified during construction work, or monitoring resource condition in the field. The collection is not expected to greatly increase through these activities. Other activities identified as occurring within and external to the South Unit are unlikely to add a large amount of museum specimens to the collections. Cumulative impacts are expected to be negligible adverse.

Conclusion. Items in the collections would continue to be stored and maintained, with some facilities meeting NPS museum storage standards. There would be no long-term overall impact on the preservation and usefulness of the collections. Accessibility to the collection by researchers and the public would remain unchanged.

Ethnographic Resources

Analysis. Ethnographic resources, such as a site, structure, landscape or natural resource feature assigned traditional legendary, subsistence religious or other significance, in addition to traditional cultural properties, exist in the area and are generally acknowledged as part of the historical territory of the Lakota branch of the Sioux. The South Unit contains evidence of continuing Lakota traditional spiritual uses. Current ethnographic information provided by the OST has indicated that several areas are known to have special spiritual significance for them.

Under the No-Action Alternative, NPS staff would consult with the OST to develop and accomplish programs in a way that respects the beliefs, traditions, and other cultural values of the Tribe that has ancestral ties to South Unit lands. NPS staff would maintain government-to-government relationship with the Tribe to ensure a collaborative working relationship and would consult regularly with them before taking actions that would affect natural and cultural resources that are of interest and concern to

them. Access to, and ceremonial use of, American Indian sacred sites by American Indian religious practitioners would continue to be accommodated in a manner that is consistent with applicable law, regulations, executive orders, and policy.

Ethnographic resources, including sacred sites and traditional cultural properties, would not be identified and protected from impacts associated with the implementation of this alternative. Alternative A would not result in any change in access by American Indians or use of ethnographic resources sacred to the tribes. The alternative would not change the 1976 *Memorandum of Agreement* that guarantees tribal members unrestricted access in perpetuity and requires their written consent to affect those sites. Under alternative A, no interpretation of cultural or ceremonial sites would occur. Limited interpretation of Oglala Sioux history and culture would continue at the White River Visitor Center. Without interpretation and with limited management of natural resources, specifically as it relates to the protection of culturally significant plants and wildlife, the impact of the No-Action Alternative would be long-term moderate adverse.

Cumulative Effects. Past, present, and anticipated projects that would contribute to impacts on ethnographic resources would be the same as those listed for archeological resources above. The impacts of other past, present, and anticipated projects, when considered with the impacts of alternative A, would result in beneficial impacts to ethnographic resources.

For the cleanup of the Bombing Range, removal of munitions could allow safer Tribal member access to important areas, and provide a beneficial impact. Potential visual impacts of munitions removal is generally short term and limited in scope. However certain removal methods in “high density” debris areas can result in complete removal and replacement of up to several feet of surface and subsurface soils over large areas (70 acres or more) by remote controlled heavy equipment. If such removal is necessary within the viewshed of an ethnographic resource or traditional cultural property moderate adverse visual effects could

result. Such cleanup activities could only occur after consultation with an authorization by the OST (Rom 2010).

Construction projects would be expected to conduct ethnographic resource inventories and consultation to provide appropriate identification and protection. Beneficial impacts would be expected in the long term.

The proposed DM&E rail line, if constructed, would likely have a moderate to major adverse impact on ethnographic resources (Grassrope, pers. comm.; Whiting pers. comm.). However, consultation and inventories were carried out and appropriate protection measures may be implemented when possible. In most cases, if ethnographic resources are within or adjacent the DM&E project corridor the corridor cannot be easily modified to protect them. Therefore, major long term adverse effects are possible.

Conclusion. Alternative A would have the potential to result in long-term moderate adverse impacts on ethnographic resources due to continuing current management and access. Added to this, other actions in and outside of the park could result in a beneficial impact as well as the DM&E project's potential long-term moderate to major adverse effects. Most impacts to ethnographic resources outside of the South Unit are being addressed and mitigated through actions such as inventory of planned projects, Tribal consultation, documentation and preservation. For Section 106 purposes, the determination would be *adverse effect*.

SCENIC RESOURCES

Analysis. Under the No-Action Alternative, there would no new human-made structures or vehicles areas in the park that would affect scenic quality. This alternative would not introduce new sources of outdoor light and therefore, would not affect the ability to view the night sky.

Cumulative Impacts. Normal maintenance of the main park roads, parking areas, and day-to-day park operations would result in a negligible short term localized, adverse impact on scenic resources. Any expanded residential or ranching structures would be visible in the vast open areas

of the South Unit in the future. Expanding developments and activities related to ranching could generate more dust. Overall such development and activities would intrude upon the area's scenery affecting visibility and introducing new light sources into the night sky. Community and commercial scale renewable energy development on the Pine Ridge Indian Reservation could have major adverse impacts on the scenic resources of the South Unit, permanently altering the panoramic vistas with the construction of wind turbines and/or solar panels on sites adjacent to the South Unit.

The No-Action Alternative would contribute long-term, localized, negligible to moderate, adverse impacts to scenery, but would not affect visibility or the night sky. Combined with other past, present, and reasonably foreseeable future impacts, on scenery and visual quality, the No-Action Alternative would have minor to major localized and regional adverse impacts on scenic resources.

Conclusion. The No-Action Alternative would have long-term, localized, minor to major, adverse impacts on scenery, but would not affect visibility or the night sky.

VISITOR EXPERIENCE

Access

Analysis. The overall accessibility of the South Unit to visitors would not change under alternative A; that is, there would be no changes in the operation or location of the entrances, in the major roadways in the park, in the amount of available parking, in visitors' access to existing park facilities, such as the White River Visitor Center, or in access to trailheads. Driving and hiking access still would be limited to two-track primitive roads. The condition of the roads still would limit access primarily to high-clearance vehicles.

The roads to Sheep Mountain and Blindman tables would remain primitive with relatively unrestricted use, but the road condition still would affect visitors by limiting access to high-clearance vehicles. The Palmer Creek area still would be relatively inaccessible for most visitors

because overland travel requires a high-clearance vehicle and local knowledge of the unmarked routes.

Overall, facilities still would be deficient in the South Unit. Because the No-Action Alternative would not involve any changes to existing conditions, the continued lack of access to the South Unit would have long-term minor adverse impacts on visitors.

Cumulative Effects. Traffic projections indicate that a substantial increase in park visitation could result from the completion of the Heartland Expressway and the proposed Crazy Horse Scenic Byway. The increase from these roads originating from the south and west, added to visitation projections, could alter the current visitation patterns to the park. The routes for these two road projects already exist, but typically park visitors do not use them. Visitor access to the South Unit would be improved by the upgrading of the roads and by their being emphasized with designations.

Implementing alternative A would continue to affect visitor access to the park. When combined with the projects listed above, impacts to visitor access would be long-term minor adverse as the beneficial impacts provided by the additional routes above do not improve access within the South Unit.

Conclusion. Alternative A would result in long-term minor adverse impacts to visitor access.

Availability of Information

Analysis. Under the No-Action Alternative, the White River Visitor Center would continue to be the only source of orientation, interpretation, and education in the South Unit until the LHEC is completed. Visitors to the South Unit still would have to travel long distances without being able to get information about the park and its resources. The White River Visitor Center would be open only during the peak season. The lack of facilities in the South Unit would continue to limit visitors' ability to get information about the park.

Educational opportunities for schools and organized groups would continue to be limited by a lack of adequate facilities, and there still

would be no access, facilities, signs, or interpretive waysides along SD 44.

Cumulative Effects. Continuing alternative A would result in minor long-term adverse effects on the visitor experience, because opportunities to obtain information in the South Unit are limited. Visitation to the South Unit would increase if the proposed Crazy Horse Scenic Byway were approved and after the construction of the LHEC is completed. When developed, the LHEC would be an outlet for distributing information to the public, resulting in long-term minor to moderate beneficial effects on the availability of information.

Conclusion. Alternative A, the No-Action Alternative, would result in continued adverse effects on the experience for visitors to the South Unit. The current effects on the visitor experience are minor; however, if changes in visitation patterns continue, the effects could become more severe.

Range and Enjoyment of Visitor Activity

Analysis. The five most popular visitor activities in Badlands National Park are vehicle use, hiking, pack stock use, camping, and picnicking. Those activities are discussed separately in the Consequences section for each alternative.

Vehicle Use. The existing range of driving opportunities in the park would continue under alternative A. In the South Unit, a sense of exploration in a primitive environment would be available for visitors. The use of high-clearance vehicles would continue on the network of primitive two-track roads; travel in this area would be difficult for visitors in passenger cars because of the primitive rutted dirt roads. Road closures and openings would continue to be weather-dependent, but generally these roads would be closed in winter. Visitation to the South Unit would continue to be limited by distance, lack of information, and inaccessibility to the general public. The popular road onto Sheep Mountain Table would continue to be open, and the existing two-track roads on the mountain would remain open. Overall, this alternative would result in long-term minor

adverse impacts to visitor range and enjoyment of activity.

Hiking and Pack Stock Use. Implementation of alternative A would have long-term negligible adverse impacts on hiking and pack stock use due to the continued lack of designated trails and pack routes, as well as the lack of corrals and loading areas.

Camping. There are no existing NPS-sanctioned camping opportunities in the South Unit. Isolated incidents of backcountry, primitive camping would continue. Long-term negligible adverse effects from lack of camping opportunities would occur under alternative A.

Picnicking. Picnicking would continue to occur at the White River Visitor Center. Long-term negligible impacts would result due to limited picnic areas.

Cumulative Effects. It is projected that various plans for road improvements in the region would increase opportunities for driving and sightseeing. If the proposed Crazy Horse Scenic Byway were designated and marked by signs, it would offer an additional scenic driving opportunity in the region. The management plan for Buffalo Gap National Grassland calls for the development of a primitive campground near the South Unit, expanding the region's camping opportunities (USFS 2001). These projects would result in long-term benefits for visitors seeking recreational opportunities in the region.

The No-Action Alternative would maintain the status quo, which provides a range of informal, unsanctioned opportunities for South Unit visitors. The long-term benefits of the regional projects, coupled with the negligible adverse effects of implementing alternative A, would result in long-term cumulative beneficial effects on the visitor experience.

Conclusion. Implementing alternative A would result in long-term negligible adverse effects on visitor range and enjoyment of activities.

SOCIOECONOMICS

Analysis. Under the No-Action Alternative, activities associated with the South Unit would continue to generate a small level of economic

activity in the study area over the life of the plan. This activity would continue to generate minor beneficial economic impacts. The NPS estimates the operating expenditures including such items as payroll, supplies and travel to operate the South Unit to range between \$160,000 and \$180,000 per year. The operation requires two full-time positions. This infusion of federal agency spending into the economy would likely generate additional economic activity in terms of jobs and income of other businesses and individuals that support operations or park service employees. Additional economic activity occurs when visitors, coming to the South Unit spend money in the local economy during their trip. Current visitation to the South Unit is approximately 9,500 per year, which is a small fraction of the estimated visitation to the North Unit which supports over 800,000 visitors per year. Thus, the economic impact from visitation to the South Unit under the No-Action Alternative would expected to be negligible adverse. Economic benefits associated with grazing leases that are expected to continue on the South Unit.

Cumulative Impacts. Past, present, and anticipated projects that would contribute to impacts on socioeconomics include (1) the cleanup of the former Bombing Range; (2) resource management under the North Unit GMP/EIS; (3) approval of the proposed Crazy Horse Scenic Byway. These combined actions would likely have short- and long-term beneficial impacts on socioeconomics due to increased access and exposure to the opportunities at the South Unit. The cumulative effects of all these projects could lead to additional visitation to the South Unit, potentially generating additional economic benefits through increased visitor spending. The impacts of other past, present, and anticipated projects, when considered with the impacts of the No-Action Alternative, would result in beneficial impacts on socioeconomics.

Conclusion. The socioeconomic effect of operations and visitor use at the South Unit under the No-Action Alternative would be long-term, negligible, and adverse.

PARK OPERATIONS

Analysis. Under the No-Action Alternative, it is assumed that staff would continue to focus on the core mission of the park in the same manner and degree as previous years. For FY 2010 the park devoted approximately \$166,000 for the annual operation cost for the South Unit. This amount covered the cost of 2 full-time positions and their overhead for operating the White River Visitor Center. This amount is a portion of the park's 2010 annual operating cost which was \$4.6 million. Modest increases in park operations would be sought to improve interpretation and resource protection. Basic functions such as law enforcement and general maintenance of the park's infrastructure would remain high priorities. Programs that have a long-range benefit of enriching visitors and protecting resources such as education and outreach to schools would continue to be sought, but difficult to expand without an approved plan. Similarly, without an approved plan that identifies management zones it would be increasingly difficult to successfully obtain funding or partnerships for future resource management programs. The effects of the lack of a clear plan and management zones on park operations would be adverse, moderate, and long term.

Volunteers and the Badlands Historic Association would remain important in the park operations. Programs to involve volunteers in inventory, monitoring, interpretation and outreach, cultural resource restoration, campground hosting, trail patrol, light maintenance, and other aspects of park operations would be continued. However, their effectiveness and ability to grow would be hampered over time by the lack of clear plan. The effects of this alternative on the volunteer program would be adverse, long term, and moderate.

Cumulative Impacts. The park has always promoted volunteers and has had good results in recruiting skilled older people with outside sources of income, who thoroughly enjoy their contribution to the national park system. This is particularly source of labor is important to the South Unit since very little resources have been

devoted to this unit. This source of labor would continue to be important to the park and efforts to promote the value of such resources would continue to be a high priority. Without a clear plan to focus these efforts, it would be increasingly difficult to leverage the most out of this opportunity.

Conclusion. Lack of a clear plan and management zones would lessen the effectiveness of existing staff and volunteers over time. This would result in adverse long-term moderate impacts to the operation of the park.

UNAVOIDABLE ADVERSE IMPACTS

Unavoidable adverse impacts are defined as impacts that cannot be fully mitigated or avoided.

Minor adverse impacts on natural resources would be caused by human use in some areas in the South Unit resulting from ongoing recreational use of land and facilities (e.g., soil compaction, vegetation trampling, wildlife disturbances, and decreased opportunities for solitude). Although these impacts would be unavoidable, mitigation to reduce them would be carried out where possible.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible commitments of resources are actions that result in loss of resources that cannot be reversed. Irretrievable commitments of resources are actions that result in the loss of resources but only for a limited period of time.

With the exception of consumption of fuels and raw materials for maintenance activities, no actions in this alternative would result in consumptions of nonrenewable natural resources or use of renewable resources that would preclude other uses for a period of time.

RELATIONSHIP OF SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

The South Unit would continue to be administered to protect resources in their natural state and provide for the care, maintenance, and preservation of prehistoric, historic, scientific, and scenic interest; interpret the history of the Sioux Nation and Oglala people; and continue to

maintain existing facilities that would provide for public use and enjoyment.

Under alternative A, the South Unit would continue to be managed as it is, and no management zones are prescribed. Under the No-Action Alternative, the park would maintain its long-term productivity and there would be virtually no new development or appreciable loss of long-term ecological productivity.

IMPACTS OF ALTERNATIVE B: EXPAND INTERPRETIVE OPPORTUNITIES

NATURAL RESOURCES

Vegetation

Analysis. Vegetation would be lost or altered in local areas under alternative B, primarily from the development or improvement of facilities and visitor services. Most new developments or improvements would be placed within the existing footprint of disturbed areas in which the vegetation already has been altered within the developed areas of the park; therefore, little additional loss of native vegetation would result from construction or improvement activities related to the White River Visitor Center. Given the previous vegetation disturbance along existing perimeter roadways in most of these areas, and with the use of appropriate mitigation measures to minimize additional impacts (such as ensuring that equipment stays within project area boundaries, revegetating disturbed areas with native vegetation, avoiding known or possible locations for special-status plant species, and taking steps to avoid the spread of exotic species), there would be negligible to minor adverse effects on native vegetation from these actions.

New facilities would be built in previously undisturbed areas. Despite the use of mitigation measures to help reduce the loss of native prairie vegetation, some vegetation would be permanently disturbed or lost in these areas resulting in a long-term minor adverse impact.

The elimination of livestock grazing in Range Unit 505 would have an influence on the distribution of some plant species and plant associations resulting in short- to long-term beneficial and short- to long-term negligible adverse effects on vegetation. Moderate grazing reduces mean annual aboveground production of mixed grass prairie only a little but can result in a shift in the relative composition of cool and warm season grasses (Plumb and Dodd 1993). Livestock grazing in the South Unit of the park influence not only the grassland composition but

also exotic species distribution. Whereas some nonnative species may actually increase under grazing pressure (e.g., Canada thistle), yellow sweetclover appears to be controlled by grazing. For example, yellow sweetclover occurs in greater abundance on ungrazed lands of the North Unit versus similar grazed lands in the South Unit. Conversely, blue grama/buffalo grass grasslands tend to be absent within the lightly grazed or ungrazed lands of the North Unit (Bureau of Reclamation 1999).

Constructing new parking lots and improving the existing road to the quarry west of Sheep Mountain Table would cause both direct and indirect adverse effects on prairie vegetation. Native grassland vegetation would be lost or damaged during siting, construction, improvement, and maintenance of the parking lots and roadway. Some rare plants could be lost, although it might be possible to locate improvements to the road to avoid those plants. Some native plants would be permanently lost because of the parking lot or road footprint. Several indirect impacts also could result from the improvement of the road segment. If erosion along the road increased, more vegetation would be lost. Nonnative plants could be introduced or spread into disturbed areas. If visitors created additional “informal” pull-offs by parking off the side of the road, some roadside plants might be crushed, trampled, or picked. Even with mitigation measures, construction equipment in the project area would result in the damage or loss of other plants resulting in short- to long-term negligible to minor adverse impacts to vegetation.

Vegetation also would be altered or lost through increased visitation under alternative B. As under alternative A, people walking over and trampling plants in and around existing facilities would result in the loss of native vegetation, a long-term minor to moderate adverse effect.

As soils would be affected, building or designating new trails and routes would cause both beneficial and adverse effects for the park’s

vegetation. Hiker and pack stock use would increase on new trails on the perimeter and the interior, resulting in the trampling and loss of vegetation. More erosion in any of these areas would cause the loss of some plants, and the potential for visitors or pack stock to inadvertently carry in and spread exotic species also would increase. Developing a trailhead in the South Unit could encourage more four-wheel-drive use of the unimproved roads in this area, which in turn could increase erosional impacts and native plant loss. If more pack stock used this area, there would be increased potential for the spread of exotic species. Depending on the level of use, time of use, and the vegetation, there could be a minor to moderate long-term adverse impact on vegetation in local areas.

Designating campsites along the primitive roads in the South Unit would increase use in these areas so that some native vegetation probably would be trampled or lost. However, the loss of vegetation from indiscriminate camping and the creation of informal campsites would be reduced, a minor beneficial effect. Development and routine maintenance of facilities, including installation and maintenance of roads, trails, and developed sites within the park would also disturb vegetation locally due to the presence of work crews and clearing of vegetation. These activities would have long-term localized negligible adverse impacts on vegetation.

Designating Natural Area / Recreation Zones in the basic core or center of the park and the Palmer Creek Unit would eliminate the use of recreational vehicles; this would reduce erosion and the loss of native plants caused by vehicles being driven on or off two-track roads in these areas. There would be a long-term beneficial effect on vegetation from these actions, depending on the number of vehicles being used in those areas. Designating a research zone might eliminate soil erosion and native plant loss from a few vehicles being driven there, resulting in a beneficial effect.

Adding outdoor classrooms, waysides, interpretive trails, a learning center, backcountry guided tours, and visitor contact stations would benefit park vegetation by improving visitor

education. With increased visitor appreciation of native and rare plants, adverse effects on vegetation would be reduced. One beneficial effect of such education would be to help avert the spread of exotic species from visitors walking in the park. The presence of the learning center and the research zone could help encourage research that would benefit the protection and management of the park's vegetation. However, there also would be the potential for the trampling and loss of some rare plants along short interpretive trails.

Most native vegetation in Badlands National Park would continue to be protected and sustain itself under alternative B. The loss of native vegetation would be reduced by better protection, and native vegetation would benefit from designating campsites, trails, and routes, eliminating the use of recreational vehicles from some areas, and increasing education and interpretation. The short- to long-term beneficial and adverse effects on native vegetation from alternative B would be negligible to moderate.

Cumulative Effects. Other past, present, and anticipated future projects that would contribute both adverse and beneficial impacts on vegetation include: (1) the cleanup of the former Bombing Range; (2) resource management actions under the North Unit GMP/EIS; (3) management of motorized vehicle use under the Nebraska National Forest Travel Management Plan; (4) the Mni Wiconi water project; (5) the proposed DM&E rail line; (6) the proposed Crazy Horse Scenic Byway; and (7) potential wind power development projects.

Short-term to long term minor adverse impacts to vegetation would result from the loss or alteration of vegetation during construction activities in the South Unit, such as the Mni Wiconi water project, the proposed DM&E rail line, and the proposed Crazy Horse Scenic Byway. Work at the White River Visitor Center and cleanup efforts at the Bombing Range may cause the loss of natural vegetation and have the potential to contribute to cumulative adverse impacts. Actions outside of the park, including the construction and operation of the DM&E rail line and the designation of the proposed Crazy Horse Scenic Byway, which could increase

visitation to the park, and the construction of primitive campgrounds and trails in the national grassland adjacent to the park could alter or cause the loss of native plants. These other actions, added to the developments and improvements of alternative B and a likely increase in visitation, would result in a long-term minor to moderate adverse cumulative effect on the region's native vegetation. Some vegetation would be cut and removed during construction and operation of the roadway and rail line, potential increasing invasive plant species until mitigation measures are employed. This would result in short-term negligible adverse impacts to vegetation. In addition, park maintenance operations along existing roads would continue to affect plants growing on road shoulders. Grazing in the South Unit would continue, altering the types and distribution of vegetation and slowing the restoration of the natural grassland ecosystem. The construction of the Mni Wiconi water pipeline probably would cause negligible effects on vegetation because it would be built along roads where native vegetation already has been altered. The development of wind power projects outside of the park could result in localized long-term minor adverse impacts with the removal of vegetation.

In addition to cumulative actions that have negative effects on vegetation, there are also some actions that have beneficial effects. Long-term beneficial effects on the park's vegetation would result from NPS-prescribed burning efforts, the reintroduction of native vegetation, and weed management efforts in the North Unit. A beneficial long-term effect on range condition would result from increases in prescribed burning in the adjacent Buffalo Gap National Grassland by reducing fire hazard fuel accumulations and aiding in fire suppression activities by reducing fire intensity and severity protecting existing native vegetation, as is delineated in the Land and Resource Management Plan for the Nebraska National Forest and Associated Units (USFS 2001). The resource management actions under the North Unit GMP/EIS identify desired conditions including specific vegetation conditions for management areas, to help restore native plant communities.

Additionally, the management of motorized vehicle use under the Nebraska National Forest Travel Management Plan could have long-term beneficial impacts to vegetation, due to improving resource protection practices. Those actions, when added to the effects of designating trails and routes and campsites in the park, eliminating recreational vehicle use in parts of the park, increasing educational and interpretive efforts, and encouraging more research, would result in better protection of native vegetation and its possible increase in previously disturbed areas. All these actions would result in a long-term beneficial cumulative effect on the region's native vegetation.

Overall, when all the effects of actions in and outside of the park were added to the effects from alternative B, there would be long-term minor adverse cumulative effects impacts on vegetation. However, the actions of alternative B would add a minimal increment to this cumulative effect because the effects on vegetation resulting from alternative B would be localized and spread out over time.

Conclusion. Alternative B would have short- to long-term negligible to moderate adverse effects on vegetation associated with the development or improvement facilities and visitor services. The impacts of other past, present, and anticipated projects combined with alternative B would likely result in long-term minor adverse impacts to vegetation. However, the actions under alternative B would add a minimal increment to this cumulative impact.

Wildlife

Analysis. New developments, improved access, and increased visitation to parts of the park would be the primary actions affecting wildlife and their habitat under alternative B. Designation of a Natural Area/Recreation Zone on approximately 89 percent of the South Unit would improve the protection of wildlife populations and habitats by allowing recreational vehicle use only on designated access roads. This would remove a source of wildlife disturbance from vehicles being driven on or off two-track roads. This would result in a

long-term beneficial effect on wildlife populations in local areas.

Initiation of active restoration programs and integrated weed management strategies for disturbed areas would increase the amount of native habitat available to wildlife. These actions would result in localized long-term beneficial effects.

Reintroduction of bison and the sustainable management of cattle grazing with potential elimination in Range Unit 505 would restore a more native grazing regime to the South Unit. Grazing dynamics between bison, cattle, other ungulates, and prairie dogs would be modified because bison and cattle have different grazing patterns (Plumb and Dodd 1993; Steuter and Hidinger 1999). The rate of expansion of prairie dog towns could be slowed by the elimination of cattle grazing over the long term. Livestock grazing provides open areas, which facilitates colonization by prairie dogs (Uresk et al. 1981; Vermeire et al. 2004). However, the reintroduction of bison would restore a native grazer to the South Unit resulting in long-term beneficial effects.

Opening a quarry for research purposes would be accompanied by improving the existing road to the quarry west of Sheep Mountain Table, constructing a new road segment from the end of the existing quarry road to the quarry, constructing a parking area, and a paved camping area. These developments would cause the permanent loss of grassland habitat, displacing wildlife along this corridor. Prairie dog towns are located in the vicinity of these developments. Clearing vegetation in that area would result in the loss of wildlife forage and shelter. Noise from construction equipment and people would displace some wildlife and temporarily disturb prairie dogs. Most birds, mammals, and reptiles would avoid the area during the construction period, but many would return after construction ceased. Some animals, primarily invertebrates, would be unable to move out of the construction area and would be killed. The new developments along with the new road segment and improved road segment could have a long-term minor to moderate adverse effect on area wildlife.

Increased educational and interpretive efforts under alternative B would generally benefit wildlife. The addition of waysides, guided trail rides/camping trips, eco-tours, interpretive trails, and a visitor contact station would help educate visitors, increasing their appreciation of the wildlife in the South Unit and minimizing impacts they could cause such as teaching them to avoid feeding wildlife. This would result in a long-term beneficial effect on the wildlife in the South Unit.

Alternative B would include new developments to enhance visitor access and enjoyment of the South Unit. These new developments would cause a permanent loss of some grassland habitat or sparsely vegetated areas. New developments within the interior of the park include the construction of a developed camping area with amenities, pedestrian trails, horseback trails, walk-in camping units, a backcountry ranger station and equestrian facilities. These developments would also cause the permanent loss of grassland habitat or sparsely vegetated areas. These losses would primarily affect smaller, less mobile wildlife species and species with smaller home ranges, such as invertebrates. Some reptiles, small mammals, and birds also could be displaced. The loss of habitat would result in a long-term minor adverse effect on animals near these facilities. Increased noise and human activity due to construction of new developments could temporarily displace some animals such as rodents and birds, resulting in minor short-term adverse impacts on wildlife populations in local areas.

Visitation to parts of the South Unit probably would be increased by improved access from developing and improving roadways, wayside exhibits, camping areas, pedestrian trails, and horseback trails. In turn, habitat fragmentation would increase over current levels because of more visitor use of trails and routes. Some wildlife sensitive to the presence of people — pronghorn antelope, bighorn sheep, bobcat, badger, and raptors — might be displaced from areas around these corridors during the peak high use season. These actions would result in a minor to moderate short-term and long-term adverse impact on wildlife populations in local areas, depending on such factors as the level,

duration, and type of visitor use, the season of use, and the wildlife species. Increased visitation due to new developments could indirectly affect some prairie dogs — some visitors might wander into prairie dog towns, affecting the behavior of animals in the area, but any disturbance would be temporary and the effect would be negligible to minor.

The improved and expanded quarry road and additional new road segments along the perimeter may result in some wildlife being hit by vehicles and injured or killed, resulting in indirect adverse impacts. Maintenance activities along the roadways could disturb wildlife. The extent of the effects would depend partly on the location of the roads and their design. With careful siting of the roads and the use of mitigation measures, the improved road segments would result in a long-term beneficial effect on area wildlife.

Some new facilities under alternative B, such as the designated campsites in the South Unit, probably would experience seasonal increases in wildlife populations that are attracted to people and their food, such as mice, chipmunks, and black-billed magpies. This action would result in a long-term beneficial effect on these populations in local areas.

Hunting would continue in the South Unit, but with appropriate regulation and monitoring, the adverse long-term effects on wildlife populations would be minor.

Cumulative Effects. Past, present, and anticipated projects that would contribute to impacts on wildlife include (1) resource management under the North Unit GMP/EIS; (2) resource management under the Buffalo Gap National Grassland Land and Resource Management Plan; (3) modifications to motorized travel under the Nebraska National Forest Travel Management Plan; (4) wilderness designation under the proposed *Tony Dean Cheyenne River Valley Conservation Act* of 2010; (5) Prairie Dog Management Plan activities and plague efforts; (6) training activities under the South Dakota National Guard Training Sites (2010-2015) - Environmental Assessment; (7) construction activities associated with the Mni Wiconi water

project; (8) the proposed DM&E rail line; and (9) the proposed Crazy Horse Scenic Byway. These actions would likely have short- and long-term minor adverse impacts on wildlife due to land disturbance activities from construction projects and other human uses, resulting in some mortality to wildlife, increased fragmentation of wildlife habitats, increased potential for wildlife to be displaced and reduced number of areas where wildlife could exist without people or facilities. These actions would also have long-term beneficial impacts on wildlife from improved resource management, additional protections from designation of wilderness area, and decreased impacts from motorized vehicles. Management efforts to expand prairie dogs at Buffalo Gap National Grassland and plague dusting efforts in the North Unit would have beneficial effects on the species. When the beneficial and adverse impacts of other past, present, and anticipated projects, are considered with the impacts of alternative B, there would be long-term minor adverse impacts on wildlife.

Conclusion. Alternative B would have short- and long-term minor to moderate adverse impacts on wildlife, as well as short- and long-term beneficial impacts. The impacts of other past, present, and anticipated projects combined with alternative B would likely result in long-term minor adverse impacts.

PALEONTOLOGICAL RESOURCES

Analysis. Under alternative B changes in management would increase public education activities, increase public vehicle access, and provide for increased law enforcement patrols. This alternative would provide for paleontological inventories to document and presumably preserve fossils in the South Unit. It would also allow a paleontological quarry for public education and fossil collection and preservation. Livestock grazing would continue unchecked, other than a possible future reduction in Range Unit 505. Interpretation of paleontological resources within the context of Lakota oral history could be developed through somewhat increased interpretive opportunities. Alternative B envisions a museum and interpretation at the LHEC. In addition,

alternative B anticipates improved and expanded exhibits at the White River Visitor Center. The increase in educational facilities, fossil preparation, and curatorial facilities would have a beneficial effect on fossil resources. Potential adverse effects from additional development are damage to fossil resources through construction and increased fossil poaching as a result of increased visitation.

The improvement of the existing road to the quarry area and the development of a parking area, restrooms, trailheads, and campsites would have a moderate adverse impact on fossil resources due to ground disturbance from construction activity. All of this activity would be monitored and fossils would be salvaged. However, some fossils could be lost. Increased development would also have a beneficial impact on paleontological resources due to the increased ability to promote paleontological education activities and salvage at risk fossils through the quarry process. Increased law enforcement and curatorial and paleontological staffing would have a beneficial impact on the protection of fossil resources.

Therefore, these current long term adverse impacts would be reduced into the foreseeable future under alternative B, and beneficial impacts would occur based on increased paleontological inventory, collection, preservation, law enforcement presence, and interpretation/public education.

Cumulative Effects. The primary projects and actions that could contribute to cumulative effects are summarized below.

Past, present, and anticipated projects that would contribute to impacts on paleontological resources include (1) the cleanup of the former Bombing Range; (2) resource management under the North Unit GMP/EIS; (3) actions on the Buffalo Gap National Grassland; (4) the Mni Wiconi water project; (5) the proposed DM&E rail line; (6) the proposed Crazy Horse Scenic Byway, and (7) a fossil resources protection ordinance planned by the OST. These combined actions would likely have short- and long-term moderate beneficial impacts on paleontological resources because they would provide for

appropriate inventory, protection, and preservation of important fossil resources.

Conclusion. Alternative B would have the potential to result in beneficial effects on paleontological resources. This would be caused primarily by an expected reduction in illegal removal of fossils from the South Unit by visitors and collectors. Continued livestock trampling of fossils and continued weathering and mass wasting (landslides) would have an adverse impact; however, these impacts could be mitigated by continuing efforts to educate visitors about fossils, efforts to allocate existing law enforcement resources toward fossil protection, and inventories to locate and salvage fossils.

The effects on paleontological resources under alternative B are anticipated to be beneficial. Illegal fossil collecting should decrease from increased law enforcement, public education, and increased inventory. Any loss of fossils would not destroy the integrity of the park relative to paleontological resources — fossils would continue to be present throughout the park, and the park staff would continue to protect, interpret, and provide opportunities for scientific research on paleontological resources. People could come to the South Unit and enjoy its values, including its fossils.

SOUNDSCAPES

Analysis. Impacts related to soundscapes under alternative B would primarily be a result of constructing campgrounds, visitor facilities, and paved and unpaved pedestrian and horseback trails. These construction activities would largely occur in the Natural Area/Recreation Zones of the South Unit. Impacts to soundscapes associated with these construction activities would be short-term, moderate to major, and adverse. Furthermore, construction activities within the proposed Development Zone of alternative B, including the construction of parking lots and visitor facilities, would also have short-term, moderate to major adverse impacts on soundscapes within the South Unit.

Noise levels would be likely to increase under alternative B in several places that have been

relatively quiet in the past. More visitors and vehicles would be likely at the White River Visitor Center, the proposed camping areas, pedestrian trails, horseback trails, parking areas, and the quarry, as a result of improving the existing quarry road. As a result, actions proposed under alternative B would have short-term, moderate to major adverse impacts on soundscapes within the South Unit.

Cumulative Effects. As with the No-Action Alternative, short-term minor to moderate adverse effects from noise would be caused by park construction machinery within the South Unit, including construction of the LHEC. Cleanup operations of the former Bombing Range would also likely cause short-term minor to moderate adverse effects on soundscapes within the South Unit. Outside the South Unit, the construction of the Mni Wiconi water project would generate noise that would be audible in places in the South Unit. Traffic along BIA Routes 27 and 2, and BIA 41, as well as traffic leading to the solid waste management facility at Red Shirt would continue to generate noise intrusions in the South Unit, resulting in long-term, negligible to minor adverse impacts on soundscapes within the South Unit. The potential extension of the DM&E rail line and the construction of the proposed Crazy Horse Scenic Byway could also have short-term negligible to minor adverse impacts on soundscapes within the South Unit. The development of an Air Tour Management Plan would include the development of soundscape goals, objectives, and standards and identifying appropriate measures for mitigating noise impacts. These effects, added to noise caused by visitors and park operations under alternative B, would result in short- and long-term minor to moderate cumulative adverse noise effects in local areas. When these noises are combined with the sounds of visitor and administrative use in the South Unit, there could be negligible to minor, long term, adverse cumulative impacts on soundscapes.

Conclusion. Due to construction activities proposed under alternative B, the soundscapes within the South Unit would likely change substantially in the short-term. However, in areas not identified as areas for future

construction, there would continue to be long-term negligible to minor adverse effects on the park's soundscape in local areas, largely from visitation and administrative activities in developed areas. Noise from activities under alternative B added to noise from other actions within and outside the South Unit could result in short-and long-term, minor to moderate adverse cumulative effects in local areas.

CULTURAL RESOURCES

Archeological Sites

Analysis. Under alternative B, changes in management would increase public education activities and visitor access, including construction of facilities along the perimeter and a road to the paleontological quarry site. In addition, increased law enforcement patrols would be provided. This alternative would provide for surveys and inventories of archeological resources and interpretation of Oglala Sioux history and culture. Livestock grazing would continue, with possible future reductions in one area. Current and future livestock trampling, natural weathering, and mass wasting (landslides) can adversely affect archeological sites very quickly as recent studies for Bombing Range cleanup activities have shown and other observations have shown (Rom 2010). General activities associated with the restoration of the rangeland would likely be beneficial because restoration focuses on restoring vegetation and reducing erosion. There are plans to build a LHEC and to upgrade the White River Visitor Center and construct visitor services along the perimeter of the South Unit. This could be beneficial to archeological resources in that it would increase archeological education opportunities and contacts, provide for additional law enforcement, and provide for ongoing and long-term collection and preservation of important archeological materials. Interpretation of archeological resources within the context of Lakota oral history could be developed through somewhat increased interpretive opportunities.

Most illegal collecting probably occurs relatively close to roads where park visitors

likely could take artifacts illegally, either knowingly or unknowingly. Illegal collecting is not well documented, but can be a minor to moderate adverse impact. The extent of all of the above impacts would have moderate, long-term adverse effect on the park's archeological resources. Increased inventory, monitoring, and interpretation, as well as development of management zones would reduce opportunities for artifact removal, increase the amount of inventory, facilitate National Register of Historic Places evaluations, and provide for appropriate preservation of archeological sites and materials; however continued grazing and erosion within the South Unit would have long-term moderate adverse impacts.

Therefore, these current long-term adverse impacts would be reduced into the foreseeable future under alternative B, and beneficial impacts would occur based on increased archeological inventory, collection, preservation, law enforcement presence, and interpretation/public education.

Cumulative Effects. The primary projects and actions that could contribute to cumulative effects are summarized below. These include ongoing and planned actions and projects in the park, reservation, communities, and adjacent counties.

The *2006 North Unit General Management Plan* provides for archeological inventories, collection and excavation to protect cultural resources. It also provides for a strong law enforcement presence to minimize illegal collection activities.

All proposed construction projects should include archeological resources inventories and implemented measures to protect them. If so, these projects should have a beneficial impact on archeological resources as additional surveying would occur.

The OSPRA is pursuing Federal Highway Administration approval for the proposed 215-mile Crazy Horse Scenic Byway (Lakota Country Times, October 13, 2009 Article by Tom Katus). The byway is likely to increase visitation within the South Unit, and with this some increased cultural resource loss could occur through increased theft and pedestrian

traffic trampling. This project will also add to interpretation of archeological resources and provide beneficial effects.

Conclusion. Alternative B would have the potential to result in beneficial effects on archeological resources within the South Unit. This would be caused primarily by the reduced illegal removal of archeological resources from the South Unit by visitors and collectors and increases in public education opportunities and inventories. The increased knowledge about the resource base would improve the ability of the park to manage the resources, as well as improve project planning and decision making. Impacts related to continued livestock trampling and continued weathering and mass wasting (landslides) would be long-term and moderate. Increased inventory would result in beneficial effects. For Section 106 purposes, this would constitute an adverse effect.

Other actions in and outside of the South Unit could result in an overall, cumulative beneficial impact. Most impacts to cultural resources outside of the South Unit are being addressed and mitigated through actions such as law enforcement, inventory of planned projects, and collection for study and preservation.

Museum Collections

Analysis. Under alternative B, an active paleontological quarry would be opened. All fossils collected from quarry operations and associated surveys would be prepared and curated by trained park personnel and stored in an off-site museum until the LHEC museum is fully operational. Park personnel would collect fossils deemed to be at risk of theft or erosion and where feasible, fossils would be cast for exhibit. These specimens would also be housed in offsite repositories until the LHEC is operational. In addition, surveys and inventories of archeological resources would be developed and findings documented and the artifacts stored either at Midwest Archeological Center or the LHEC.

It is anticipated that the excavations from an active paleontological quarry would produce a large amount of specimens needing storage. The offsite facilities would be able to accommodate

such a large amount of museum specimens. The current configuration for storage at the LHEC is currently unknown, but for this study, it was assumed the LHEC would be able to house all specimens from the South Unit through the life of this management plan. It is intended that the offsite storage of collections would eventually come to an end. The collection would be subject to a minor adverse impact because the collection would continue to be split between facilities for some time before the LHEC became available.

Under this alternative, it is the intention of the OST to gain control of all specimens that have been taken from the South Unit, as practical. If the Tribe is successful in that effort, it is unlikely that there would be adequate storage space for all the collection to be housed in any single facility. The collection would again be subject to a minor adverse impact because the collection would continue to be split between facilities.

Finally, the movement of fragile materials between facilities may cause the loss of materials. A minor adverse impact would result.

Cumulative Effects. Numerous museums and private parties holding archeological and fossil collections from the badlands of South Dakota exist throughout the world as a result of excavations by government agencies, universities, historical societies, and individuals over the last approximately 150 years. Known collections at the facilities in South Dakota are extensive. The collections within the park make up a small but important portion of the whole collection. The collections would be expanded through donation, testing prior to development, excavations of sites inadvertently identified during construction work, or monitoring resource conditions in the field. In addition, active efforts would be taken to retrieve parts of the collection scattered in other museums or private collections. Other activities identified as occurring within and external to the South Unit are unlikely to add a large amount of museum specimens to the collections. Cumulative impacts are expected to be minor and adverse.

Conclusion. Items in the collections would continue to be stored and maintained, with some facilities meeting NPS museum storage

standards. It is assumed for this study that the LHEC would be able to house known collections from the South Unit, but the volume of materials coming from private and other repositories may overcome storage facilities. There would be a long-term minor adverse impact on the overall preservation and usefulness of the collections. Accessibility to the collection by researchers and the public would be increased.

Ethnographic Resources

Analysis. Park managers would consult with the OST to develop and accomplish programs in a way that respects the beliefs, traditions, and other cultural values of the Tribe that has ancestral ties to South Unit lands. Park managers would maintain a government-to-government relationship with the Tribe to ensure a collaborative working relationship, and would consult regularly with them before taking actions that would affect natural and cultural resources that are of interest and concern to them. Access to, and use of, American Indian sacred sites by American Indian religious practitioners would be accommodated in a manner consistent with applicable law, regulations, executive orders, and policy.

Ethnographic resources, including sacred sites and traditional cultural properties, would be identified and protected from impacts associated with the implementation of this alternative through increased consultation and inventory. As a result, there would be beneficial impacts on ethnographic resources from this alternative. Alternative B would not result in any change in access by American Indians or use of ethnographic resources sacred to the tribes. The alternative would not change the agreement that guarantees tribal members unrestricted access in perpetuity and requires their written consent to affect those sites. Consultation with tribes to identify traditional use areas would precede ground-disturbing or other activities that could affect the current use, viewshed, or perception of the resource.

Cumulative Effects. Actions inside the South Unit could affect ethnographic resources, including traditional cultural properties. Efforts to clean up the Bombing Range could alter

vegetation patterns and landscapes, affecting the viewshed of a sacred site. Although surveys and cleanup plans would help to reduce the extent of these effects, the cleanup efforts could result in long-term moderate and, possibly, major adverse impacts.

The impacts of other past, present, and anticipated projects, when considered with the impacts of alternative B, would result in beneficial impacts to ethnographic resources.

For the cleanup of the Bombing Range, removal of munitions would allow safer tribal member access to important areas, providing a beneficial impact. Potential visual impacts of munitions removal would be generally short-term and limited in scope. However, certain removal methods in “high density” debris areas can result in complete removal and replacement of up to several feet of surface and subsurface soils over large areas (70 acres or more) by remote controlled heavy equipment. If such removal is necessary within the viewshed of an ethnographic resource or traditional cultural property moderate adverse visual effects could result. However, such cleanup activities would only occur after consultation with the OST (Rom 2010).

The proposed DM&E rail line, if constructed, would likely have a moderate to major adverse impact on ethnographic resources (Grassrope, pers. comm.; Whiting pers. comm.). However, consultation and inventories would be carried out and appropriate protection measures would be implemented when possible. In most cases, if ethnographic resources are within or adjacent the DM&E project corridor, the corridor cannot be easily modified to protect them. Therefore, major long-term adverse effects would be possible.

The OSPRA is pursuing Federal Highway Administration approval for the proposed 215-mile Crazy Horse Scenic Byway (Lakota Country Times, October 13, 2009 Article by Tom Katus). The byway is likely to increase visitation within the South Unit, but without additional developed facilities negligible impact to ethnographic resources is expected, and interpretive aspects could result in beneficial impacts.

Conclusion. Alternative B would result in beneficial effects on ethnographic resources due to increased inventory and protection, and the addition of appropriate interpretation. Added to this, other actions in and outside of the park could result in a beneficial impact; and the DM&E project’s potential long-term moderate to major adverse effects. Most impacts to ethnographic resources outside of the South Unit would be addressed and mitigated through actions such as inventory of planned projects, tribal consultation, documentation and preservation. For the purposes of Section 106, the determination of effect would be no adverse effect.

Implementing alternative B would result in beneficial impacts on ethnographic resources in the South Unit. Until the completion of inventories of ethnographic resources, park managers would conduct site-specific surveys and consult as appropriate with American Indians for each development action.

SCENIC RESOURCES

Analysis. Under alternative B, additional facilities would be added to the park such as improved roadways, new visitor contact and entrance structures, new small parking areas with short access roads, developed campgrounds with amenities such as restrooms, overlooks, and interpretive signing. These facilities would increase human use in the developed areas and along roadways. These facilities and use however would be dispersed throughout the South Unit. As under the No-Action Alternative any expanded residential ranching structures would be visible in the vast open areas of the South Unit in the future. Expanding developments and activities related to ranching could generate more dust. Overall such development and activities would intrude upon the area’s scenery, affecting visibility and introducing new light sources into the night sky. Such developments and land uses would be relatively small in scale and would have negligible to minor, long-term, localized, adverse impacts on scenery.

With the addition of trailheads more people would be dispersed throughout the park along

trails for hikers and horseback use. These types of use can cause soil erosion and airborne dust particles that tend to linger in the air for short periods, affecting visibility. Overall, limited and highly dispersed new facilities and activities in areas of development would have short-term and long-term, localized, negligible to minor impacts on scenery and visibility.

New sources of outdoor light associated with new structures such as campgrounds, visitor contact stations and entrance stations and expanding the visitor center would be introduced. These sources of light would be minimal. Public activities would generally be scheduled for daylight hours, and any new lighting needs would be minimized. Impacts on night sky from the implementation of Alternative B would be negligible to minor, long term, and adverse.

Cumulative Impacts. Rehabilitation of the main park roads and parking areas and the addition of the facilities would increase the capacity of the park by an estimated 15 to 20 percent. This would result in a negligible, long-term, localized, adverse impact on the scenic resources of the park. Community and commercial-scale renewable energy development on the Pine Ridge Indian Reservation could have major adverse impacts on the scenic resources of the South Unit, permanently altering the panoramic vistas with the construction of wind turbines and/or solar panels on sites adjacent to the South Unit.

Overall, the development proposed under this alternative would intrude on the area's natural scenery, affect visibility, and introduce new light sources into the night sky. Combined with other past, present, and reasonably foreseeable future impacts, impacts generated as a result of implementing alternative B would be long term, minor to major, and adverse.

Conclusion. Alternative B would have negligible to major, short-and long-term, localized, adverse impacts on scenery, visibility, and night sky.

VISITOR EXPERIENCE

Access

Analysis. Alternative B primarily focuses on expanded access and opportunities for visitors to the South Unit.

Developed perimeter access would be focused in one location with trails, trailheads, parking areas, rest areas with comfort stations, overlooks, and wayside exhibits. Visitors could explore the South Unit at dispersed visitor access points along the perimeter. The existing road to the quarry area would be improved and would include parking, restrooms, trailheads, and campsites. Existing two-track roads would continue to provide access to the South Unit. The main roads in the South Unit would be improved.

Recreational opportunities would be available through guided trail rides, and hiking trails and camping sites would be established. Hiking would be allowed on some primitive trails. Primitive camping would allow for unguided camping experiences, and limited overnight backpacking by permit. Visitors could plan and schedule backcountry camping trips at a backcountry contact station / visitor center. Guided horse camping trips would be offered.

Hiking and horseback riding trails would be developed, along with trailheads with parking, comfort facilities, interpretive signs, and informational signage. A mountain biking trail might be developed. Biking along the roads would be encouraged in places where bike lanes could be established.

Access would be afforded through the means identified above, thus restricting unguided access to ceremonial and other cultural sites of the South Unit. Thus, beneficial impacts on visitor access would result from improvement of local roads, construction of new parking lots, guided and unguided tours to the backcountry, increased camping opportunities, and improved signage on surrounding roads.

Cumulative Effects. Traffic projections indicate that a substantial increase in park visitation could result from the completion of the Heartland Expressway and the proposed Crazy

Horse Scenic Byway. The increase from these roads originating from the south and west, added to visitation projections, could alter the current visitation patterns to the park. The routes for these two road projects already exist, but typically park visitors do not use them. Visitor access to the park's South Unit would be improved by the upgrading of the roads and by their being emphasized with designations.

Conclusion. By improving access in the South Unit, alternative B would produce a beneficial effect on visitor access. The improvement in access would come from improvement of local roads, construction of new parking lots, guided and unguided tours to the backcountry, increased camping opportunities, and improved signage on surrounding roads.

Availability of Information

Analysis. Under alternative B, interpretation would be available at some cultural sites across the South Unit, and programs offered by tribal members would focus on aspects of Oglala history and culture. Historical exhibits would remain on display at the White River Visitor Center, which would be staffed by Tribal employees. The NPS would design the exhibits with OST input. However, under alternative B, interpretive opportunities would be offered to visitors in a variety of new ways:

- Historic and cultural interpretive opportunities would include activities such as powwows and ceremonies. At some cultural or ceremonial sites, as well as at campgrounds, interpretive activities would be presented so visitors could learn more about the Lakota culture and history. Programs would feature tribal members who wear and explain traditional dress, and story-telling and oral history would be presented by tribal elders.
- Oglala guides would conduct travel into the backcountry and less-developed areas. The guides would interpret natural resources, the history of the area, Oglala culture, and traditional Lakota land management.

- Interpretation of the Bombing Range would continue.
- Paleontology digs, monitored by trained park personnel, might be observed by visitors, and outdoor classrooms might be offered by the staff.
- Interpretive signs would be placed along roads to identify locations, animals and plants, historic locations, and mileages.
- The exhibits at the White River Visitor Center would be improved and expanded and there would be a working museum with a hands-on education section. An entrance station and visitor contact station would also be constructed in the vicinity of the White River Visitor Center. A visitor contact station would also be developed on the west side of the South Unit. Interpretation and orientation information would also be available at the LHEC.

As a result of the expanded interpretive programs and signage, adding the visitor contact station at the White River Visitor Center and a new learning center and having park information available from outside sources (Tribal members) under alternative B, there would be beneficial impacts on availability of information about park resources.

Cumulative Effects. The LHEC would be an additional outlet disseminating information to the public. The development of the proposed interpretive trails under the Nebraska National Forest Land and Resource Management Plan could also provide additional opportunities to disseminate information to visitors. These projects would produce beneficial effects on the availability of information for visitors.

Conclusion. Alternative B would result in beneficial effects on the availability of information about the park. The increase in the number of outlets where visitors could obtain information and the dispersed locations of these outlets would substantially improve the visitor experience.

Range and Enjoyment of Visitor Activity

Analysis. Vehicle use, hiking and pack stock use, camping, and picnicking are the four most popular activities.

Vehicle Use. Under alternative B, developed perimeter vehicular access would be focused in one location with trails, trailheads, parking areas, rest areas with comfort stations, overlooks, and wayside exhibits. Visitors would be able to explore the South Unit at dispersed visitor access points along the perimeter. The existing road to the quarry area would be improved and would include parking, restrooms, trailheads, and campsites. Existing two-track roads would continue to provide access to the South Unit, and the main roads in the South Unit would be improved. Therefore, beneficial impacts would result from the development of new facilities, trails, and roads, and would allow more visitors and vehicles in previously inaccessible areas.

Hiking and Pack Stock. Developing trailheads and designating trails in the Natural Area / Recreation Zone would substantially increase opportunities for hiking and pack stock users. Many visitors are reluctant to explore the backcountry except in areas with designated trails or routes. The designation of new routes would expand opportunities beyond the limited number of trails now in the South Unit. Designating trails, increasing hiking opportunities, and adding trailer parking areas would result in beneficial effects on the visitor experience.

Camping. Under alternative B, a total of four new camping areas would be developed. Specific locations for the camping areas would be determined based on park management recommendations, but the general locations would be: one camping area with amenities on the perimeter of the South Unit; one camping area with amenities in the interior area for guided trips; one camping area, consisting of 15 primitive walk-in units, in the interior; and one paved 15-unit camping area with a 2-unit toilet and a trailhead in the vicinity of the quarry area. Primitive camping opportunities would allow for unguided camping experiences, and limited

overnight backpacking by permit. As a result of the expanded camping opportunities offered, alternative B would have beneficial impact to camping.

Picnicking. New picnic areas would be developed on the west side of the South Unit (near the Red Shirt Table overlook), at the proposed visitor contact center, at the improved area at the White River Visitor Center, and at other appropriate areas to be identified by park staff. As a result, alternative B would have beneficial impacts to picnicking opportunities.

Cumulative Effects. It is projected that various plans for road improvements in the region would increase opportunities for driving and sightseeing. If the proposed Crazy Horse Scenic Byway were designated and marked by signs, it would offer an additional scenic driving opportunity in the region. The management plan for Buffalo Gap National Grassland calls for the development of a primitive campground near the South Unit, expanding the region's camping opportunities (USFS 2001). These projects would result in beneficial impacts for visitors seeking recreational opportunities in the region.

Conclusion. There would be more opportunities throughout the park and vicinity for visitors seeking to drive/sightsee, hike, camp, and/or picnic, creating beneficial effects on such visitors.

SOCIOECONOMICS

Analysis. Implementation of alternative B would be expected to lead to an increase in expenditures on staff and operations over the No-Action Alternative. The total number of staff needed under this alternative would be expected to increase by 23 full-time positions at a cost of \$3.3 million per year. In addition, implementation of this alternative would be expected to generate additional expenditures for the construction or rehabilitation of facilities and development of a number of studies and plans, all of which are considered one-time costs. On-going operations would bring well-paying, permanent employment opportunities to a traditional, economically depressed area which could have noticeable economic benefits. In addition, one-time construction and plan and

study costs could also generate minor to moderate economic impacts throughout the larger study region, though these impacts are expected to be short-term. This infusion of federal agency spending into the economy would likely generate additional economic activity in terms of jobs and income. The intensity of these impacts would depend on the ability of local firms to have the necessary skills and expertise to meet the requirements of the construction and study projects.

Visitation under alternative B would be expected to increase over the long-term with the expansion of programs, opportunities and facilities at the South Unit. Increases in visitation could lead to increased visitor spending in the local and regional economies as more visitors are spending money while visiting the area or extending their time in southwestern South Dakota. Sustained increases in visitation to the South Unit may also generate additional economic development outside park boundaries which would generate additional economic benefits to a traditionally economically depressed region.

Implementation of alternative B could also cause minor adverse economic impacts as grazing activities are eliminated from Range Unit 505.

Cumulative Impacts. Past, present, and anticipated projects that would contribute to impacts on socioeconomics include (1) the cleanup of the former Bombing Range; (2) resource management under the North Unit GMP/EIS; and (3) approval of the proposed Crazy Horse Scenic Byway. These combined actions would likely be beneficial impacts on socioeconomics due to increased access and exposure to the opportunities at the South Unit. The cumulative effects of all these projects could lead to additional visitation to the South Unit potentially generating additional economic benefits through increased visitor spending. The impacts of other past, present, and anticipated projects, when considered with the impacts of Alternative B, would result in short- and long-term minor impacts on socioeconomics.

Conclusion. The socioeconomic effect of operations and visitor use at the South Unit

under alternative B would be expected to have beneficial economic impacts.

PARK OPERATIONS

Analysis. Staffing levels would increase to approximately 25 full-time positions to implement the actions of alternative B. Under this alternative it is estimated that the park would need an annual operating budget increase of approximately \$3.3 million to operate the South Unit once the alternative is fully implemented. This would result expanding a wide range of recreation opportunities, improving interpretation and education, and improving resource protection, law enforcement, and administration. This would also lead to better services and programs, such as developing an education and outreach program. Expanded staff levels would be ready to face future changes. Knowing the value of promoting volunteers in the park in view of continual shrinking budgets, major emphasis would also be placed on interagency volunteer coordination, which would efficiently leverage partnerships and volunteers to achieve the purposes of the park. Programs to involve volunteers in inventory, monitoring, interpretation and outreach, cultural resource data collection, resource restoration, area or campground hosting, trail patrol, light maintenance, and other aspects of park operations would be continued and expanded. The effects on the South Unit would be beneficial and long term.

Cumulative Impacts. There would continue to be a strong demand for the recreational opportunities that the South Unit would offer as well as those associated with nonprofit organizations and volunteers to be partners in managing all federal lands, not just those of the NPS. The region and the country at large has a strong and growing population of highly skilled, senior population with outside sources of income, who tend to volunteer and would likely be able to supply adequate volunteer services. Even with increasing demands, better organization and use of volunteers would keep supply abreast with demand and benefit park operations.

Conclusion. A clear plan of action and increased staff to implement those actions would result in highly effective park operations and coordination of partners and volunteers to protect resources and serve visitors. The effect would be beneficial.

UNAVOIDABLE ADVERSE IMPACTS

Under alternative B, the activities related to the construction of additional facilities as well as human use, would result in minor adverse impacts on natural resources in some areas of the South Unit. Although these impacts (e.g., soil compaction, vegetation trampling, wildlife disturbances, and decreased opportunities for solitude) would be unavoidable, mitigation to reduce them would be carried out where possible. The impacts on wildlife, vegetation, and visitor experience are discussed in detail for the specific impact topics.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Under alternative B, there would be a commitment of land, raw materials, and consumption of fuels associated with the construction of the new visitor and administrative facilities as described in detail in “Chapter 3: Alternatives, Including the Preferred Alternative.” These energy requirements, raw materials and land requirements to construct new facilities represent an irretrievable commitment of resources.

RELATIONSHIP OF SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

Most of the South Unit would be managed as a Natural Area/Recreation Zone (approximately 89 percent) and would maintain its long-term productivity. A small percentage of the South Unit would be converted to a Development Zone (approximately 11 percent) along the perimeter. The quarry would be managed as a Research Zone (less than 1 percent).

Under alternative B there would be new highly developed visitor and administrative facilities constructed in the Development Zone as well as more primitive facilities for the same purpose within the Natural Area/Recreation Zone. There would be some localized loss of ecological productivity as a result. Actions would be taken to minimize adverse effects on the long-term productivity of biotic communities. The proposed developments within both zones could reduce ecological productivity in some localized areas as a result of construction and increased use.

Short-term impacts might result from construction of new visitor and administrative facilities to resources such as local water pollution, as detailed in the analysis of specific impact topics. Noise and human activity from construction might displace some wildlife from the immediate area. However, these activities would not jeopardize the long-term productivity of the environment except in areas occupied by new facilities. Proposed actions would also yield long-term benefits from a visitor experience perspective.

IMPACTS OF ALTERNATIVE C: FOCUS ON RESOURCE PROTECTION/PRESERVATION

NATURAL RESOURCES

Vegetation

Analysis. Similar to alternative B, under alternative C vegetation would be lost or altered in local areas, primarily from the development or improvement of facilities and visitor services. Most new developments or improvements would be placed within the existing footprint of disturbed areas where the vegetation already has been altered; therefore, little additional loss of native vegetation would result from construction or improvement activities related to the White River Visitor Center. With the use of appropriate mitigation measures to minimize impacts (such as ensuring that equipment stays within project area boundaries, revegetating disturbed areas with native vegetation, avoiding known or possible locations for special-status plant species, and taking steps to avoid the spread of exotic species), there would be short- to long-term negligible to minor adverse effects on native vegetation from these actions.

The elimination of livestock grazing in Range Unit 505 would have an influence on the distribution of some plant species and plant associations resulting in beneficial and short- to long-term negligible adverse effects on vegetation. Moderate grazing reduces mean annual aboveground production of mixed grass prairie only a little but can result in a shift in the relative composition of cool and warm season grasses (Plumb and Dodd 1993). Livestock grazing in the South Unit influences not only the grassland composition but also exotic species distribution. Whereas some nonnative species may actually increase under grazing pressure (e.g., Canada thistle), yellow sweetclover appears to be controlled by grazing. For example, yellow sweetclover occurs in greater abundance on ungrazed lands of the North Unit versus similar grazed lands in the South Unit. Conversely, blue grama/buffalo grass grasslands tend to be absent within the lightly grazed or

ungrazed lands of the North Unit (Bureau of Reclamation 1999).

The elimination of livestock grazing and the introduction of bison to the South Unit would result in beneficial effects and short- to long-term negligible to minor adverse impacts to vegetation. The introduction of bison could create a shift in the composition and structure of native vegetation in the South Unit. Cattle and bison are considered generalist foragers, yet differences in food habits indicate that cattle are more selective foragers than bison. Bison tend to avoid patches dominated by forbs and browse while cattle select more strongly for these forages. Forage selection by bison varies with changes in forage quality and abundance. Evidence suggests that bison graze heavily on a local scale, which when combined with secondary effects such as wallowing, trampling, and rubbing, create a vegetation mosaic resulting in beneficial effects on vegetation. Foraging by cattle is highly associated with temporal and spatial patterns of higher forage quality and/or quantity. Bison respond to spatial and temporal variation in forage quality by selecting for higher quality and thus influence function and structure (Anderson 2006). Additionally wallowing by bison directly impacts late-successional perennial vegetation and provides a refuge for flora different from that of the surrounding grassland. Bison also show greater affinity for rubbing, resulting in substantial physical damage to individual woody plants.

As under alternative B, constructing the new parking lots and the 800 yards of paved roadway would cause both direct and indirect adverse effects on prairie vegetation. Native grassland vegetation would be lost or damaged during siting, construction, and maintenance of the parking lots and roadway. Some rare plants could be lost, although it might be possible to locate the parking areas and road to avoid those plants. Some native plants would be permanently lost because of the parking lot or road footprint. Nonnative plants could be introduced or spread into disturbed areas. Even

with mitigation measures, construction equipment in the project area would result in the damage or loss of other plants resulting in short- to long-term negligible to minor adverse impacts to vegetation.

Vegetation would be altered or lost through increased visitation under alternative C. As under alternatives A and B, people walking over and trampling plants in and around existing facilities would result in the loss of native vegetation. However, due to the minimal amount of development and the preservation of park lands and native vegetation there would be negligible minor impacts to vegetation.

The new entrance station, backcountry ranger station and equestrian facilities, restrooms, and camping areas would be built in previously undisturbed areas. Despite the use of mitigation measures to help reduce the loss of native prairie vegetation, some vegetation would be permanently disturbed or lost in these areas resulting in a long-term minor adverse impact.

As soils would be affected, building or designating new trails and routes would cause both beneficial and adverse effects for the park's vegetation. Hiker and pack stock use would increase on new trails on the perimeter and the interior, resulting in the trampling and loss of vegetation. More erosion in any of these areas would cause the loss of some plants, and the potential for visitors or pack stock to inadvertently carry in and spread exotic species also would increase. Developing a trailhead in the South Unit could encourage more four-wheel-drive use of the unimproved roads in this area, which in turn could increase erosional impacts and native plant loss. If more pack stock used this area, there would be increased potential for the spread of exotic species. Depending on the level of use, time of use, and the vegetation, there could be a minor to moderate long-term adverse impact on vegetation in local areas.

Designating campsites along the primitive roads in the South Unit would increase use in these areas so that some native vegetation probably would be trampled or lost. However, the loss of vegetation from indiscriminate camping and from the creation of informal campsites would

be reduced, a beneficial effect. Development and routine maintenance of facilities, including installation and maintenance of roads, trails, and developed sites within the park would also disturb vegetation locally due to the presence of work crews and clearing of vegetation. These activities would have long-term localized negligible adverse impacts on vegetation.

Designating Natural Area / Recreation Zones in the southwest corner of the park and the Palmer Creek Unit and a large Preservation Zone would eliminate the use of recreational vehicles; this would reduce erosion and the loss of native plants caused by vehicles being driven on or off two-track roads in these areas.

Adding waysides in the southeast corner of the park and the Palmer Creek Unit, interpretive trails, a learning center, backcountry guided tours, and visitor contact stations would benefit park vegetation by improving visitor education. With increased visitor appreciation of native and rare plants, adverse effects on vegetation would be reduced. One beneficial effect of such education would be to help avert the spread of exotic species from visitors walking in the park. The presence of the learning center and the research zone could help encourage research that would benefit the protection and management of the park's vegetation. However, there also would be the potential for the trampling and loss of some rare plants along short interpretive trails.

Most native vegetation in the South Unit would continue to be protected and sustain itself under alternative C. The loss of native vegetation would be reduced by better protection, and native vegetation would benefit from designating campsites, trails, and routes; eliminating the use of recreational vehicles from some areas; and increasing education and interpretation. The beneficial and adverse effects on native vegetation from alternative C would be negligible to moderate.

Cumulative Effects. Other past, present, and anticipated future projects that would contribute both adverse and beneficial impacts on vegetation include (1) the cleanup of the former Bombing Range; (2) resource management actions under the North Unit GMP/EIS;

(3) ongoing prairie dog plague management efforts; (4) management of motorized vehicle use under the Nebraska National Forest Travel Management Plan; (5) major rehabilitation of Loop Road 240; (6) the Mni Wiconi water project; (7) the proposed DM&E rail line; (8) the proposed Crazy Horse Scenic Byway and (9) potential wind power development projects.

Short-term to long term minor adverse impacts to vegetation would result from the loss or alteration of vegetation during construction activities in the South Unit, such as the Mni Wiconi water project, the proposed DM&E rail line, and the proposed Crazy Horse Scenic Byway. Work at the White River Visitor Center area and cleanup efforts at the Bombing Range may cause the loss of natural vegetation and have the potential to contribute to cumulative adverse impacts. Actions outside of the park, including the construction and operation of the DM&E rail line and the designation of the proposed Crazy Horse Scenic Byway, which could increase visitation to the park, and the construction of primitive campgrounds and trails in the national grassland adjacent to the park could alter or cause the loss of native plants. These other actions, added to the developments and improvements of alternative C and a likely increase in visitation, would result in a long-term minor to moderate adverse cumulative effect on the region's native vegetation. Some vegetation would be cut and removed during construction and operation of the roadway and rail line, potentially increasing invasive plant species until mitigation measures are employed. This would result in short-term negligible adverse impacts to vegetation. In addition, park maintenance operations along existing roads would continue to affect plants growing on road shoulders. Grazing in the South Unit would continue, altering the types and distribution of vegetation and slowing the restoration of the natural grassland ecosystem. The construction of the Mni Wiconi water pipeline probably would cause negligible effects on vegetation because it would be built along roads where native vegetation already has been altered. The development of wind power projects outside of the park could result in localized long-term

minor adverse impacts with the removal of vegetation.

In addition to cumulative actions that have negative effects on vegetation, there are also some actions that have beneficial effects. Beneficial effects on the park's vegetation would result from prescribed burning efforts, the reintroduction of native vegetation, and weed management efforts. A beneficial effect on range condition would result from increases in prescribed burning in the adjacent Buffalo Gap National Grassland by reducing fire hazard fuel accumulations and aiding in fire suppression activities by reducing fire intensity and severity protecting existing native vegetation, as is delineated in the Land and Resource Management Plan for the Nebraska National Forest and Associated Units (USFS 2001). The resource management actions under the North Unit GMP/EIS identify desired conditions including specific vegetation conditions for management areas, to help restore native plant communities. Additionally, the management of motorized vehicle use under the Nebraska National Forest Travel Management Plan could have beneficial impacts to vegetation, due to improving resource protection practices. Those actions, when added to the effects of designating trails and routes and campsites in the park; eliminating recreational vehicle use in parts of the park; and reintroducing native plants to disturbed areas, would result in better protection of native vegetation and its possible increase in previously disturbed areas. All these actions would result in a beneficial cumulative effect on the region's native vegetation.

Overall, when all the effects of actions in and outside of the park were added to the effects resulting from alternative C, there would be long-term minor adverse cumulative effects on the park's vegetation. However, the actions of alternative C would add a minimal increment to this cumulative effect because the effects resulting from alternative C would be localized and spread out over time.

Conclusion. Alternative C would have short- to long-term adverse and beneficial effects on vegetation resulting in negligible to moderate adverse effects on vegetation associated with the

development or improvement facilities and visitor services. The impacts of other past, present, and anticipated projects combined with alternative C would likely result in long-term cumulative minor adverse effects on the park's vegetation. However, the actions under alternative C would add a minimal increment to this cumulative impact.

Wildlife

Analysis. New developments, improved access, and increased visitation to parts of the park would be the primary actions affecting wildlife and their habitat under alternative C. Designation of a Preservation Zone approximately 77 percent and a Natural Area/Recreation Zone approximately 21 percent of the South Unit would improve the protection of wildlife populations and habitats by eliminating private vehicle access in that area. This would remove a source of wildlife disturbance from vehicles being driven on or off two-track roads, resulting in a beneficial effect on wildlife populations in local areas.

Initiation of active restoration programs and integrated weed management strategies for disturbed areas would increase the amount of native habitat available to wildlife. These actions would result in localized beneficial effects.

Reintroduction of bison into Range Unit 505 to create a preserve/reserve and the sustainable management of cattle grazing with potential long-term elimination in the South Unit would restore a more native grazing regime. Grazing dynamics between bison, cattle, other ungulates, and prairie dogs would be modified because bison and cattle have different grazing patterns (Plumb and Dodd 1993; Steuter and Hiding 1999). The rate of expansion of prairie dog towns could be slowed by the elimination of cattle grazing over the long-term. Grazing provides open areas, which facilitates colonization by prairie dogs (Uresk et al. 1981; Vermeire et al. 2004). However, the reintroduction of bison would restore a native grazer to the South Unit resulting in beneficial effects.

Increased educational and interpretive efforts under alternative C would generally benefit

wildlife. The addition of waysides, guided trail rides/camping trips, interpretive trails, and a visitor contact station would help educate visitors, increasing their appreciation of wildlife at the South Unit and minimizing impacts they could cause, such as by teaching them to avoid feeding wildlife. This would result in a beneficial effect on the wildlife at the South Unit.

Alternative C would include new developments to enhance visitor access and enjoyment of the South Unit. New developments along the perimeter would cause a permanent loss of some grassland habitat and sparsely vegetated areas. New developments within the interior of the park include the construction of primitive camping areas, pedestrian trails, horseback trails, and a backcountry ranger station and equestrian facilities. These developments would also cause the permanent loss of grassland habitat and sparsely vegetated areas. These losses would primarily affect smaller, less mobile wildlife species and species with smaller home ranges, such as invertebrates. Some reptiles, small mammals, and birds also could be displaced. The loss of habitat would result in a long-term minor adverse effect on animals near these facilities. Increased noise and human activity due to construction of new developments could temporarily displace some animals such as rodents and birds, resulting in minor short-term adverse impacts on wildlife populations in local areas.

Visitation to parts of the park probably would be increased by improved access from developing and improving roadways, wayside exhibits, camping areas, pedestrian trails, and horseback trails. In turn, habitat fragmentation would increase over current levels because of more visitor use of trails and routes. Some wildlife sensitive to the presence of people — pronghorn antelope, bighorn sheep, bobcat, badger, and raptors — might be displaced from areas around these corridors during the peak high use season. These actions would result in a minor to moderate short-term and long-term adverse impact on wildlife populations in local areas, depending on such factors as the level, duration, and type of visitor use, the season of use, and the wildlife species. Increased visitation due to new

developments could indirectly affect some prairie dogs — some visitors might wander into prairie dog towns, affecting the behavior of animals in the area, but any disturbance would be temporary and the effect would be negligible to minor.

New road segments along the perimeter may result in some wildlife being hit by vehicles and injured or killed, resulting in indirect adverse impacts. Maintenance activities along the roadways could disturb wildlife. The extent of the effects would depend partly on the location of the roads and their design. With careful siting of the roads and the use of mitigation measures, the roads would result in a long-term minor to moderate adverse effect on area wildlife.

Some new facilities under alternative C, such as the primitive campsites in the South Unit, probably would result in seasonal increases in wildlife populations that are attracted to people and their food, such as mice, chipmunks, and black-billed magpies. This action would result in a beneficial effect on these populations in local areas.

Hunting could increase in the South Unit with improved access, resulting in more animals being harvested, but with appropriate regulation and monitoring, the adverse effects on wildlife populations would be minor.

Cumulative Effects. Past, present, and anticipated projects that would contribute to impacts on wildlife include (1) resource management under the North Unit GMP/EIS; (2) resource management under the Buffalo Gap National Grassland Land and Resource Management Plan; (3) modifications to motorized travel under the Nebraska Travel Management Plan FEIS; (4) wilderness designation under the proposed *Tony Dean Cheyenne River Valley Conservation Act* of 2010; (5) Prairie Dog Management Plan activities and plague efforts; (6) training activities under the South Dakota National Guard Training Sites (2010-2015) Environmental Assessment; (7) construction activities associated with the Mni Wiconi water project; (8) the proposed DM&E rail line; and (9) the proposed Crazy Horse Scenic Byway. These actions would likely have short- and long-

term minor adverse impacts on wildlife due to land disturbance activities from construction projects and other human uses which would result in some mortality to wildlife, increased fragmentation of wildlife habitats, increased potential for wildlife to be displaced and reduced number of areas where wildlife could exist without people or facilities. These actions would also have beneficial impacts on wildlife from improved resource management, additional protections from designation of wilderness area, and decreased impacts from motorized vehicles. Management efforts to expand prairie dogs at Buffalo Gap National Grassland and plague dusting efforts in the North Unit would have beneficial effects on the species. When the beneficial and adverse impacts of other past, present, and anticipated projects are considered with the impacts of alternative C, there would be long-term minor adverse impacts on wildlife.

Conclusion. Alternative C would have short- and long-term minor to moderate adverse impacts to wildlife; as well as beneficial impacts. The impacts of other past, present, and anticipated projects combined with alternative C would likely result in long-term minor adverse impacts.

PALEONTOLOGICAL RESOURCES

Analysis. Alternative C focuses on fossil resource protection. Changes in proposed management would increase public education activities, reduce public vehicle access, and provide for increased law enforcement patrols. Alternative C would provide for paleontological inventories for planned projects and the location, documentation, and preservation of fossils in the South Unit. Paleontologists, fossil preparators, and park curators would be hired to manage and implement these activities. Livestock grazing would gradually be eliminated from the South Unit. Interpretation of paleontological resources within the context of Lakota oral history could be developed through increased interpretive opportunities that focus on Lakota and OST Tribal beliefs. There would be a focus on elders and spiritual leaders and their oral history about fossil resources. In addition, visitor activities would be restricted to the perimeter, reducing

the potential for theft or inadvertent damage of fossils.

There are plans to build a LHEC on land close to the South Unit. In addition, alternative C includes the upgrade of the White River Visitor Center. The increase in educational facilities, fossil preparation, and curatorial facilities would have a beneficial effect on fossil resources.

Therefore, the current long-term adverse impacts would be reduced in the foreseeable future under alternative C, and beneficial impacts would occur based on increased paleontological inventory, collection, preservation, law enforcement presence, availability of appropriate personnel, and interpretation/public education.

Cumulative Effects. The primary projects and actions that could contribute to cumulative effects are summarized below.

Past, present, and anticipated projects that would contribute to impacts on paleontological resources include (1) the cleanup of the former Bombing Range; (2) resource management under the North Unit GMP/EIS; (3) actions on the Buffalo Gap National Grassland; (4) the Mni Wiconi water project; (5) the proposed DM&E rail line; (6) the proposed Crazy Horse Scenic Byway; and (7) a fossil resources protection ordinance planned by the OST. These combined actions would likely have short- and long-term moderate beneficial impacts on paleontological resources because they would provide for appropriate inventory, protection, and preservation of important fossil resources.

Conclusion. Alternative C would have potential beneficial effects on paleontological resources. This would be caused primarily by an expected reduction in illegal removal of fossils from the South Unit by visitors and collectors and reduced livestock trampling of fossils. However, the reintroduction of bison could have an adverse impact through increased trampling of fossils.

Impacts could be mitigated by continuing efforts to educate visitors about fossils, efforts to allocate existing law enforcement resources toward fossil protection, inventories to locate and protect fossils, and availability of professional personnel. Added to this, other

actions in and outside of the park could result in a cumulative beneficial impact. Most impacts to fossil resources outside of the South Unit are being addressed and mitigated through actions such as law enforcement, inventory of planned projects, and collection for study and preservation.

The effects on paleontological resources under alternative C are anticipated to be beneficial. Illegal fossil collecting should decrease from increased law enforcement, and increased inventory. Any loss of fossils, reduced from current levels would not destroy the integrity of the park relative to paleontological resources—fossils would continue to be present throughout the park, and the park staff would continue to protect, interpret, and provide opportunities for scientific research on paleontological resources. People still could come to the South Unit and enjoy its values, including its fossils.

SOUNDSCAPES

Analysis. Impacts related to soundscapes under alternative C would primarily be a result of constructing campgrounds, backcountry facilities, and access to unpaved pedestrian and horseback trails. These construction activities would largely occur in the Natural Area/Recreation Zones of the South Unit, which would be contained to the southwest corner of the park and the Palmer Creek Unit. Impacts to soundscapes associated with these construction activities would be short-term, moderate, and adverse. Furthermore, construction activities within the proposed Development Zone of alternative C, located on the southeast portion of the South Unit, including the construction of parking lots and visitor facilities, would also have short-term, moderate adverse impacts on soundscapes within the South Unit.

Cumulative Effects. As with the No-Action Alternative, short-term minor to moderate adverse effects from noise would be caused by park construction machinery within the South Unit, including construction of the LHEC. Cleanup operations of the former Bombing Range would also likely cause short-term minor to moderate adverse effects on soundscapes within the South Unit. Outside the South Unit,

the construction of the Mni Wiconi water project would generate noise that would be audible in places in the South Unit. Traffic along BIA Routes 27 and 2, and BIA 41, as well as traffic leading to the solid waste management facility at Red Shirt would continue to generate noise intrusions in the South Unit, resulting in long-term, negligible to minor adverse impacts on soundscapes within the South Unit. The potential extension of the DM&E railroad and the construction of the proposed Crazy Horse Scenic Byway could also have short-term negligible to minor adverse impacts on soundscapes within the South Unit. These effects, added to noise caused by visitors and park operations under alternative C, would result in short- and long-term minor to moderate cumulative adverse noise effects in local areas. When these noises are combined with the sounds of visitor and administrative use in the South Unit, there could be negligible to minor, long term, adverse cumulative impacts on soundscapes.

Conclusion. Due to the construction activities proposed under alternative C, the soundscapes within the South Unit would likely change considerably in the short-term. However, in areas not identified as areas for future construction, there would continue to be long-term negligible to minor adverse effects on the park's soundscape in local areas, largely from visitation and administrative activities in developed areas. Noise from activities under alternative C added to noise from other actions within and outside the South Unit could result in short-and long-term, moderate adverse cumulative effects in local areas.

CULTURAL RESOURCES

Archeological Sites

Analysis. Under alternative C, focusing on archeological resource protection, changes in proposed management would increase public education activities, reduce public vehicle access, and provide for increased law enforcement patrols. Alternative C would provide for archeological inventories for planned projects and the location, documentation, and

preservation of archeological resources in the South Unit. Databases would be prepared to aid in cultural resource management. An archeological resources management plan and a curatorial management plan would be completed. Livestock grazing would continue, but would eventually be phased out. These activities associated with the restoration of the rangeland would likely be beneficial because restoration focuses on restoring vegetation and reducing erosion. Interpretation of archeological resources within the context of Lakota oral history could be developed through increased interpretive opportunities that focus on Lakota and OST Tribal beliefs. There would be a focus on elders and spiritual leaders and their oral history about archeological resources. Visitor activities would be restricted primarily to the perimeter, reducing the potential for theft or inadvertent damage of archeological materials.

Therefore, beneficial impacts would occur based on increased archeological inventory, collection, preservation, law enforcement presence, availability of appropriate personnel, control of access to the interior by the public, and interpretation/public education. Negligible to minor adverse impacts would continue to occur from natural weathering, erosion, or landslides.

Cumulative Effects. The primary projects and actions that could contribute to cumulative effects are summarized below.

Past, present, and anticipated projects that would contribute to impacts on archeological resources include (1) the cleanup of the former Bombing Range; (2) resource management under the North Unit GMP/EIS; (3) actions on the Buffalo Gap National Grassland; (4) the Mni Wiconi water project; (5) the proposed DM&E rail line; and (6) the proposed Crazy Horse Scenic Byway. These combined actions would likely have beneficial impacts on archeological resources because they would generally provide for appropriate inventory, protection, and preservation of important fossil resources.

The impacts of other past, present, and anticipated projects, when considered with the impacts of alternative C, would result in beneficial impacts to archeological resources. All proposed construction projects should

include archeological resources inventories and implemented measures to protect them. If so, these projects should have a beneficial impact on archeological resources as additional surveying would occur.

Conclusion. Alternative C would result in beneficial effects on archeological resources. This would be caused primarily by an expected reduction in illegal removal of archeological materials from the South Unit by visitors and collectors and reduced livestock trampling. Impacts related to continued weathering and mass wasting could be mitigated by continuing efforts to educate visitors about archeological resources, efforts to allocate existing law enforcement resources towards resource protection, and inventories to locate and protect archeological sites. Added to this, other actions in and outside of the park could result in a beneficial impact. Most impacts to archeological resources outside of the South Unit would generally be addressed and mitigated through actions such as law enforcement, inventory of planned projects, and collection for study and preservation.

The effects on archeological resources under alternative C are anticipated to be beneficial. Illegal collecting should decrease due to increased law enforcement and increased inventory. Losses of archeological materials should be reduced considerably, and increasingly limited to losses through natural processes. Park staff would continue to protect, interpret, and provide opportunities for scientific research on archeological resources. For the purposes of Section 106, the determination of effect would be *no adverse effect*.

Museum Collections

Analysis. Under alternative C, no active paleontological quarry would be opened. Park personnel would collect fossils deemed to be at risk of theft or erosion and where feasible, fossils would be cast for exhibit. These specimens would be housed in offsite repositories until the LHEC is operational. In addition, surveys and inventories of archeological resources would be developed and findings documented and the artifacts stored

either at Midwest Archeological Center or the LHEC.

The current configuration for storage at the LHEC facility is currently unknown, but for this study, it was assumed LHEC would be able to house all specimens from the South Unit through the life of this management plan. It is intended that the off-site storage of collections would eventually come to an end. The collection would be subject to a minor adverse impact because the collection would continue to be split between facilities for some time before the LHEC would become available.

Under this alternative, it is the intention of the OST to gain control of all specimens that have been taken from the South Unit, as practical. If the Tribe is successful in that effort, it is unlikely to be adequate storage space for all the collection to be housed in any single facility. The collection would again be subject to a minor adverse impact because the collection would continue to be split between facilities.

Finally, the movement of fragile materials between facilities may cause the loss of materials. The impact would be a minor adverse.

Cumulative Effects. Numerous museums and private parties holding archeological and fossil collections from the badlands of South Dakota exist throughout the world as a result of excavations by government agencies, universities, historical societies, and individuals over the last approximately 150 years. Known collections at the facilities in South Dakota are extensive. The collections within the park make up a small but important portion of the whole collection. The collections would be expanded through donation, testing prior to development, excavations of sites inadvertently identified during construction work, or monitoring resource conditions in the field. Other activities identified as occurring within and external to the South Unit are unlikely to add a large amount of museum specimens to the collections. Cumulative impacts are expected to be minor and adverse.

Conclusion. Items in the collections would continue to be stored and maintained, with some facilities meeting NPS museum storage

standards. It is assumed for this study that the LHEC would be able to house known collections from the South Unit. There would be a long-term minor adverse impact on the overall preservation and usefulness of the collections. Accessibility to the collection by researchers and the public would be increased.

Ethnographic Resources

Analysis. Park managers would consult with the OST to develop and accomplish programs in a way that respects the beliefs, traditions, and other cultural values of the Tribe that has ancestral ties to South Unit lands. NPS staff would maintain a government-to-government relationship with the Tribe to ensure a collaborative working relationship, and would consult regularly with them before taking actions that would affect natural and cultural resources that are of interest and concern to them. Access to, and use of, American Indian sacred sites by American Indian religious practitioners would be accommodated in a manner that is consistent with applicable law, regulations, executive orders, and policy.

Ethnographic resources, including sacred sites and traditional cultural properties, would be identified and protected from impacts associated with the implementation of this alternative through increased consultation and inventory. As a result, there would be no effects on ethnographic resources from this alternative. Alternative C would not result in any change in access by American Indians or use of ethnographic resources sacred to the tribes. The alternative would not change the agreement that guarantees tribal members unrestricted access in perpetuity and requires their written consent to affect those sites. Consultation with tribes to identify traditional use areas would precede ground-disturbing or other activities that could affect the current use, viewshed, or perception of the resource.

Cumulative Effects. Actions inside the South Unit could affect ethnographic resources, including traditional cultural properties. Efforts to clean up the Bombing Range could alter vegetation patterns and landscapes, affecting the viewshed of a sacred site. Although surveys and

cleanup plans would help to reduce the extent of these effects, the cleanup efforts could result in long-term moderate, and possibly major adverse impacts.

Past, present, and anticipated projects that would contribute to impacts on ethnographic resources include (1) the cleanup of the former Bombing Range; (2) resource management under the North Unit GMP/EIS; (3) the Mni Wiconi water project; (4) the proposed DM&E rail line; and (5) the proposed Crazy Horse Scenic Byway. These combined actions would likely have beneficial impacts on ethnographic resources because they would provide for appropriate inventory, protection, and preservation of ethnographic resources through tribal consultation.

The impacts of other past, present, and anticipated projects, when considered with the impacts of alternative C, would result in beneficial impacts to ethnographic resources.

Conclusion. Alternative C would have the potential to result in beneficial effects on ethnographic resources due to increased inventory and protection, and the addition of appropriate interpretation. Added to this, other actions in and outside of the park could result in a beneficial impact; and the DM&E project's potential long-term moderate to major adverse effects. Most impacts to ethnographic resources outside of the South Unit would be addressed and mitigated through actions such as inventory of planned projects, tribal consultation, documentation and preservation.

For the purposes of Section 106, implementing alternative C would result in *no adverse effect* on ethnographic resources in the South Unit. Until the completion of inventories of ethnographic resources, park managers would conduct site-specific surveys and consult as appropriate with American Indians for each development action.

SCENIC RESOURCES

Analysis. Under alternative C, additional facilities would be added to the park such as improved roadways, new visitor contact and entrance structures, new small parking areas

with short access roads, developed campgrounds with amenities such as restrooms, overlooks, and interpretive signing. These facilities would increase human use in the developed areas and along roadways. These facilities and use however would be dispersed throughout the South Unit. As under the No-Action Alternative, any expanded residential ranching structures would be visible in the vast open areas of the South Unit in the future. Expanding developments and activities related to ranching could generate more dust. Overall such development and activities would intrude upon the area's scenery affecting visibility, and introducing new light sources into the night sky. Such developments and land uses would be relatively small in scale and would have negligible to minor, long-term, localized, adverse impacts on scenery.

With the addition of trailheads more people would be dispersed throughout the park along trails for hikers and horseback use. These types of use can cause soil erosion and airborne dust particles that tend to linger in the air for short periods, affecting visibility. Overall, limited and highly dispersed new facilities and activities in areas of development would have short-term and long-term, localized, negligible to minor impacts on scenery and visibility.

New sources of outdoor light associated with new structures such as campgrounds, visitor contact stations and entrance stations and expanding the visitor center would be introduced. These sources of light would be minimal. Public activities would generally be scheduled for daylight hours, and any new lighting needs would be minimized. Impacts on night sky from the implementation of alternative C would be negligible to minor, long term, and adverse.

Cumulative Impacts. Rehabilitation of the main park roads and parking areas and the addition of the facilities would increase the capacity of the park by an estimated 15 to 20 percent. This would result in a negligible, long-term, localized, adverse impact on the scenic resources of the park. Community and commercial scale renewable energy development on the Pine Ridge Indian

Reservation could have major adverse impacts on the scenic resources of the South Unit, permanently altering the panoramic vistas with the construction of wind turbines and/or solar panels on sites adjacent to the South Unit.

Overall, the development proposed under this alternative would intrude upon the area's natural scenery, affect visibility, and introduce new light sources into the night sky. Combined with other past, present, and reasonably foreseeable future impacts, impacts generated as a result of implementing alternative C would be long term, minor to major, and adverse.

Conclusion. Alternative C would have negligible to major, short-and long-term, localized, adverse impacts on scenery, visibility, and night sky.

VISITOR EXPERIENCE

Access

Analysis. Under alternative C, recreational opportunities would be available through guided trail rides, and hiking trails and camping sites would be established along the perimeter of the South Unit. Hiking would be allowed on some primitive trails in the Natural Area / Recreation Zone, with limited access to the Palmer Creek Unit. Visitors could plan and schedule guided backcountry camping trips at a backcountry contact station/visitor center. Guided horse camping trips would be offered.

Developed perimeter access would be focused in one location with trails, trailheads, parking areas, rest areas with comfort stations, overlooks, and wayside exhibits. Visitors could explore the South Unit at dispersed visitor access points along the perimeter. There would not be any improved roads providing access to the interior.

Park management would institute a reservation trail system for unguided access into the interior. Guided trail tours would take visitors to select areas in the interior. Biking along the roads would be encouraged in places where bike lanes could be established.

Access would be afforded through the means identified above, thus restricting unguided access to ceremonial and other cultural sites of the South Unit. Preservation Zones would be established for limited access through guided tours only.

Cumulative Effects. Traffic projections indicate that a substantial increase in park visitation could result from the completion of the Heartland Expressway and the proposed Crazy Horse Scenic Byway. The increase from these roads originating from the south and west, added to visitation projections, could alter the current visitation patterns to the park. The routes for these two road projects already exist, but typically park visitors do not use them. Visitors' access to the park's South Unit would be improved by the upgrading of the roads and by their being emphasized with designations.

Conclusion. By improving access in the South Unit, alternative C would produce a beneficial effect on visitor access. The improvement in access would come from improvement of the local roads, guided tours into the backcountry, construction of new parking lots, increased camping opportunities, the development of interior pedestrian trails, and improved signage on surrounding roads. Access into the backcountry would be limited.

Availability of Information

Analysis. Under alternative C, park managers would continue to design exhibits with OST input. However, under alternative C, interpretive opportunities would be offered to visitors in a variety of new ways:

- A better understanding of Lakota culture would be promoted through a variety of education and interpretive offerings, such as living history and opportunities to meet with, listen to, and talk with Tribal elders, spiritual leaders, and native interpreters. The White River Visitor Center would add biological and ecological interpretation to exhibits about Oglala history and culture. Multiple vista points around the perimeter would include wayside

exhibits on the cultural importance of ethnographic resources.

- Emphasis would be placed on the preservation of Lakota language and culture through a variety of education and interpretation programs, such as family history and living history, monuments that memorialize events in Lakota history, and wayside exhibits that focus on native background and history. There would be a focus on elders and spiritual leaders. The Lakota language and Oglala culture would be incorporated into programs, interpretive displays, and wayside exhibits. Bilingual (English and Lakota) signs would be used on roads, in interpretive displays, and elsewhere.
- Historic and cultural discovery would occur at activities such as powwows and ceremonies. At some cultural or ceremonial sites, as well as at campgrounds, interpretive activities would be presented so visitors could learn more about the Lakota culture and history. Programs would feature tribal members who wear and explain traditional dress, and story-telling and oral history would be presented by Tribal elders.
- Interpretation of the Bombing Range would continue.
- Interpretive signs would be placed along roads to identify locations, animals and plants, historic locations, and mileages.
- The exhibits at the White River Visitor Center would be improved and expanded, and there would be a working museum with hands on education section and an entrance station would be developed in the vicinity of the White River Visitor Center. A visitor contact station would also be developed on the west side of the South Unit. Interpretation and orientation information would also be available at the LHEC.

As a result of the expanded interpretive opportunities under alternative C, beneficial impacts on the availability of information about park resources would occur.

Cumulative Effects. The development of the proposed interpretive trails under the Nebraska National Forest Land and Resource Management Plan could also provide additional opportunities to disseminate information to visitors. These projects would produce beneficial effects on the availability of information for visitors.

Conclusion. Alternative C would result in beneficial effects on the availability of information about the park. The increase in the number of outlets where visitors could obtain information and the dispersed locations of these outlets would substantially improve the visitor experience.

Range and Enjoyment of Visitor Activity

Analysis. Vehicle use, hiking and pack stock use, camping, and picnicking are the four most popular activities.

Vehicle Use. Under alternative C, developed perimeter access would be focused in one location with trails, trailheads, parking areas, rest areas with comfort stations, overlooks, and wayside exhibits. Visitors could explore the South Unit at dispersed visitor access points along the perimeter. There would not be any improved roads providing access to the interior. Therefore, long-term minor beneficial impacts would occur from providing improved access on the perimeter of the park, while eliminating vehicles from much of the rest of the South Unit.

Hiking and Pack Stock. Under alternative C, hiking and pack stock opportunities would be available through guided trail rides, and hiking trails and camping sites would be established along the perimeter of the South Unit. Hiking would be allowed on some primitive trails in the Natural Area/Recreation Zone, with limited access to the Palmer Creek Unit. Park management would institute a reservation trail system for unguided access into the interior. Guided trail tours would take visitors to select areas in the interior. Thus, long-term negligible

beneficial impacts to hiking and pack stock use would occur as a result of developing a small amount of additional hiking trails and pack stock opportunities under alternative C.

Camping. Primitive camping would be allowed by permit in designated areas along the perimeter and in the Natural Area/Recreation Zone. Visitors could plan and schedule guided backcountry camping trips at a backcountry contact station/visitor center. Guided horse camping trips would also be offered. Developed camping would not be provided in the Development Zone. Therefore, long-term negligible beneficial impacts to camping would occur from established camping on the perimeter of the South Unit, while also eliminating camping from much of the rest of the South Unit.

Picnicking. There would be expanded opportunities to picnic, such as along the perimeter of the South Unit, but picnicking would be limited to much of the rest of the South Unit.

Cumulative Effects. It is projected that various plans for road improvements in the region would increase opportunities for driving and sightseeing. If the proposed Crazy Horse Scenic Byway were designated and marked by signs, it would offer an additional scenic driving opportunity in the region. The management plan for Buffalo Gap National Grassland calls for the development of a primitive campground near the South Unit, expanding the region's camping opportunities (USFS 2001). These projects would result in beneficial impacts for visitors seeking recreational opportunities in the region.

Conclusion. There would be slightly more opportunities throughout the park for visitors seeking to drive/sightsee, hike, camp, and/or picnic, creating beneficial effects on such visitors.

SOCIOECONOMICS

Analysis. Implementation of alternative C would be expected to lead to an increase in expenditures on staff and operations over the No-Action Alternative. The total number of staff needed under this alternative would be expected

to increase to 21 full-time positions at a cost of \$2.5 million per year. In addition, implementation of this alternative would be expected to generate additional expenditures for the construction or rehabilitation of facilities (\$11.2 million) and development of a number of studies and plans (\$4.7 million), all of which are considered one-time costs. On-going operations would bring well paying, permanent employment opportunities to a traditional, economically depressed area which could have noticeable economic benefits. In addition, one-time construction and plan and study costs could also generate minor to moderate economic impacts throughout the larger study region, though these impacts are expected to be short-term. This infusion of federal agency spending into the economy is likely to generate additional economic activity in terms of jobs and income. The intensity of these impacts would depend on the ability of local firms to have the necessary skills and expertise to meet the requirements of the construction and study projects.

Visitation under alternative C would be expected to increase over the long-term compared to that which would exist under the No-Action Alternative. However, visitation under this alternative would not increase as much as other action alternatives due to the emphasis on preservation, restoration of natural and cultural resources. Increases in visitation would likely result in increased visitor spending in the local and regional economy due to more visitors spending money while visiting the area or extending their time in southwestern South Dakota, though it is expected the impact would be small. In addition, increased sustained visitation to the South Unit under this alternative would not be sufficient to generate additional economic development outside park boundaries that would generate additional economic benefits to a traditionally economically depressed region.

Implementation of alternative C could also cause adverse economic impacts as grazing leases are eliminated over time at the South Unit.

Cumulative Impacts. Past, present, and anticipated projects that would contribute to impacts on socioeconomics include (1) the

cleanup of the former Bombing Range; (2) resource management under the North Unit GMP/EIS; and (3) approval of the proposed Crazy Horse Scenic Byway. These combined actions would likely have short- and long-term beneficial impacts on socioeconomics due to increased access and exposure to the opportunities at the South Unit, potentially generating additional visitation to the South Unit which could generate additional economic benefits through increased visitor spending. The impacts of other past, present, and anticipated projects, when considered with the impacts of alternative C, would result in beneficial impacts on socioeconomics.

Conclusion. The socioeconomic effect of operations and visitor use at the South Unit under the alternative C would be expected to have beneficial economic impacts.

PARK OPERATIONS

Analysis. Staffing levels would increase to approximately 21 full-time positions to implement the actions of alternative C. Under this alternative it is estimated that the park would need an annual operating budget increase of approximately \$2.5 million to operate the South Unit once the alternative is fully implemented. This would result expanding a wide range of recreation opportunities, improving interpretation and education, improving resource protection, law enforcement, and administration. This would also lead to better services and programs, such as developing an education and outreach program. Expanded staff levels would be ready to face future changes. Knowing the value of promoting volunteers in the park in view of continual shrinking budgets, major emphasis would also be placed on interagency volunteer coordination, which would efficiently leverage partnerships and volunteers to achieve the purposes of the park. Programs to involve volunteers in inventory, monitoring, interpretation and outreach, cultural resource data collection, resource restoration, area or campground hosting, trail patrol, light maintenance, and other aspects of park operations would be continued

and expanded. The effects on the South Unit would be major, beneficial, and long term.

Cumulative Impacts. There would continue to be a strong demand for the recreational opportunities that the South Unit would offer as well as those associated with nonprofit organizations and volunteers to be partners in managing park lands. The region and the country at large has a strong and growing population of highly skilled, senior population with outside sources of income, who tend to volunteer and would likely be able to supply adequate volunteer services. Even with increasing demands, better organization and use of volunteers would keep supply abreast with demand and benefit park operations.

Conclusion. A clear plan of action and increased staff to implement those actions would result in highly effective park operations and coordination of partners and volunteers to protect resources and visitors. The effect would be beneficial.

UNAVOIDABLE ADVERSE IMPACTS

Under alternative C, the activities related to the construction of additional facilities, as well as human use, would result in minor adverse impacts on natural resources in some areas of the South Unit. Although these impacts (e.g., soil compaction, vegetation trampling, wildlife disturbances, and decreased opportunities for solitude) would be unavoidable, mitigation to reduce them would be carried out where possible. The impacts on wildlife, vegetation, and the visitor experience are discussed in detail for the specific impact topics.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Under alternative C, there would be a commitment of land, raw materials and consumption of fuels associated with the

construction of the new visitor and administrative facilities as described in detail in “Chapter 3: Alternatives, Including the Preferred Alternative.” These energy requirements, raw materials and land requirements to construct new facilities represent an irretrievable commitment of resources for a period of time.

RELATIONSHIP OF SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

The majority of the South Unit would be managed as a Preservation Zone (approximately 77 percent), allowing the park to maintain its long-term productivity. Only a small percentage of the South Unit would be converted to Development Zone (approximately 2 percent). A Natural Area/Recreation Zone (approximately 21 percent) would exist along the perimeter.

Under alternative C, new highly developed visitor use and administrative facilities would be constructed in the Development Zone as well as more primitive facilities for the same purpose within the Natural Area/Recreation Zone. There would be some localized loss of ecological productivity as a result. The proposed developments within both zones could reduce ecological productivity in some localized areas as a result of construction and increased use. Actions would be taken to minimize adverse effects on the long-term productivity of biotic communities. Proposed actions would yield long-term benefits from a visitor experience perspective.

Short-term impacts might result from construction of new visitor and administrative facilities to resources such as local water pollution, as detailed in the analyses of specific impact topics. Noise and human activity from construction and restoration might displace some wildlife from the immediate area. However, these activities would not jeopardize the long-term productivity of the environment except in areas occupied by new facilities.

IMPACTS OF ALTERNATIVE D: PROTECT RESOURCES WHILE EXPANDING INTERPRETIVE OPPORTUNITIES (PREFERRED ALTERNATIVE)

NATURAL RESOURCES

Vegetation

Analysis. Vegetation would be lost or altered in local areas under alternative D, primarily from the development or improvement of facilities and visitor services. Most new developments or improvements would be placed within the existing footprint of disturbed areas in which the vegetation already has been altered; therefore, little additional loss of native vegetation would result from construction or improvement actions proposed under alternative D. Given the previous vegetation disturbance along existing perimeter roadways in most of these areas, and with the use of appropriate mitigation measures to minimize additional impacts (such as ensuring that equipment stays within project area boundaries, revegetating disturbed areas with native vegetation, avoiding known or possible locations for special-status plant species, and taking steps to avoid the spread of exotic species), there would be negligible to minor adverse effects on native vegetation from these actions.

The elimination of livestock grazing in Range Unit 505 would have an influence on the distribution of some plant species and plant associations resulting in short- to long-term beneficial and short- to long-term negligible adverse effects on vegetation. Moderate grazing reduces mean annual aboveground production of mixed grass prairie only a little but can result in a shift in the relative composition of cool and warm season grasses (Plumb and Dodd 1993). Livestock grazing in the South Unit influence not only the grassland composition but also exotic species distribution. Whereas some nonnative species may actually increase under grazing pressure (e.g., Canada thistle), yellow sweetclover appears to be controlled by grazing. For example, yellow sweetclover occurs in greater abundance on ungrazed lands of the

North Unit versus similar grazed lands in the South Unit. Conversely, blue grama/buffalo grass grasslands tend to be absent within the lightly grazed or ungrazed lands of the North Unit (Bureau of Reclamation 1999).

The elimination of livestock grazing and the introduction of bison to the South Unit would result in short- to long-term beneficial effects and short- to long-term negligible to minor adverse impacts to vegetation. The introduction of bison could create a shift in the composition and structure of native vegetation in the South Unit. Cattle and bison are considered generalist foragers, yet differences in food habits indicate that cattle are more selective foragers than bison. Bison tend to avoid patches dominated by forbs and browse while cattle select more strongly for these forages. Forage selection by bison varies with changes in forage quality and abundance. Evidence suggests that bison graze heavily on a local scale, which when combined with secondary effects such as wallowing, trampling, and rubbing, create a vegetation mosaic resulting in long-term beneficial effects on vegetation. Foraging by cattle is highly associated with temporal and spatial patterns of higher forage quality and/or quantity. Bison also respond to spatial and temporal variation in forage quality by selecting for higher quality and thus influence function and structure (Anderson 2006). Additionally wallowing by bison directly impacts late-successional perennial vegetation and provides a refuge for flora different from that of the surrounding grassland. Bison also show greater affinity for rubbing, resulting in substantial physical damage to individual woody plants.

Constructing new parking lots and improving the existing road to the quarry west of Sheep Mountain Table would cause both direct and indirect adverse effects on prairie vegetation. Native grassland vegetation would be lost or damaged during siting, construction, improvement, and maintenance of the parking lots and roadway. Some rare plants could be

lost, although it might be possible to locate improvements to the road to avoid those plants. Some native plants would be permanently lost because of the parking lot or road footprint. Several indirect impacts also could result from the improvement of the road segment. If erosion along the road increased, more vegetation would be lost. Nonnative plants could be introduced or spread into disturbed areas. If visitors created additional “informal” pull-offs by parking off the side of the road, some roadside plants might be crushed, trampled, or picked. Even with mitigation measures, construction equipment in the project area would result in the damage or loss of other plants resulting in short- to long-term negligible to minor adverse impacts to vegetation.

Vegetation would be altered or lost through visitation under alternative D. As in the other alternatives, people walking over and trampling plants in and around new campgrounds, campsites, road overlooks, picnic areas, and trailheads would cause the loss of native vegetation. These actions would result in long-term minor to moderate adverse effects on vegetation.

As soils would be affected, building or designating new trails and routes would cause both beneficial and adverse effects for the park’s vegetation. Hiker and pack stock use would increase on new trails on the perimeter and the interior, resulting in the trampling and loss of vegetation. More erosion in any of these areas would cause the loss of some plants, and the potential for visitors or pack stock to inadvertently carry in and spread exotic species also would increase. Developing a trailhead in the South Unit could encourage more four-wheel-drive use of the unimproved roads in this area, which in turn could increase erosional impacts and native plant loss. If more pack stock used this area, there would be increased potential for the spread of exotic species. Depending on the level of use, time of use, and the vegetation, there could be a minor to moderate long-term adverse impact on vegetation in local areas.

Designating campsites along the primitive roads in the South Unit would increase use in these

areas, so that some native vegetation probably would be trampled or lost. However, the loss of vegetation from indiscriminate camping and from the creation of informal campsites would be reduced, a minor beneficial effect.

Development and routine maintenance of facilities, including installation and maintenance of roads, trails, and developed sites within the park would also disturb vegetation locally due to the presence of work crews and clearing of vegetation. These activities would have long-term localized negligible adverse impacts on vegetation.

Adding interpretive opportunities would benefit park vegetation by improving visitor education. With increased visitor appreciation of native and rare plants would be increased, so that adverse effects on vegetation would be reduced. One beneficial effect of such education would be to help avert the spread of exotic species from visitors walking in the park. The presence of the learning center and the research zone could help encourage research that would benefit the protection and management of the park’s vegetation. However, there also would be the potential for the trampling and loss of some rare plants along short interpretive trails.

Most native vegetation in Badlands National Park would continue to be protected and sustain itself under alternative D. The loss of native vegetation would be reduced by better protection, and native vegetation would benefit from designating campsites, trails, and routes, eliminating the use of recreational vehicles from some areas, and increasing education and interpretation. The short- to long-term beneficial and adverse effects on native vegetation from alternative D would be negligible to moderate.

Cumulative Effects. Other past, present, and anticipated future projects that would contribute both adverse and beneficial impacts on vegetation include: (1) the cleanup of the former Bombing Range; (2) resource management actions under the North Unit GMP/EIS; (3) management of motorized vehicle use under the Nebraska National Forest Travel Management Plan; (4) the Mni Wiconi water project; (5) the proposed DM&E rail line; (6) the proposed

Crazy Horse Scenic Byway and (7) potential wind power development projects.

Short-term to long term minor adverse impacts to vegetation would result from the loss or alteration of vegetation during construction activities in the South Unit, such as the Mni Wiconi water project, the proposed DM&E rail line, and the proposed Crazy Horse Scenic Byway. Work at the White River Visitor Center area and cleanup efforts at the Bombing Range may cause the loss of natural vegetation and have the potential to contribute to cumulative adverse impacts. Actions outside of the park, including the construction and operation of the DM&E rail line and the designation of the proposed Crazy Horse Scenic Byway, which could increase visitation to the park, and the construction of primitive campgrounds and trails in the national grassland adjacent to the park could alter or cause the loss of native plants. These other actions, added to the developments and improvements of alternative D and a likely increase in visitation would result in a long-term minor to moderate adverse cumulative effect on the region's native vegetation. Some vegetation would be cut and removed during construction and operation of the roadway and rail line, potentially increasing invasive plant species until mitigation measures are employed. This would result in short-term negligible adverse impacts to vegetation. In addition, park maintenance operations along existing roads would continue to affect plants growing on road shoulders. Grazing in the South Unit would continue, altering the types and distribution of vegetation and slowing the restoration of the natural grassland ecosystem. The construction of the Mni Wiconi water pipeline probably would cause negligible effects on vegetation because it would be built along roads where native vegetation already has been altered. The development of wind power projects outside of the park could result in localized long-term minor adverse impacts with the removal of vegetation.

In addition to cumulative actions that have negative effects on vegetation, there are also some actions that have beneficial effects. Long-term beneficial effects on the park's vegetation would result from continued NPS prescribed

burning efforts, the reintroduction of native vegetation, and weed management efforts. A beneficial long-term effect on range condition would result from increases in prescribed burning in the adjacent Buffalo Gap National Grassland by reducing fire hazard fuel accumulations and aiding in fire suppression activities by reducing fire intensity and severity protecting existing native vegetation, as is delineated in the Land and Resource Management Plan for the Nebraska National Forest and Associated Units (USFS 2001). The resource management actions under the North Unit GMP/EIS identify desired conditions including specific vegetation conditions for management areas, to help restore native plant communities. Additionally, the management of motorized vehicle use under the Nebraska National Forest Travel Management Plan could have long-term beneficial impacts to vegetation, due to improving resource protection practices. Those actions, when added to the effects of designating trails and routes and campsites in the park, eliminating recreational vehicle use in parts of the park, increasing educational and interpretive efforts, changing the use of Sheep Mountain Table, and encouraging more research, would result in better protection of native vegetation and its possible increase in previously disturbed areas. All these actions would result in a long-term beneficial cumulative effect on the region's native vegetation.

Overall, when all the effects of actions in and outside of the park were added to the effects from alternative D, there would be long-term minor adverse cumulative effects impacts on vegetation. However, the actions of alternative D would add a minimal increment to this cumulative effect because the effects on vegetation resulting from alternative D would be localized and spread out over time.

Conclusion. Alternative D would have short- to long-term adverse and beneficial effects on vegetation resulting in negligible to moderate adverse effects on vegetation associated with the development or improvement facilities and visitor services. The impacts of other past, present, and anticipated projects combined with alternative D would likely result in long-term

minor adverse impacts to vegetation. However, the actions of alternative D would add a minimal increment to this cumulative impact.

Wildlife

Analysis. New developments, improved access, and increased visitation to parts of the park would be the primary actions affecting wildlife and their habitat under alternative D. Designation of a Natural Area/Recreation Zone approximately 90 percent of the South Unit would improve the protection of wildlife populations and habitats by eliminating recreational vehicle use in that area. This would remove a source of wildlife disturbance from vehicles being driven on or off two-track roads. This would result in a long-term beneficial effect on wildlife populations in local areas.

As under alternatives B and C, initiation of active restoration programs and integrated weed management strategies for disturbed areas would increase the amount of native habitat available to wildlife. These actions would result in localized long-term beneficial effects.

As under alternative C, reintroduction of bison into Range Unit 505 to create a preserve/reserve and the sustainable management of cattle grazing with potential long-term elimination in the South Unit would restore a more native grazing regime. Grazing dynamics between bison, cattle, other ungulates, and prairie dogs would be modified because bison and cattle have different grazing patterns (Plumb and Dodd 1993; Steuter and Hidinger 1999). The rate of expansion of prairie dog towns could be slowed by the elimination of cattle grazing over the long-term. Grazing provides open areas, which facilitates colonization by prairie dogs (Uresk et al. 1981; Vermeire et al. 2004). However, the reintroduction of bison would restore a native grazer to the South Unit resulting in long-term beneficial effects.

As under alternative B, opening a quarry for research purposes would be accompanied by improving the existing road to the quarry, construction a new road segment from the end of the existing quarry road to the quarry, construction of a parking area, and a paved camping area. These developments would cause

the permanent loss of grassland habitat or sparsely vegetated areas, displacing wildlife along this corridor. Prairie dog towns are located in the vicinity of these developments. Clearing vegetation in that area would result in the loss of wildlife forage and shelter. Noise from construction equipment and people would displace some wildlife and temporarily disturb prairie dogs. Most birds, mammals, and reptiles would avoid the area during the construction period, but many would return after construction ceased. Some animals, primarily invertebrates, would be unable to move out of the construction area and would be killed. The new developments along with the new road segment and improved road segment could have a long-term minor to moderate adverse effect on area wildlife.

Increased educational and interpretive efforts under alternative D would generally benefit wildlife. The addition of waysides, guided trail tours, interpretive trails, and two new visitor contact stations would help educate visitors, increasing their appreciation of wildlife in the South Unit and minimizing impacts they could cause such as by teaching them to avoid feeding wildlife. This would result in a long-term beneficial effect on wildlife in the South Unit.

Alternative D would include new developments to enhance visitor access and enjoyment of the South Unit. New developments along the perimeter would cause a permanent loss of some grassland habitat or sparsely vegetated areas. New developments within the interior of the park include the construction of a primitive 15-unit camping area with toilets, pedestrian trails, horseback trails, walk-in camping units, and a backcountry ranger station and equestrian facilities. These developments would also cause the permanent loss of grassland habitat or sparsely vegetated areas. These losses would primarily affect smaller, less mobile wildlife species and species with smaller home ranges, such as invertebrates. Some reptiles, small mammals, and birds also could be displaced. The loss of habitat would result in a long-term minor adverse effect on animals near these facilities. Increased noise and human activity due to construction of new developments could temporarily displace some animals such as rodents and birds, resulting in minor short-term

adverse impacts on wildlife populations in local areas.

Visitation to parts of the park probably would be increased by improved access from developing and improving roadways, wayside exhibits, camping areas, pedestrian trails, and horseback trails. In turn, habitat fragmentation would increase over current levels because of more visitor use of trails and routes. Some wildlife sensitive to the presence of people — pronghorn antelope, bighorn sheep, bobcat, badger, and raptors — might be displaced from areas around these corridors during the peak high use season. These actions would result in a minor to moderate short-term and long-term adverse impact on wildlife populations in local areas, depending on such factors as the level, duration, and type of visitor use, the season of use, and the wildlife species. Increased visitation due to new developments could indirectly affect some prairie dogs — some visitors might wander into prairie dog towns, affecting the behavior of animals in the area, but any disturbance would be temporary and the effect would be negligible to minor.

As with alternative B, the improved and expanded quarry road and additional new road segment along the perimeter may result in some wildlife being hit by vehicles and injured or killed, resulting in indirect adverse impacts. Maintenance activities along the roadways could disturb wildlife. The extent of the effects would depend partly on the location of the roads and their design. With careful siting of the roads and the use of mitigation measures, the improved road segments would result in a long-term minor to moderate adverse effect on area wildlife.

Some new facilities under alternative D, such as the designated campsites in the South Unit, probably would result in seasonal increases in wildlife populations that are attracted to people and their food, such as mice, chipmunks, and black-billed magpies. This action would result in a long-term beneficial effect on these populations in local areas.

Hunting could increase in the South Unit with improved access, resulting in more animals being harvested, but with appropriate regulation

and monitoring, the adverse effects on wildlife populations would be minor.

Cumulative Effects. Past, present, and anticipated projects that would contribute to impacts on wildlife include (1) resource management under the North Unit GMP/EIS; (2) resource management under the Buffalo Gap National Grassland Land and Resource Management Plan; (3) modifications to motorized travel under the Nebraska Travel Management Plan FEIS; (4) wilderness designation under the proposed *Tony Dean Cheyenne River Valley Conservation Act* of 2010; (5) Prairie Dog Management Plan activities and plague efforts; (6) training activities of the South Dakota National Guard; (7) construction activities associated with the Mni Wiconi water project; (8) the proposed DM&E rail line; and (9) the proposed Crazy Horse Scenic Byway. These actions would likely have short- and long-term minor adverse impacts on wildlife due to land disturbance activities from construction projects and other human uses, resulting in some mortality to wildlife, increased fragmentation of wildlife habitats, increased potential for wildlife to be displaced and reduced number of areas where wildlife could exist without people or facilities. These actions would also have long-term beneficial impacts on wildlife from improved resource management, additional protections from designation of wilderness area, and decreased impacts from motorized vehicles. Management efforts to expand prairie dogs at Buffalo Gap National Grassland and plague dusting efforts in the North Unit would have beneficial effects on the species. When the beneficial and adverse impacts of other past, present, and anticipated projects, are considered with the impacts of alternative D, there would be long-term minor adverse impacts on wildlife.

Conclusion. Alternative D would have short- and long-term minor to moderate adverse impacts to wildlife; as well as short- and long-term beneficial effects. The impacts of other past, present, and anticipated projects combined with alternative D would likely result in long-term minor adverse impacts.

PALEONTOLOGICAL RESOURCES

Analysis. Alternative D proposes the greatest percentage area managed as Natural Area and the smallest as Development Zone. Focusing on fossil resource protection, changes in proposed management would increase public education activities, reduce public vehicle access, and provide for increased law enforcement patrols. This alternative would provide for paleontological inventories for planned projects and the location, documentation, and preservation of important fossils in the South Unit. Databases would be prepared to aid in fossil management. A paleontological quarry would be developed for public education, paleontological research, and preservation. Livestock grazing would continue in the foreseeable future, but would gradually be eliminated from the South Unit. Interpretation of paleontological resources within the context of Lakota oral history could be developed through increased interpretive opportunities that focus on Lakota and OST Tribal beliefs. There would be a focus on elders and spiritual leaders and their oral history about fossil resources. Paleontologists could be hired to manage and implement these activities. In addition, unsupervised visitor activities would be restricted to the smallest area, reducing the potential for theft or inadvertent damage to, or theft of, fossils. The focus would be to restore natural species and processes when possible. Fossils removed from the South Unit, whether in the past or in the future, could be housed within the LHEC, for the benefit of the Tribe and for future secure storage and study. Tribal member guides would interpret paleontological resources in relationship to Lakota oral history for the public.

Therefore, the current long-term adverse impacts would be reduced in the foreseeable future under alternative D, and major beneficial impacts would occur based on increased paleontological inventory, collection, preservation, law enforcement presence, availability of appropriate personnel, and interpretation/public education.

Cumulative Effects. The primary projects and actions that could contribute to cumulative effects are summarized below.

Alternative D anticipates a museum and fossil curation facility at the LHEC. This would provide for the curation and preservation of fossils. These actions would likely be beneficial to paleontological resources in that they would increase paleontological education opportunities and contacts, provide for additional law enforcement, and provide for ongoing and long-term collection and preservation of important fossils.

The impacts of other past, present, and anticipated projects, when considered with the impacts of alternative D, would result in beneficial impacts to paleontological resources.

Conclusion. Alternative D would produce beneficial effects on paleontological resources. There would be an expected reduction in illegal removal of fossils from the South Unit by visitors and collectors, reduced livestock trampling of fossils, and continued weathering and mass wasting (landslides). These impacts could be mitigated by continuing efforts to educate visitors about fossils, efforts to allocate existing law enforcement resources towards fossil protection, inventories to locate and protect fossils, and availability of professional personnel. Added to this, other actions in and outside of the park could result in a long-term cumulative moderate beneficial impact. Most impacts to fossil resources outside of the South Unit are being addressed and mitigated through actions such as law enforcement, inventory of planned projects, and collection for study and preservation.

The effects on paleontological resources under alternative D are anticipated to have a major beneficial effect. Illegal fossil collecting should decrease from increased law enforcement, and increased inventory. Any loss of fossils, reduced from current levels, not destroy the integrity of the park relative to paleontological resources—fossils would continue to be present throughout the park, and the park staff would continue to protect, interpret, and provide opportunities for scientific research on paleontological resources. People still could come to the South Unit and enjoy its values, including its fossils. The interpretive focus would be on the Lakota oral history view of these important resources.

SOUNDSCAPES

Analysis. Impacts related to soundscapes under alternative D would primarily be a result of constructing campgrounds, visitor facilities, and access to paved and unpaved pedestrian and horseback trails. These construction activities would largely occur in the Natural Area/Recreation Zones of the South Unit. Impacts to soundscapes associated with these construction activities would be short-term, moderate to major, and adverse. Furthermore, construction activities within the proposed Development Zone of alternative D, located on the western and southern portion of the South Unit and includes the White River area, would include the construction of parking lots and visitor facilities, would also have short-term, moderate to major adverse impacts on soundscapes within the South Unit.

Noise levels would be likely to increase under alternative D in several places that have been relatively quiet in the past. More visitors and vehicles would be likely at the White River Visitor Center, the proposed camping areas, pedestrian trails, horseback trails, parking areas, and at the quarry, as a result of improving the existing road leading to the quarry west of Sheep Mountain Table. As a result, actions proposed under alternative D would have long-term, negligible to minor adverse effects on the park's soundscapes in local areas.

Cumulative Effects. As with the No-Action Alternative, short-term minor to moderate adverse effects from noise would be caused by park construction machinery within the South Unit, including construction of the LHEC. Cleanup operations of the former Bombing Range would also likely cause short-term minor to moderate adverse effects on soundscapes within the South Unit. Outside the South Unit, the construction of the Mni Wiconi water project would generate noise that would be audible in places in the South Unit. Traffic along BIA Routes 27 and 2, and BIA 41, as well as traffic leading to the solid waste management facility at Red Shirt would continue to generate noise intrusions in the South Unit, resulting in long-term, negligible to minor adverse impacts on soundscapes within the South Unit. The

potential extension of the DM&E railroad and the construction of the proposed Crazy Horse Scenic Byway could also have short-term negligible to minor adverse impacts on soundscapes within the South Unit. These effects, added to noise caused by visitors and park operations under alternative D, would result in short- and long-term minor to moderate cumulative adverse noise effects in local areas. When these noises are combined with the sounds of visitor and administrative use in the South Unit, there could be negligible to minor, long term, adverse cumulative impacts on soundscapes.

Conclusion. Due to construction activities proposed under alternative D, the soundscapes within the South Unit would likely change substantially in the short-term. However, in areas not identified as areas for future construction, there would continue to be long-term negligible to minor adverse effects on the park's soundscape in local areas, largely from visitation and administrative activities in developed areas. Noise from activities under alternative D added to noise from other actions within and outside the South Unit could result in short-and long-term, moderate to major adverse cumulative effects in local areas.

CULTURAL RESOURCES

Archeological Sites

Analysis. Under alternative D, there would be the highest percentage of area managed as Natural Area/Recreation Zone and a small area as Development Zone. Focusing on resource protection, changes in proposed management would increase public education activities, reduce public vehicle access, and provide for increased law enforcement patrols. Alternative D would provide for archeological inventories for planned projects and to locate, document and preserve significant archeological resources in the South Unit. Databases would be prepared to aid in resource management. An archeological resources management plan and a curatorial management plan would be completed. Under alternative D, facilities would be conducted along the perimeter and a road to the

paleontological quarry site. Livestock grazing would continue in the foreseeable future but would be reduced when possible. Activities associated with the restoration of the rangeland would likely be beneficial because restoration focuses on restoring vegetation and reducing erosion. However, increased visitation by hikers could increase erosion in some areas of the South Unit. Interpretation of archeological resources within the context of Lakota oral history could be developed through increased interpretive opportunities that focus on Lakota and OST Tribal beliefs. There would be a focus on elders and spiritual leaders and their oral history about archeological resources. In addition, unsupervised visitor activities would be restricted, reducing the potential for theft or inadvertent damage to, or theft of, archeological materials. There are plans to build a LHEC and to upgrade the White River Visitor Center to provide for curation and preservation of artifacts. These actions would likely be beneficial to archeological resources in that they would increase archeological education opportunities and contacts, provide for additional law enforcement, and provide for ongoing and long term collection and preservation of important archeological sites.

The focus would be to restore natural species and processes when possible. Artifacts removed from the South Unit, whether in the past or in the future, would be able to be housed within the park, for the benefit of the Tribe and for future secure storage and study. Tribal member guides would interpret archeological resources in relation to Lakota oral history for the public.

Therefore, the current long term adverse impacts would be reduced in the foreseeable future under alternative D, and beneficial impacts would occur based on increased archeological inventory, collection, preservation, law enforcement presence, availability of appropriate personnel, and interpretation/public education.

Cumulative Effects. Past, present, and anticipated projects that would contribute to impacts on archeological resources include (1) the cleanup of the former Bombing Range; (2) resource management under the North Unit GMP/EIS; (3) actions on the Buffalo Gap

National Grassland; (4) the Mni Wiconi water project; (5) the proposed DM&E rail line; and (6) the proposed Crazy Horse Scenic Byway. These combined actions would likely have beneficial impacts on archeological resources because they would provide for appropriate inventory, protection, and preservation of important fossil resources.

The impacts of other past, present, and anticipated projects, when considered with the impacts of alternative D, would result in beneficial impacts to archeological resources. All proposed construction projects should include archeological resources inventories and implemented measures to protect them. If so, these projects should have a beneficial impact on archeological resources as additional surveying would occur.

Conclusion. Alternative D would have the potential to result in beneficial effects on archeological resources. There would be an expected reduction in illegal removal of archeological resources from the South Unit by visitors and collectors and reduced livestock trampling. The increased knowledge about the resource base would improve the ability of the park to manage the resources, as well as improve project planning and decision making. Impacts resulting from continued weathering and mass wasting could be mitigated by continuing efforts to educate visitors, efforts to allocate existing law enforcement resources toward protection, and inventories to locate and protect archeological sites. Added to this, other actions in and outside of the park could result in a beneficial impact. Most impacts to archeological resources outside of the South Unit are being addressed and mitigated through actions such as law enforcement, inventory of planned projects, and collection for study and preservation.

The effects on archeological resources under alternative D are anticipated to have a beneficial effect. Illegal collecting should decrease from increased law enforcement, and increased inventory. Losses of archeological materials should be reduced considerably, and increasingly limited to losses through natural processes only. Park staff would continue to protect, interpret, and provide opportunities for

scientific research on archeological resources. People still could come to the South Unit and enjoy its values, including its archeology. The interpretive focus would be on the Lakota oral history view of these important resources.

For the purposes of Section 106, there would be no adverse effects.

Museum Collections

Analysis. Under alternative D, an active paleontological quarry would be opened. All fossils collected from quarry operations and associated surveys would be prepared and curated by trained park personnel and stored in an offsite museum until the LHEC museum is fully operational. Park personnel would collect fossils deemed to be at risk of theft or erosion and where feasible, fossils would be cast for exhibit. These specimens would also be housed in offsite repositories until the LHEC is operational. In addition, surveys and inventories of archeological resources would be developed and findings documented and the artifacts stored either at Midwest Archeological Center or the LHEC.

It is anticipated that the excavations from an active paleontological quarry would produce a large amount of specimens needing storage. The offsite facilities would be able to accommodate such a large amount of museum specimens. The current configuration for storage at the LHEC facility is currently unknown, but for this study, it was assumed the LHEC would be able to house all specimens from the South Unit through the life of this management plan. It is intended that the offsite storage of collections would eventually come to an end. The collection would be subject to a minor adverse impact because the collection would continue to be split between facilities for some time before the LHEC would become available.

Under this alternative, it is the intention of the OST to gain control of all specimens that have been taken from the South Unit, as practical. If the Tribe is successful in that effort, there is unlikely to be adequate storage space for all the collection to be housed in any single facility. The collection would again be subject to a minor

adverse impact because the collection would continue to be split between facilities.

Finally, the movement of fragile materials between facilities may cause the loss of materials. The impact would be a minor adverse.

Cumulative Effects. Numerous museums and private parties holding archeological and fossil collections from the badlands of South Dakota exist throughout the world as a result of excavations by government agencies, universities, historical societies, and individuals over the last approximately 150 years. Known collections at the facilities in South Dakota are extensive. The collections within the park make up a small but important portion of the whole collection. The collections would be expanded through donation, testing prior to development, excavations of sites inadvertently identified during construction work, or monitoring resource conditions in the field. In addition, active efforts would be taken to retrieve parts of the collection scattered in other museums or private collections. Other activities identified as occurring within and external to the South Unit are unlikely to add a large amount of museum specimens to the collections. Cumulative impacts are expected to be minor and adverse.

Conclusion. Items in the collections would continue to be stored and maintained, with some facilities meeting NPS museum storage standards. It is assumed for this study that the LHEC would be able to house known collections from the South Unit, but the volume of materials coming from private and other repositories may overcome storage facilities. There would be a long-term minor adverse impact on the overall preservation and usefulness of the collections. Accessibility to the collection by researchers and the public would be increased.

Ethnographic Resources

Analysis. Park managers would consult with the OST to develop and accomplish programs in a way that respects the beliefs, traditions, and other cultural values of the Tribe that has ancestral ties to South Unit lands. Park managers would maintain a government-to-government relationship with the Tribe to ensure a collaborative working relationship, and would

consult regularly with them before taking actions that would affect natural and cultural resources that are of interest and concern to them. Access to, and use of, American Indian sacred sites by American Indian religious practitioners would be accommodated in a manner that is consistent with applicable law, regulations, executive orders, and policy.

Ethnographic resources, including sacred sites and traditional cultural properties, would be identified and protected from impacts associated with the implementation of this alternative through increased consultation and inventory. As a result, there would be no effects on ethnographic resources from this alternative. Alternative D would not result in any change in access by American Indians or use of ethnographic resources sacred to the tribes. The alternative would not change the agreement that guarantees tribal members unrestricted access in perpetuity and requires their written consent to affect those sites. Consultation with tribes to identify traditional use areas would precede ground-disturbing or other activities that could affect the current use, viewshed, or perception of the resource.

Cleanup of the Bombing Range within the South Unit and removal of munitions could allow safer tribal member access to important areas, and provide a beneficial impact. Potential visual impacts of munitions removal is generally short term and very limited in scope. However certain removal methods in “high density” debris areas can result in complete removal and replacement of up to several feet of surface and subsurface soils over large areas by remote controlled heavy equipment. If such removal is necessary within the viewshed of an ethnographic resource or traditional cultural property within the South Unit, moderate adverse visual effects could result. Such cleanup activities could only occur after consultation with an authorization by the OST (Rom 2010) and every effort would likely be made to reduce any adverse impacts to the minimum needed for successful cleanup.

Cumulative Effects. Actions inside the South Unit could affect ethnographic resources, including traditional cultural properties. Efforts to clean up the Bombing Range could alter

vegetation patterns and landscapes, affecting the viewshed of a sacred site. Although surveys and cleanup plans would help to reduce the extent of these effects, the cleanup efforts could result in long-term moderate, and possibly major adverse impacts.

Past, present, and anticipated projects that would contribute to impacts on ethnographic resources include (1) the cleanup of the former Bombing Range; (2) resource management under the North Unit GMP/EIS; (3) the Mni Wiconi water project; (4) the proposed DM&E rail line; and (5) the proposed Crazy Horse Scenic Byway. These combined actions would likely have beneficial impacts on ethnographic resources because they would provide for appropriate inventory, protection, and preservation of ethnographic resources through tribal consultation.

The impacts of other past, present, and anticipated projects, when considered with the impacts of alternative D, would result in beneficial impacts to ethnographic resources.

For the cleanup of the Bombing Range, removal of munitions could allow safer tribal member access to important areas, and provide a beneficial impact. Potential visual impacts of munitions removal are generally short term and very limited in scope. However some removal methods in “high density” debris areas can result in complete removal and replacement of up to several feet of surface and subsurface soils by remote controlled heavy equipment. If such removal is necessary within the viewshed of an ethnographic resource or traditional cultural property moderate adverse visual effects could result. Such cleanup activities could only occur after consultation with an authorization by the OST (Rom 2010).

The Mni Wiconi water project would be expected to conduct ethnographic resource inventories and consultation to provide appropriate identification and protection. It could have a beneficial impact, and is not expected to result in any adverse effects.

The DM&E railroad project, if constructed, would likely have a moderate to major adverse impact on ethnographic resources (Grassrope,

pers. comm.; Whiting pers. comm.). However, consultation and inventories were carried out and appropriate protection measures are may be implemented when possible. In most cases, if ethnographic resources are within or adjacent the DM&E project corridor the corridor cannot be easily modified to protect them. Therefore, major long term adverse effects are possible if this project were to be built.

The OSPRA is pursuing Federal Highway Administration approval for the proposed 215-mile Crazy Horse Scenic Byway (Lakota Country Times, October 13, 2009 Article by Tom Katus). The byway is likely to increase visitation within the South Unit, but without additional developed facilities negligible impact to ethnographic resources is expected, and interpretive aspects can result in beneficial impacts.

Conclusion. Alternative D would have the potential to result in beneficial effects on ethnographic resources due to increased inventory and protection, and the addition of appropriate interpretation. Added to this, other actions in and outside of the park could result in a beneficial impact; and the DM&E project's potential long term moderate to major adverse effects. Most impacts to ethnographic resources outside of the South Unit are being addressed and mitigated through actions such as inventory of planned projects, tribal consultation, documentation and preservation.

Implementing alternative D would result in a determination of *no adverse effect* on ethnographic resources in the South Unit under Section 106. Until the completion of inventories of ethnographic resources, park managers would conduct site-specific surveys and consult as appropriate with American Indians for each development action.

SCENIC RESOURCES

Under alternative D, additional facilities would be added to the park such as improved roadways, new visitor contact and entrance structures, new small parking areas with short access roads, developed campgrounds with amenities such as restrooms, overlooks, and

interpretive signing. These facilities would increase human use in the developed areas and along roadways. These facilities and use however would be dispersed throughout the South Unit. As under the No-Action Alternative any expanded residential or ranching structures would be visible in the vast open areas of the South Unit in the future. Expanding developments and activities related to ranching could generate more dust. Overall such development and activities would intrude upon the area's scenery affecting visibility, and introducing new light sources into the night sky. Such developments and land uses would be relatively small in scale and would have negligible to minor, long-term, localized, adverse impacts on scenery.

With the addition of trailheads more people would be dispersed throughout the park along trail for hikers and horseback use. These types of use can cause soil erosion and airborne dust particles that tend to linger in the air for short periods, affecting visibility. Overall, limited and highly dispersed new facilities and activities in areas of development would have short-term and long-term, localized, negligible to minor impacts on scenery and visibility.

New sources of outdoor light associated with new structures such as campgrounds, visitor contact stations and entrance stations and expanding the visitor center would be introduced. These sources of light would be minimal. Public activities would generally be scheduled for daylight hours, and any new lighting needs would be minimized. Impacts on night sky from the implementation of alternative D would be negligible to minor, long term, and adverse.

Cumulative Impacts Rehabilitation of the main park roads and parking areas and the addition of the facilities would increase the capacity of the park by an estimated 15 to 20 percent. This would result in a negligible, long-term, localized, adverse impact on the scenic resources of the park. Overall, the development proposed under this alternative would intrude upon the area's natural scenery, affect visibility, and introduce new light sources into the night sky. Community and commercial-scale renewable

energy development on the Pine Ridge Indian Reservation could have major adverse impacts on the scenic resources of the South Unit, permanently altering the panoramic vistas with the construction of wind turbines and/or solar panels on sites adjacent to the South Unit.

Combined with other past, present, and reasonably foreseeable future impacts, impacts generated as a result of implementing alternative D would be long term, minor to major, and adverse.

Conclusion. Alternative D would have negligible to major, short-and long-term, localized, adverse impacts on scenery, visibility, and night sky.

VISITOR EXPERIENCE

Access

Analysis. Under alternative D, most of the interior of the South Unit would be closed to public access. Recreational opportunities would be available through guided hikes, and unpaved hiking trails and camping sites would be established along the perimeter of the South Unit. Hiking would be allowed on some primitive trails in the Natural Area/Recreation Zone, with limited access to the Palmer Creek Unit. Park management would institute a permit trail system for unguided access into the interior; guided access would be allowed.

Access would be afforded through the means identified above, thus restricting unguided access to ceremonial and other cultural sites of the South Unit. Pristine areas would be set aside for limited access through guided tours only. Visitor participation at scientific activity sites, such as paleontological digs, would be controlled.

Cumulative Effects. Traffic projections indicate that a substantial increase in park visitation could result from the completion of the Heartland Expressway and the proposed Crazy Horse Scenic Byway. The increase from these roads originating from the south and west, added to visitation projections, could alter the current visitation patterns to the park. The routes for these two road projects already exist, but

typically park visitors do not use them. Visitors' access to the park's South Unit would be improved by the upgrading of the roads and by their being emphasized with designations.

Conclusion. By improving access in the South Unit, alternative D would produce a beneficial effect on visitor access. The improvement in access would come from the construction of two new entrance stations, improvement of the local roads, guided tours into the backcountry, construction of new parking lots, increased camping opportunities, the development of interior pedestrian trails, and improved signage on surrounding roads. Access into the backcountry would be limited, and an emphasis would be placed on educational opportunities in the backcountry and on Lakota history and culture.

Availability of Information

Analysis. Under alternative D, park managers would continue to share the responsibility for managing the White River Visitor Center. The visitor center would be staffed by tribal personnel. Park managers would design the exhibits with OST input. However, under alternative D, interpretive opportunities would be offered to visitors in a variety of new ways:

- Emphasis would be placed on the preservation of Lakota language and culture through a variety of education and interpretation programs, such as family history and living history, monuments that memorialize events in Lakota history, and wayside exhibits that focus on native background and history. Exhibits at the visitor contact centers and the LHEC would include information about Oglala history and culture. A living history village would be created. Visitors would be able to explore the history and culture of the area, the resources, and traditional land management through tours led by Tribal members. Additionally, there would be opportunities for visitors to see and purchase Oglala art and crafts. Audio tours would be available. Bilingual (English and Lakota) signs would be

used on roads, in interpretive displays, and elsewhere.

- Historic and cultural discovery would occur at activities such as powwows and ceremonies. At some cultural or ceremonial sites, as well as at campgrounds, interpretive activities would be presented so visitors could learn more about the Lakota culture and history. Programs would feature tribal members who wear and explain traditional dress, and story-telling and oral history would be presented by tribal elders.
- Interpretation of the Bombing Range would continue.
- Paleontology digs, monitored by trained park personnel, might be observed by visitors, and outdoor classrooms might be offered by the staff.
- Interpretive signs would be placed along roads to identify locations, animals and plants, historic locations, and mileages.
- The exhibits at the White River Visitor Center would be improved and expanded, and a visitor contact station would be developed on the west side of the South Unit. Interpretation and orientation information would also be available at the LHEC.

As a result of the expanded interpretive opportunities under alternative D, including the new visitor contact station on the west side of the South Unit, beneficial impacts on the availability of information about park resources would occur.

Cumulative Effects. The development of the proposed interpretive trails under the Nebraska National Forest Land and Resource Management Plan could also provide additional opportunities to disseminate information to visitors. These projects would produce beneficial effects on the availability of information for visitors.

Conclusion. Alternative D would result in beneficial effects on the availability of information about the park. The increase in the number of outlets where visitors could obtain

information and the dispersed locations of these outlets would substantially improve the visitor experience.

Range and Enjoyment of Visitor Activity

Analysis. Vehicle use, hiking and pack stock use, camping, and picnicking are the four most popular activities.

Vehicle Use. Along the perimeter of the park there would be arts and crafts outlets, powwow grounds, and modern equestrian grounds, and visitor amenities accessible by vehicle. Developed perimeter access would be focused in one location with trails, trailheads, parking areas, rest areas with comfort stations, overlooks, and wayside exhibits. Visitors could explore the South Unit at dispersed visitor access points along the perimeter. There would be an improved road to the quarry area, which would feature parking, restrooms, trailheads, and campsites. Two-track unimproved roads in the interior would be used for administrative access only. The interior would not have visitor facilities, and there would not be any improved or maintained roads for visitor use other than the road to the quarry. Therefore, beneficial impacts would occur from providing improved access on the perimeter of the park, while eliminating vehicles from much of the rest of the South Unit.

Hiking and Pack Stock Use. Recreational opportunities would be available through guided hikes, and unpaved hiking trails and camping sites would be established along the perimeter of the South Unit. Hiking would be allowed on some primitive trails in the Natural Area / Recreation Zone, with limited access to the Palmer Creek Unit. Park management would institute a permit trail system for unguided access into the interior; guided access would be allowed. Guided trail tours would take visitors to select areas in the interior. Thus, beneficial impacts to hiking and pack stock use would occur as a result of developing a small amount of additional hiking trails and pack stock opportunities under alternative D.

Camping. Some developed camping sites would be established and available around the perimeter of the South Unit. Backcountry

camping would be allowed in designated interior areas by permit. Therefore, beneficial impacts to camping would occur from established camping on the perimeter of the South Unit, while also eliminating camping from much of the rest of the South Unit.

Picnicking. There would be expanded opportunities to picnic, such as along the perimeter of the South Unit, but picnicking would be limited to much of the rest of the South Unit.

Cumulative Effects. It is projected that various plans for road improvements in the region would increase opportunities for driving and sightseeing. If the proposed Crazy Horse Scenic Byway were designated and marked by signs, it would offer an additional scenic driving opportunity in the region. The management plan for Buffalo Gap National Grassland calls for the development of a primitive campground near the South Unit, expanding the region's camping opportunities (USFS 2001). These projects would result in beneficial impacts for visitors seeking recreational opportunities in the region.

Conclusion. There would be slightly more opportunities throughout the park for visitors seeking to drive/sightsee, hike, camp, and/or picnic, creating beneficial effects on such visitors.

SOCIOECONOMICS

Analysis. Implementation of alternative D would be expected to lead to an increase in expenditures on staff and operations over the No-Action Alternative. The total number of staff needed under this alternative would be expected to increase to 26 FTEs at a cost of \$3.1 million per year. In addition, implementation of this alternative would be expected to generate additional expenditures for the construction or rehabilitation of facilities (\$21.8 million) and development of a number of studies and plans (\$4.7 million), all of which are considered one-time costs. On-going operations would bring well paying, permanent employment opportunities to a traditional, economically depressed area and could have noticeable economic benefits. In addition, one-time

construction and plan and study costs could also generate minor to moderate economic impacts throughout the larger study region, though these impacts are expected to be short-term. This infusion of federal agency spending into the economy is likely to generate additional economic activity in terms of jobs and income. The intensity of these impacts would depend on the ability of local firms to have the necessary skills and expertise to meet the requirements of the construction and study projects.

Visitation under alternative D would be expected to increase over the long-term with the expansion of access and opportunities at the South Unit. Increases in visitation could lead to increase visitor spending in the local and regional economies as more visitors spend money while visiting the area or extend their stays in Southwest South Dakota. Sustained increases in visitation to the South Unit may also generate additional economic development outside park boundaries which would generate additional economic benefits to a traditionally economically depressed region.

Implementation of alternative D could also cause negative economic impacts as grazing leases are eliminated over time at the South Unit.

Cumulative Impacts. Past, present, and anticipated projects that would contribute to impacts on socioeconomics include (1) the cleanup of the former Bombing Range; (2) resource management under the North Unit GMP/EIS; and (3) approval of the proposed Crazy Horse Scenic Byway. These combined actions would likely have short- and long-term beneficial impacts on socioeconomics due to increased access and exposure to the opportunities at the South Unit. The cumulative effects of all these projects could lead to additional visitation to the South, potentially generating additional economic benefits through increased visitor spending. The impacts of other past, present, and anticipated projects, when considered with the impacts of Alternative D, would result in short- and long-term minor impacts on socioeconomics.

Conclusion. The socioeconomic effect of operations and visitor use at the South Unit

under the alternative D would be expected to have beneficial economic impacts.

PARK OPERATIONS

Analysis. Staffing levels would increase to approximately 26 full-time positions to implement the actions of alternative D. Under this alternative it is estimated that the park would need an annual operating budget increase of approximately \$3.1 million to operate the South Unit once the alternative is fully implemented. In the South Unit this would result expanding a wide range of recreation opportunities, improving interpretation and education, improving resource protection, law enforcement, and administration. This would also lead to better services and programs, such as developing an education and outreach program. Expanded staff levels would be ready to face future changes. Knowing the value of promoting volunteers in the park in view of continual shrinking budgets, major emphasis would also be placed on interagency volunteer coordination, which would efficiently leverage partnerships and volunteers to achieve the purposes of the park. Programs to involve volunteers in inventory, monitoring, interpretation and outreach, cultural resource data collection, resource restoration, area or campground hosting, trail patrol, light maintenance, and other aspects of park operations would be continued and expanded. The effects on the park and particularly the South Unit would be major, beneficial, and long term.

Cumulative Impacts. There would continue to be a strong demand for the recreational opportunities the South Unit would offer as well as those associated with nonprofit organizations and volunteers to be partners in managing all federal lands, not just those of the NPS. The region and the country at large has a strong and growing population of highly skilled, senior population with outside sources of income, who tend to volunteer and would likely be able to supply adequate volunteer services. Even with increasing demands, better organization and use of volunteers would keep supply abreast with demand and benefit park operations.

Conclusion. A clear plan of action and increased staff to implement those actions would result in highly effective park operations and coordination of partners and volunteers to protect resources and serve visitors. The effect would be beneficial.

UNAVOIDABLE ADVERSE IMPACTS

Under alternative D (preferred alternative) the activities related to the construction of additional facilities as well as human use, would result in minor adverse impacts on natural resources in some areas of the South Unit. Although these impacts (e.g., soil compaction, vegetation trampling, wildlife disturbances, and decreased opportunities for solitude) would be unavoidable, mitigation to reduce them would be carried out where possible. The impacts on wildlife, vegetation, and the visitor experience, are discussed in detail for the specific impact topics.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Under alternative D, there would be a commitment of land, raw materials and consumption of fuels associated with the construction of perimeter facilities as described in detail in “Chapter 3: Alternatives, Including the Preferred Alternative.” These commitments represent an irretrievable commitment of resources for a period of time.

RELATIONSHIP OF SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

The South Unit would be managed with a Natural Area/Recreation Zone (approximately 90 percent), a Research Zone (less than 1 percent) and a Development Zone (approximately 10 percent), allowing the South Unit to maintain its long-term productivity.

Under alternative D there would be highly developed visitor use and administrative facilities constructed in the Development Zone as well as more primitive facilities for the same

purpose within the Natural Area/Recreation Zone. There would be some localized loss of ecological productivity as a result. The proposed developments within both zones could reduce ecological productivity in some localized areas as a result of construction and increased use. Actions would be taken to minimize adverse effects on the long-term productivity of biotic communities. Proposed actions would yield long-term benefits from a visitor experience perspective.

Short-term impacts such as impacts to soils might result from construction, as detailed in the analyses of specific impact topics. Noise and human activity from construction and restoration might displace some wildlife from the immediate area. However, these activities would not jeopardize the long-term productivity of the environment except in areas permanently occupied by new facilities.