



Final General Management Plan/Wilderness Study/ Environmental Impact Statement

April 2007



**Final
General Management Plan / Wilderness Study / Environmental Impact Statement
Great Sand Dunes National Park and Preserve**

Alamosa and Saguache Counties, Colorado

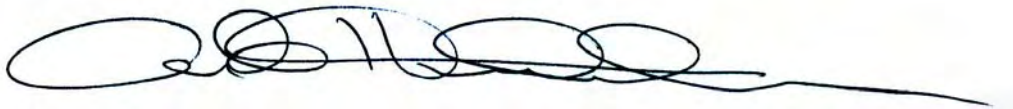
April 2007

This document is the Final General Management Plan / Wilderness Study / Environmental Impact Statement for Great Sand Dunes National Park and Preserve. A general management plan describes the general path the National Park Service intends to follow in managing a park over the next 15 to 20 years. The general management plan (GMP) portion of this document (chapters one and two) presents four alternative ways to manage natural and cultural resources, visitor use and opportunities, and facilities at Great Sand Dunes National Park and Preserve. One of the four GMP alternatives is a “no-action alternative” that provides a baseline against which to consider the other alternatives; it describes continuation of current management practices into the future. The National Park Service preferred alternative is the management strategy the National Park Service intends to implement. It has been modified to reflect applicable comments on the draft GMP during public review in 2006 (see appendix E). Issues addressed by the GMP relate to protection of fundamental park resources and values, management of new park lands, public access, crowding/overuse, wilderness, wild and scenic rivers, and development and uses in and around the park.

The wilderness study portion of this document provides a public forum for evaluating new lands within the expanded Great Sand Dunes National Park and Preserve boundary for possible recommendation to Congress for inclusion in the National Wilderness Preservation System. This document provides a formal evaluation of those lands by studying wilderness eligibility, wilderness alternatives, and impacts of those alternatives. The wilderness alternatives are matched to the four GMP alternatives.

The environmental impact statement portion of this document (chapters three, four, and five) provides background information about conditions in and around Great Sand Dunes National Park and Preserve (e.g., for natural and cultural resources, the socioeconomic environment, and agency operations), and describes the environmental consequences that would be expected from implementing each of the four GMP/wilderness alternatives.

Signed,



Art Hutchinson, Superintendent
Great Sand Dunes National Park and Preserve
11500 Highway 150
Mosca, Colorado 81146
E-mail: grsa_superintendent@nps.gov

SUMMARY

The purpose of this conceptual plan is to describe the general path the National Park Service (NPS) intends to follow in managing Great Sand Dunes National Park and Preserve over the next 15 to 20 years. The approved plan will provide a framework for proactive decision making on visitor use, natural and cultural resource management, and park facilities. Although a general management plan (GMP) provides the analysis and justification for future funding, the plan in no way guarantees that the level of future funding will be sufficient to fully implement the plan. Requirements for additional data for legal compliance and competing national park priorities can delay implementation of actions. Full implementation of a plan could lie many years in the future.

ALTERNATIVES

Four alternatives have been developed for managing visitor use and resources at Great Sand Dunes National Park and Preserve. Each alternative provides a different management approach. The alternatives were based on the park's purpose and significance, fundamental resources and values, legal mandates, public views, and information on visitor use and park resources.

The **no-action alternative** was developed to provide a baseline for evaluating the changes and impacts of the three action alternatives. This baseline is characterized primarily by conditions in December 2004, roughly two months after ownership and management of the Baca Ranch was transferred to the U.S. government, and by continuation of current management practices into the future. (There are funded

projects planned for very near term; these are included in the no-action alternative). Most visitor use would continue to be focused in or near the eastern part of the dunefield. The developed area east of the dunes (main park road, visitor center, and campground) would remain essentially the same. Some visitors would continue to explore backcountry areas of the park and preserve via designated trails and roads, and cross-country horse and hiking use would also continue. Some people would enter the north part of the park on foot from the Baca Grande subdivision, via the two county roads that end at the park boundary.

No new areas would be recommended for wilderness. New park lands that were not open to public use before December 2004 would be managed in a very conservative manner. That is, there would be no new development and visitor use would be managed so as to not establish new practices for camping, types and routes of access, etc.

New park areas would be inventoried for natural and cultural resources and managed according to NPS policies that emphasize natural processes (for example, nonnative species, interior pasture fences, and artificial water holes and sources would be removed). Existing trails and trailheads in the park and preserve would be maintained, but there would be no new trails or trailheads. The Nature Conservancy would continue to manage Medano Ranch, including the Medano Ranch headquarters. There would be no public use of Medano Ranch. Bison grazing would continue within the park on lands leased or owned by The Nature Conservancy. Leashed dogs would generally be allowed

within the national park (in the frontcountry, dunes play, and backcountry access zones, and the Liberty Road administrative zone only), and within the national preserve.

The **NPS preferred alternative** was developed with substantial public, interagency, and NPS staff participation between 2003 and 2006 (see Appendix E: Development of the General Management Plan and “Wilderness Recommendation” section). This is the alternative the National Park Service proposes to implement over the next 15 to 20 years. It was modified in response to comments on the draft GMP during public review in 2006. Options would be created for dispersed hiking and horseback riding; a few new trails would be provided. Cooperative or joint facilities (such as access routes, trailheads, and ranger stations) with neighboring management agencies or private partners would be emphasized.

A large portion of the park expansion lands would be recommended for future designation as wilderness. To address existing and growing congestion in parking areas near the high dunes and visitor center, the park would pursue traffic management and possible transportation solutions, rather than building additional parking or limiting use. The park’s entrance station would be removed and a new one would be located closer to the park boundary. Bike lanes would be added to the main entrance road from the park boundary to the dunes parking lot. A hiking/biking path would connect the Pinyon Flats campground to the dunes parking lot and visitor center.

The National Park Service would seek to acquire Medano Ranch and adaptively use the ranch headquarters for administrative purposes (offices, housing, storage, research support) and scheduled, guided public activities (interpretive programs,

environmental education, a base for guided hiking or horseback tours, special events). Most historic Medano Ranch structures would be retained. Leashed dogs would be allowed within the national park (in the frontcountry, dunes play, backcountry access zones and the Liberty Road administrative zone only) and within the national preserve.

A trailhead would be provided in the north part of the park to provide a closer access point for backcountry recreation on the nearby national forest, the preserve, and new lands within the national park. Assuming neighboring entities find a way to provide vehicle access, the trailhead would be accessed via the Baca Grande subdivision, and then via an existing primitive road within the north portion of the national park. Also, the U.S. Forest Service (USFS), in consultation with the National Park Service, may study the need for (and impacts of) providing public vehicle access to USFS lands via Liberty Road or via an extension of an existing primitive road; these options would be studied in a separate NPS/USFS environmental analysis study.

In the **dunefield focus—maximize wildness alternative**, most visitor use and visitor activities would be focused in or near the eastern edge of the dunefield. Most of the rest of the park and preserve would remain wild and undeveloped, allowing natural processes to continue with minimal human influence. Backcountry areas would be primitive and rugged, providing outstanding opportunities for solitude and adventure. A large portion of the park expansion lands would be recommended for future designation as wilderness.

Existing trails and trailheads would be maintained. Most visitors would continue to visit the main dunefield area (main park

road, visitor center, dunes parking lot, and picnic area). Parking and related support facilities, such as restrooms, could be expanded in the frontcountry zone if dunes parking lots filled too often. A new multi-use trail for bicyclists and pedestrians would extend from near the park's main entrance to the visitor center, dunes parking lot / picnic area, and to Pinyon Flats campground. A gate for horse access would be provided on the north boundary of the national park, and pedestrian access from the Baca Grande subdivision would continue.

The National Park Service would seek acquisition of Medano Ranch and would manage it as a natural/wild zone. Ranch structures would not be maintained (or would be removed after documentation). Leashed dogs would be restricted to parking areas, picnic areas, and car campgrounds within the national park—they would not be permitted in the national preserve.

In the **three public nodes alternative**, most visitors would gain access to the park and preserve via three areas or “nodes.” Visitor facilities and trails would be concentrated in or near the three nodes, and the rest of the park and preserve would remain largely undeveloped. This alternative would provide diverse options for visitors to experience different portions of the dunes system.

The first node, located at the existing developed area east of the dunes, would remain essentially the same. The second node would be located at the Medano Ranch headquarters. The National Park Service would seek acquisition of Medano Ranch and would manage the ranch headquarters as a public day-use area, most historic ranch structures would be maintained, and guided hiking and horseback tours to nearby high interest

areas could be provided. The third node, located in the north part of the park, would include a backcountry trailhead and a primitive campground if an appropriate public vehicle access route could be identified via the Baca National Wildlife Refuge or Baca Grande subdivision. Dogs would not be permitted in areas where there is increased potential for or a history of conflicts with visitors or with wildlife; otherwise leashed dogs would be allowed. No new wilderness would be recommended in this alternative. The USFS, in consultation with the National Park Service, may study the need for (and impacts of) providing public vehicle access to USFS lands via Liberty Road or via an extension of Cow Camp Road to the mountain front; these options would be studied in a separate NPS/USFS environmental analysis study.

BOUNDARY ADJUSTMENTS

Due to the Great Sand Dunes Act of 2000 and the major park boundary expansion that followed, the *General Management Plan / Wilderness Study / Environmental Impact Statement* addresses only minor, technical boundary adjustments. The National Park Service would pursue, through legislation or administrative action, minor boundary corrections, including one to address boundary discrepancies near San Luis Lakes State Park.

ENVIRONMENTAL CONSEQUENCES

For all alternatives, most impacts on natural resources (vegetation, wildlife, wetlands, etc.) and cultural resources (e.g., archeological sites) would result from visitor use in new park areas and growth in visitor use over the life of the plan. The action alternatives would also have direct

Summary

and indirect natural and cultural resource impacts from limited new facilities such as trails, trailheads, and (in one alternative) a primitive campground. Some such facilities would affect scenery and traffic in and around the park. In the NPS preferred and three public nodes alternatives, NPS adaptive use of the Medano Ranch headquarters would help protect historic structures, and the guided learning zone would allow visitors to learn about and enjoy sensitive resources while protecting those resources. Under the three action alternatives, an NPS-managed bison herd would not be feasible, but if additional bison habitat becomes available in the future, this option may be reconsidered. If and when The Nature Conservancy ceased agricultural uses of Medano Ranch,

irrigation of meadows would be discontinued and bison fences removed. Wilderness recommendations in the NPS preferred and dunefield focus-maximize wildness alternatives would affect park resources, visitor experiences, and operations of the National Park Service and other agencies. Providing a trailhead in the north end of the national park (NPS preferred and three public nodes alternatives) would improve access to new NPS and USFS lands and have other beneficial and adverse impacts on neighboring communities and agencies.

For a detailed summary table of environmental consequences (including type, intensity, and duration), see chapter four, table 26.

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Chapter One: Purpose and Need for the Plan

PURPOSE AND NEED FOR THE PLAN

OVERVIEW OF THE PARK AND PRESERVE AND THE REGION

Great Sand Dunes National Monument was established in 1932 by presidential proclamation “for the preservation of the Great Sand Dunes and additional features of scenic, scientific, and educational interest.” The Great Sand Dunes Wilderness Area, established in 1976, includes most of the original monument. In November 2000, the Great Sand Dunes National Park and Preserve Act authorized expansion of the national monument into a national park and preserve almost four times the size of the original monument. Some of the land within the expanded national park boundaries is in private or state ownership. The national preserve includes some 40,000 acres of wilderness formerly managed by the U.S. Forest Service (USFS).

In this document, Great Sand Dunes National Park and Preserve is referred to collectively as “the park” or “the Great Sand Dunes.” Great Sand Dunes National Preserve (only) is referred to as “the preserve” or “the national preserve.” Great Sand Dunes National Park (only) is referred to as “the national park.”

The park is located in the high San Luis Valley of south-central Colorado at an elevation of 8,175 feet (~2500 meters) (see “Region” and “Vicinity” maps). The San Luis Valley (“Valley”) is bordered by Poncha Pass on the north, the San Juan Mountains on the west, and the Sangre de Cristo Mountains on the east. To the south, the San Luis Valley extends into New

Mexico along the Rio Grande. The Valley is a discrete cultural region rich in Hispanic culture and place names. Cattle ranching and irrigated agriculture (especially potatoes and alfalfa) are two main land uses in the Valley. Blanca Peak, the fourth-highest mountain in Colorado and sacred to some native peoples, towers over the Valley, southeast of the park.

The park straddles the Saguache-Alamosa county line. Alamosa, population 8,545, is located about 25 miles southwest of the park. Several smaller settlements (Moffat, Hooper, Mosca, and Crestone) lie closer to the park.

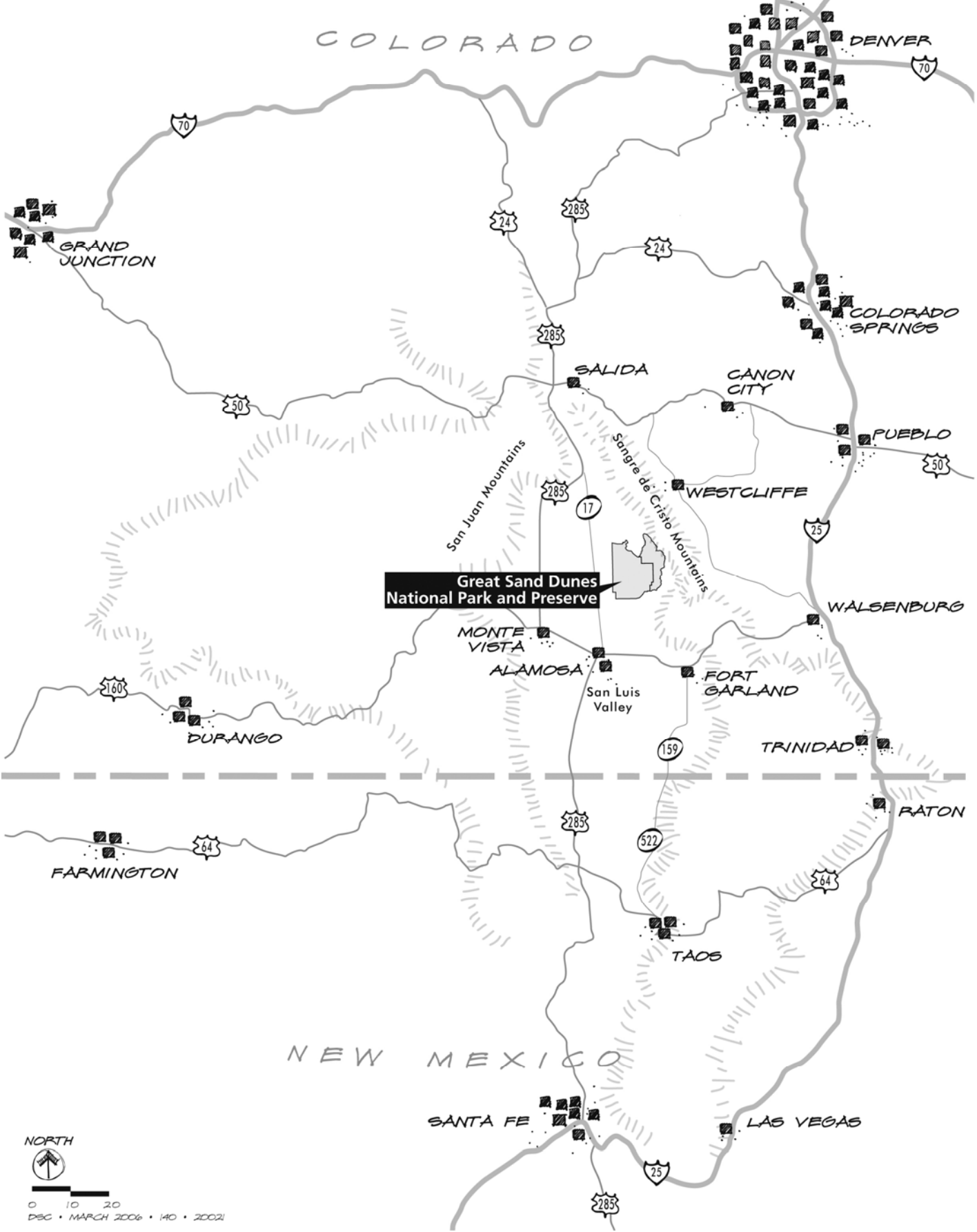
Sand, sun, wind, and water provide a land of elemental contrasts at the dunes. Early and late in the day, shadows lengthen and muted colors melt into one another. Sand ridge shadows paint striking patterns across the dune mass. At midday, intense solar radiation unimpeded by the thin atmosphere can heat sand to scorching temperatures. At the foot of the dunes, Medano Creek’s surging waters provide a delightful contrast to the barren sand surface in the spring and early summer. In the springtime, strong winds can blow for days; countless sand grains scour everything in their path.

The park is part of a fragile, dynamic system that influences and sustains the dunes. The dune mass is a huge deposit of pure sand nestled against the Sangre de Cristo Mountains. The sand sheet surrounds the dune mass and is stabilized by grasses and other low-growing plant life.

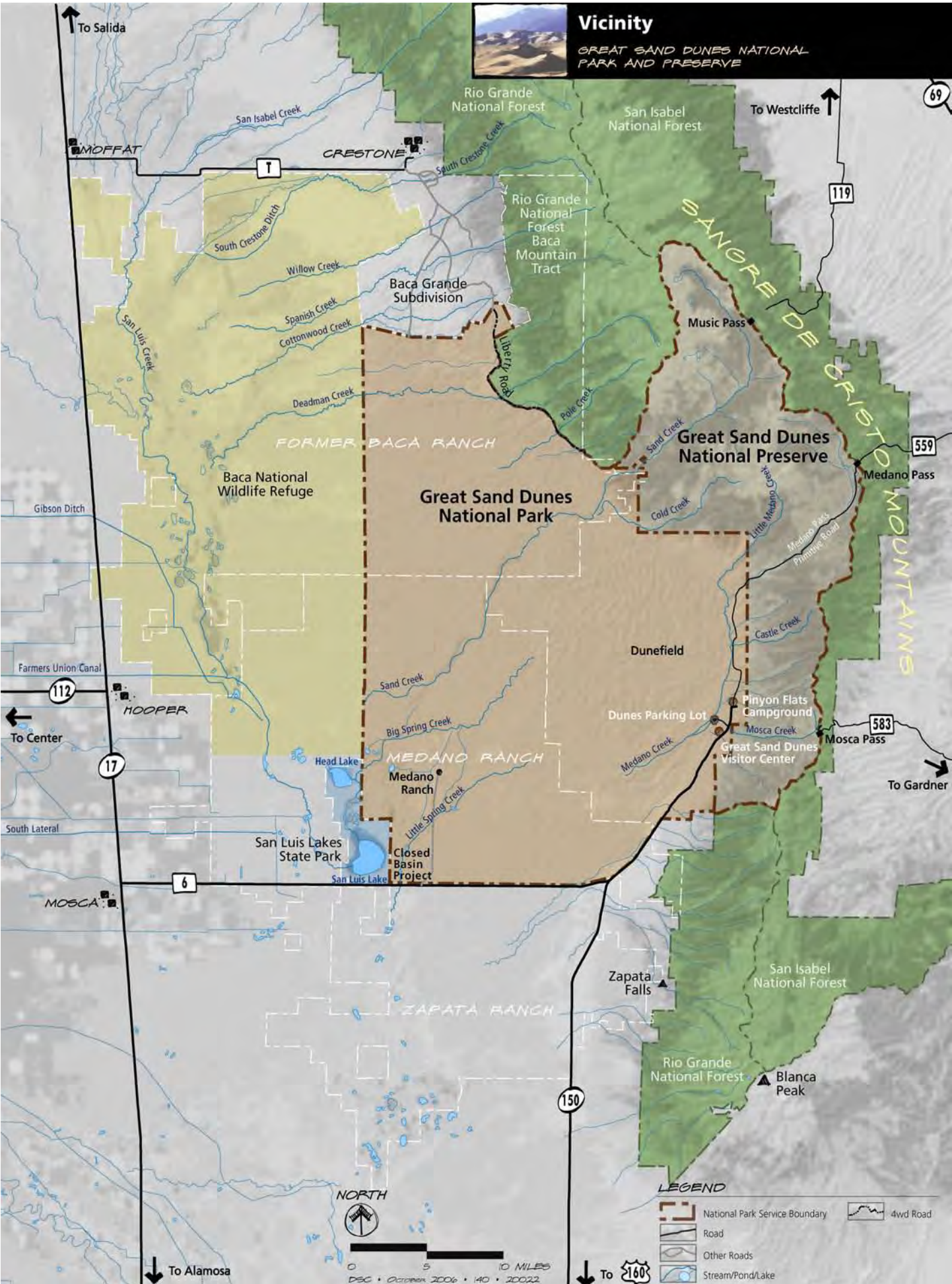


Region

GREAT SAND DUNES NATIONAL PARK AND PRESERVE



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The sabkha (a sand deposit hardened by minerals) is located west of the sand sheet, and is cemented by minerals deposited by seasonal wetlands. Streams born high in the Sangre de Cristo Mountains recycle wind-blown sand back to and around the dunes. Over time, sand, wind, and water combine and join forces to shape the ever-changing dunefield.

From valley floor to the crest of the Sangre de Cristos, a dramatic variety of life zones provides distinct communities of plant and animal life. Just above the dunefield, at the base of the mountains, short shrubs give way to sparse pinyon-juniper woodland. With rising elevation, the pinyon-juniper forest transitions into denser montane forests of fir, pine, and aspen. Higher still is the subalpine life zone, where hardy stands of spruce and fir mingle with rocky talus slopes. Near the crest of the mountains is the rocky, snowy alpine zone. Each life zone supports specially adapted plant, animal, and insect life.

American Indian groups hunted and camped near the Great Sand Dunes as early as 10,000 to 12,000 years ago. Beginning around AD 1400, several Indian groups, including the Apaches, Arapahos, Cheyennes, Comanches, Kiowas, Navajos, and Utes, migrated to the San Luis Valley and other areas of the Southwest. The Spanish arrived in the San Luis Valley in the late 1500s—their cultural influence remains today. In 1807, Zebulon Pike and his men climbed over the crest of the Sangre de Cristo Mountains and into the Valley. Pike documented the expedition's first glimpse of the Great Sand Dunes. Today, the park bears evidence of past human use and occupation in many forms: archeological sites and artifacts, historic homesteads and trails, "culturally peeled" trees, and wickiups (temporary shelters made from tree saplings).

GENERAL MANAGEMENT PLANNING

Park planning is a decision-making process, and general management planning is the broadest level of decision making for parks. General management plans are required for all units of the national park system and are intended to establish the future management direction of a park. General management planning is the first phase of tiered planning and decision making for national park units. It focuses on why the park was established (purpose), why it is special (significance and fundamental resources and values), and what resource conditions and visitor experiences should be achieved and maintained (desired future conditions). General management plans look years into the future and consider the park holistically, in its full ecological and cultural context and as part of a surrounding region.

Although a general management plan provides the analysis and justification for future funding, the plan in no way guarantees that the level of future funding will be sufficient to fully implement the plan. Requirements for additional data or legal compliance and competing national park system priorities can delay implementation of actions. Full implementation of a plan could lie many years in the future.

This *General Management Plan / Wilderness Study / Environmental Impact Statement* (GMP) was developed by an interdisciplinary team in consultation with relevant National Park Service (NPS) offices; the Great Sand Dunes National Park Advisory Council; tribal, federal, state, and local agencies; other interested parties; and the general public. Establishment of the advisory council was mandated by the Great Sand Dunes National Park and Preserve Act of 2000, which authorized the expansion of the national park. The role of

the advisory council is to advise the Secretary of the Interior (generally via the Great Sand Dunes superintendent) regarding development of the Great Sand Dunes GMP. The backgrounds and experience of the advisory council members reflect the purposes of the park and the interests of persons who will be affected by the planning and management of the Great Sand Dunes. More information about the advisory council and its contributions to this GMP effort can be found in appendix E.

PURPOSE AND NEED FOR THE GENERAL MANAGEMENT PLAN

This GMP provides comprehensive guidance for perpetuating natural systems, preserving cultural resources, and providing opportunities for quality visitor experiences at Great Sand Dunes National Park and Preserve. Its purpose is to ensure that park managers and the public share the same vision of how best to achieve the park's purpose and protect its resources unimpaired for future generations.

The GMP describes the general path the National Park Service intends to follow in managing the Great Sand Dunes over the next 15 to 20 years. The GMP does not provide specific and detailed answers to every issue facing the park and preserve, but rather, is a framework to assist NPS managers in making decisions in today's and future contexts. The GMP:

- Provides general guidance for how to manage resources and provide for visitor use.
- Presents a general approach for facilities and access.

- Supports the park's purpose and significance and protects its fundamental resources and values.
- Clearly defines the resource conditions and visitor experience opportunities to be achieved.
- Ensures that the foundation for decision making has been developed in consultation with an interested public and adopted by NPS leadership after sufficient analysis of the benefits, impacts, and economic costs of alternative courses of action.

The park is currently operating under a master plan approved in 1977. The National Park Service initiated development of a new GMP in the mid-1990s, but this effort was halted in 1999, when it appeared that Congress would greatly expand the national monument. In the year 2000, the Great Sand Dunes National Park and Preserve Act enlarged the national monument almost four-fold, authorized conversion of the national monument to a national park, and established the Great Sand Dunes National Preserve (also managed by the National Park Service). The 1977 master plan is outdated and does not provide background information, a foundation for planning, or management guidance for the expanded national park and preserve.

The park is located adjacent to the newly established Baca National Wildlife Refuge (managed by the U.S. Fish and Wildlife Service [USFWS]), Rio Grande and San Isabel national forests (managed by the USFS), San Luis Lakes State Park (managed by Colorado State Parks), San Luis Lakes State Wildlife Area (managed by Colorado Division of Wildlife [CDOW]), and land owned by private entities and individuals. This situation creates remarkable

opportunities for the National Park Service to work cooperatively with others toward

long-term stewardship of the dunes and the San Luis Valley.

PURPOSE AND NEED FOR THE WILDERNESS STUDY

This wilderness study provides a public forum for evaluating new land within the expanded park boundary for possible recommendation to Congress for inclusion in the National Wilderness Preservation System. Wilderness, which can be designated only by Congress, provides for permanent protection of lands in their natural condition.

Lands within Great Sand Dunes have been part of the National Wilderness Preservation System since 1976. The 35,955-acre Great Sand Dunes Wilderness Area is located within the former Great Sand Dunes National Monument. About 40,000 acres of wilderness located within the national preserve (part of the Sangre de Cristo Wilderness Area established in 1993) were added by the Great Sand Dunes National Park and Preserve Act of 2000. Most remaining lands within the expanded national park boundary, including former Baca Ranch and Medano Ranch lands, have not previously been evaluated for wilderness.

The wilderness study is included as part of this GMP because of legislation, public interest, and timeliness. The Great Sand Dunes Act (2000) cites wilderness as one of several important resources for which the park was expanded. The wilderness review process for the park expansion lands began with a *Federal Register* notice and a wilderness suitability/eligibility assessment

conducted during the early phases of GMP planning. Since initial scoping of this plan, the public has been interested in protecting natural systems and wilderness values. A wilderness study may be a separate document accompanied by an environmental impact statement (EIS), or it may be part of a general management plan / environmental impact statement. Including the wilderness study with the general management plan and EIS provides efficiencies of time and money, as the two processes have similar environmental compliance and public involvement needs.

The first step of this wilderness study was to conduct a wilderness suitability / eligibility assessment, which determined that some areas within the expanded park boundary possess wilderness characteristics. The next step was to conduct a formal evaluation of those lands by studying alternatives and impacts to see if the lands should be recommended for wilderness. With a general management plan, the wilderness alternatives are matched to various general management alternatives. A wilderness study results in a recommendation to Congress to designate all, some, or none of the lands possessing wilderness character as part of the National Wilderness Preservation System. Based on the wilderness study, the National Park Service may prepare a wilderness proposal to forward to the Department of the Interior.

FOUNDATION FOR PLANNING AND MANAGEMENT

The foundation for planning and management identifies what is most important about the park. It consists of two parts. Part I outlines the intentions of Congress or the president in creating the park as a unit of the national park system. These intentions, which take precedence over all other considerations, include the park's purpose, significance, mission, primary interpretive themes, and special mandates. Part II documents the fundamental resources and values that deserve primary consideration during planning and management.

PART I: PURPOSE, SIGNIFICANCE, MISSION, PRIMARY INTERPRETIVE THEMES, AND SPECIAL MANDATES

Park Purpose

Park purpose statements convey the reasons for which the park was set aside as part of the national park system. They are grounded in a thorough analysis of park legislation and legislative history, and provide fundamental criteria against which the appropriateness of plan recommendations, operational decisions, and actions are tested. The purpose of Great Sand Dunes National Park and Preserve is to:

- Preserve spectacular and unique sand dunes and their high elevation watersheds, and perpetuate the entire system for the benefit and enjoyment of present and future generations. Protect the sand deposits associated with the dune mass and the groundwater system on which the sand dune and wetlands systems depend.

- Provide long-term protection of the geological, hydrological, ecological, scenic, scientific, cultural, wilderness, educational, wildlife, and recreational resources of the area. Preserve the remarkable biodiversity evident in the landscape from the valley floor to the mountain crest.
- Provide opportunities for visitors to experience, understand, enjoy, and gain a sense of stewardship of the park's natural and cultural resources.
- Facilitate research to support park management and to promote scientific knowledge and education.

Park Significance

Park significance statements capture the essence of the park's importance to the nation's natural and cultural heritage. They describe the park's distinctiveness and describe why an area is important within regional, national, and global contexts. This helps park managers focus their efforts and limited funding on protection and enjoyment of attributes that are directly related to the purpose of the park.

Great Sand Dunes National Park and Preserve:

- Contains the tallest dunes in North America and one of the most fragile and complex dune systems in the world.
- Protects a globally significant water- and wind-driven system, which

includes creeks that demonstrate surge flow, a rare hydrologic phenomenon.

- Provides tremendous scenic settings that, for many, provoke strong emotional responses. These settings (including massive dunes surrounded by alpine peaks, a desert valley, creeks flowing on the surface of the sand, pristine mountains, and rural rangeland) offer spacious relief from urban America, exceptional opportunities for solitude and quiet, and a remarkably unspoiled day and night sky.
- Hosts a great diversity of plants and animals, including insect species found nowhere else on earth. The system, which spans high desert to alpine life zones, supports rare biological communities that are mostly intact and functional.
- Contains some of the oldest (9,000+ years before present) known archeological sites in America. The dunes have been identified as having special importance by people of various cultures, and the area is recognized for the culturally diverse nature of human use.
- Provides special opportunities for recreation, exploration, and education in the highly resilient dune mass and adjoining creek environments.

Mission

The mission statement is a visionary summary that conveys the essence of park qualities to be protected and understood, forging an intellectual and emotional

connection between people and their national heritage.

Majestic and austere, the Great Sand Dunes rise from a high mountain valley flanked by some of the tallest peaks in the Rocky Mountains. Great Sand Dunes National Park and Preserve celebrates the entire natural system of the Great Sand Dunes, as well as a rich and living connection with ancient and modern peoples. Our mission is to offer visitors opportunities for enjoyment, learning, solitude, and a growing sense of stewardship in an accessible and undeniably enticing natural setting. The National Park Service works with park partners, neighbors, and the American public to protect this treasure forever.

Primary Interpretive Themes

Primary interpretive themes are the most important ideas and concepts communicated to the public about the park. They are the core of all interpretive programs and media provided to park visitors.

- The unexpected combination of massive dunes surrounded by alpine peaks, a desert valley, and creeks flowing on the surface of the sand makes Great Sand Dunes National Park and Preserve a unique landscape that inspires awe, mystery, and wonder.
- Although the active dunefield appears stark, in reality Great Sand Dunes National Park and Preserve is a rich and complex environment ranging from desert valley floor to snow-capped mountain peaks where many different plants and animals live in a variety of distinct natural communities.

- The towering dunes and the life they support are the most visible indicators of the health of the natural system that extends beyond park boundaries. To protect the ecological health of the park, the National Park Service must partner with the larger community.
- Just as human survival is dependent upon water, this complex, dynamic dune system, with its distinctive geological and biological character, is dependent on the area's unusual, fragile, and near-pristine water system for its continued existence.
- The same physical characteristics that influenced the formation of the sand dunes created a cultural crossroads, resulting in a landscape of special significance to many people over thousands of years.
- The wilderness areas within Great Sand Dunes National Park and Preserve offer spacious relief from urban America, exceptional solitude and quiet, and a remarkably unspoiled day and night sky.

Special Mandates

Special mandates are legal requirements and administrative commitments that apply to a specific unit of the national park system. They are mandated by Congress or by signed agreements with other entities. Special mandates for Great Sand Dunes National Park and Preserve are listed below. The Great Sand Dunes National Park and Preserve Act of 2000 is referred to herein as the "Great Sand Dunes Act of 2000" for brevity.

Advisory Council

The Secretary of the Interior has responsibility for establishing a "Great Sand Dunes Advisory Council." The council is to advise the secretary with respect to preparation and implementation of a management plan for the national park and preserve. The advisory council is to dissolve upon completion of the GMP (Great Sand Dunes Act of 2000, Public Law 106-530).

Water Resources

The Secretary of the Interior is to obtain and exercise water rights required to fulfill the purposes of the national park and preserve, provided:

1. Such water rights are appropriated and administered pursuant to the procedural requirements of Colorado state law.
2. The purposes and other substantive characteristics of water rights are established according to state law, except that the Secretary of the Interior is specifically authorized to appropriate water exclusively for maintaining groundwater levels; surface water levels; and stream flows on, across, and under the national park and preserve; to accomplish the purposes of the national park and preserve; and to protect park resources and park uses.
3. Water rights are established without interfering with: (a) any exercise of a water right for a nonfederal purpose in the San Luis Valley that existed when the Great Sand Dunes Act of 2000 was

passed, and (b) the Closed Basin Project.

4. Except for those rights already established for the national monument and for the Rio Grande National Forest, no federal reservation of water may be claimed or established for the national park or preserve.

Two irrigation ditches in the headwaters of Medano Creek are associated with water rights senior to those of the park. The Hudson Ditch was constructed in 1886, and the Medano Ditch in 1892. Since no easement was issued for these ditches by the USFS prior to passage of the Great Sand Dunes Act of 2000, the legislative authority for issuing easements and establishing terms and conditions for such easements on these ditches now falls to the National Park Service. However, since the USFS was in the process of issuing easements for these ditches prior to the passage of the Great Sand Dunes Act of 2000, the National Park Service may be required to issue an easement pursuant to the Colorado Ditch Bill (Public Law 99–545, October 27, 1986) despite the fact that this legislation would not normally pertain to an NPS area.

Wilderness

The Great Sand Dunes Wilderness Area, comprised primarily of the main dunes within Great Sand Dunes National Park, was established in 1976 by Public Law 94–567 and amended in 1978 by Public Law 95–625. It is 35,955 acres in size. The Sangre de Cristo Wilderness Area was established by the Colorado Wilderness Act of 1993 (Public Law 103–77). It is 226,420 acres in size. In 2000, 39,686 acres of the Sangre de Cristo Wilderness Area was administratively transferred from the USFS to the

National Park Service (Great Sand Dunes Act of 2000). Total designated wilderness in Great Sand Dunes National Park and Preserve amounts to 75,641 acres. Nothing in the Great Sand Dunes Act of 2000 alters the wilderness designation of any lands within the national park or preserve.

Hunting, Fishing, and Trapping

- **National Preserve:** Hunting, fishing, and trapping¹ shall generally be permitted on land and water within the preserve, in accordance with applicable federal and state laws. Areas may be designated where, and limited periods established when, no hunting, fishing, or trapping are permitted for reasons of public safety, administration, or compliance with applicable law (Great Sand Dunes Act of 2000).
- **National Park:** Fishing is allowed in the national park. Hunting and trapping are not allowed in the national park.

Domestic Livestock

On former state or private land where grazing was permitted when the Great Sand Dunes Act of 2000 was passed, and which is acquired for the national park or preserve, the Secretary of the Interior, in consultation with the lessee, may permit continued grazing by the lessee at the time of acquisition. Where grazing was permitted on federal land when the Great Sand Dunes Act of 2000 was passed, the secretary may

¹ A state constitutional amendment was passed in 1996 that made it generally unlawful to take wildlife with any leghold trap, any instant kill body-gripping design trap, or by poison or snare in the state of Colorado (*Colorado Revised Statutes* 33-6-203).

permit continued grazing unless it would harm the resources or values of the national park or preserve. Permits for grazing are subject to applicable law and regulations. The secretary may accept voluntary termination of leases or permits for grazing within the national park or preserve (Great Sand Dunes Act of 2000).

Closed Basin Project

The Closed Basin Division, San Luis Valley project (Closed Basin Project) is located in a topographic depression (the Closed Basin) in the San Luis Valley. The purpose of the project is to pump and deliver unconfined groundwater and available surface flows in the Closed Basin to the Rio Grande River via a 42-mile conveyance channel. The project helps Colorado meet its water delivery commitment to New Mexico and Texas under the Rio Grande Compact of 1939, and helps the United States meet its water delivery commitment to Mexico under a treaty dated May 21, 1906. The project also delivers water to the Alamosa National Wildlife Refuge.

Features of the Closed Basin Project within the national park are not to be affected by the park expansion. Management responsibility for the Closed Basin Project features within the national park is to remain with the U.S. Bureau of Reclamation (Great Sand Dunes Act of 2000).

PART II: FUNDAMENTAL RESOURCES AND VALUES

Fundamental resources and values are systems, processes, features, visitor experiences, stories, and scenes that deserve primary consideration in planning and management because they are critical to maintaining the park's purpose and significance. Fundamental resources and

values are subject to periodic review and updates based on new information or changing conditions. The planning team, with assistance from the Great Sand Dunes National Park Advisory Council and the public, has identified the following fundamental resources and values for Great Sand Dunes National Park and Preserve.

Dunes System

The dunes system is complex, fragile, and dynamic due to the interactions of sand, wind, streams, groundwater, vegetation, and mountains. The main components of the dunes system must be protected to ensure that the system remains intact. The main components that can be feasibly managed are listed below. Sand particles, wind, and the geologic setting are important components, but were not included in the list because they cannot be managed.

- **dunefield (complex, tall, inland dunes)**
–natural transport of sand by streams must be protected
- **sand sheet (relatively flat sand sheet stabilized by vegetation)**
–natural vegetation patterns must be protected
- **sabkha (sand deposit hardened by minerals)**
–groundwater aquifer must be protected
- **Sand Creek (transports and recirculates sand)**
–watershed and groundwater aquifer must be protected

- **Medano Creek and its surge flow (transports and recirculates sand)**
–watershed and groundwater aquifer must be protected
- **groundwater aquifers (integral to sabkha, vegetation on sand sheet, surface water flows)**
–natural water table levels must be maintained
- **balanced and sustainable populations of native wildlife and plants**
–important habitat and natural processes, including fire, must be protected
- **tundra**
–highly erosive, fragile (highly vulnerable to damage from visitor use)

Natural Diversity

Great Sand Dunes National Park and Preserve contains remarkable natural biological diversity, which is due largely to its range of elevation zones and mix of wet and desert habitats. The following key resources help contribute to the dunes' unusual species diversity:

- **insects that are endemic to the Great Sand Dunes**
–there are at least seven known endemic species
- **Medano Creek's outstanding water quality and closed system**
–serves as a genetic refuge/breeding area for native fish such as the state-endangered Rio Grande sucker and the Rio Grande cutthroat trout, a state species of special concern
- **un-hybridized narrowleaf cottonwoods**
–located along creeks (e.g., Sand Creek)—trees up to 340 years old, oldest cored, which conserve a native plant gene pool
- **sand sheet wetlands**
–(e.g., interdunal ponds, Big Spring Creek, Little Spring Creek)
–increases the variety of flora and fauna

Human Connections

The Great Sand Dunes have served as a prominent visual and cultural marker, drawing people physically and spiritually for thousands of years. Cultural resources and values that are key to maintaining the park's purpose and significance include the following:

- **early archeological sites**
–associated with Folsom Early Man, ~9,000 years before present
- **dunes area—important to American Indians and other people**
–e.g., traditional hunting and gathering place, sacred and spiritual place
- **scarred ponderosa pines**
–inner bark of peeled trees used by native peoples for food (mid-1800s)
–one cluster of trees (Indian Grove) is listed in the National Register of Historic Places (NRHP)
- **contemporary community ties to the dunes**
–emotional connection, support for park expansion

Visitor Opportunities

The Great Sand Dunes are attractive, inviting, and approachable. These qualities and certain inspirational, recreational, and educational opportunities must be managed and protected to maintain the park's purpose and significance:

- **climbing and descending the high dunes**
- **experiencing surge flow, playing in Medano Creek near the foot of the dunes**
- **seeing the heavens (Milky Way, stars, planets, comets, etc.) at night**
–dark night sky must be protected
- **viewing the dune mass with backdrop of the high peaks and from the mountains**
–key elements: views from west and south, viewing the dunes from the mountains, changing light conditions
–shadow and contrast especially impressive in early morning and evening
–air quality and undeveloped mountain slopes must be protected
- **seeing wildlife in its natural setting (e.g., elk, pronghorn, deer)**
–important habitat must be protected
- **learning about the dunes system—its components and dynamic nature**
–includes research, education, and stewardship opportunities
- **experiencing quiet, solitude, isolation in a wilderness environment**
- **driving in sand on Medano Pass primitive road (high clearance four-wheel drive required)**

RESOURCE OPPORTUNITY AREAS

Differences in resource values and visitor opportunities generally exist within different areas of a park. Resource opportunity areas are a way of organizing and describing these differences—especially fundamental resources and values—so they can be considered during management planning. Resource opportunity areas are often documented with a map that shows where in the park they occur and a table that lists the characteristics or qualities of each resource opportunity area (appendix C).

The resources and values of Great Sand Dunes National Park and Preserve have

been organized into the following resource opportunity areas: Sangre de Cristo Mountains and Foothills, Mountain Lakes and Streams, Lower Medano and Sand Creeks, Dunefield, Sand Sheet and Sabkha, Spring Creeks and Wetlands. The map on the following page shows where the resource opportunity areas occur in the park and preserve. Appendix C characterizes the different resource opportunity areas, focusing primarily on fundamental resources and values because these are a primary consideration in general management planning.

DESIRED CONDITIONS AND STRATEGIES

This section focuses on parkwide desired conditions and strategies that guide management of the Great Sand Dunes in all alternatives, including the no-action alternative. They guide actions taken by park staff on such topics as natural and cultural resource management, wilderness management, park facilities, and visitor use management. Each topic discussed below has two parts: (1) desired conditions for that topic, and (2) strategies that may be applied to achieve those desired conditions.

Desired conditions describe the ideal conditions that the National Park Service is striving to attain. “Desired conditions” is used interchangeably with “goals.” Desired conditions provide guidance for fulfilling the park’s purpose and for protecting the park’s fundamental resources and values. To emphasize this, the desired conditions listed below (in italics) are organized by fundamental resource and value type (dunes and biological diversity, human connections, visitor opportunities, and other).

The strategies describe actions that may be taken by park staff to achieve the desired conditions. Most of these strategies are already being implemented. Those that are not already being implemented are consistent with NPS policy, are not believed to be controversial, and require no additional analysis and documentation under the National Environmental Policy Act of 1969 (NEPA) (or analysis and

documentation would be completed separately from this GMP/EIS).

The alternatives in this GMP include additional desired conditions and strategies besides the ongoing ones described below. The parkwide desired conditions and strategies in this section, combined with others that are specific to the alternative selected for implementation (see chapter two), will form the complete GMP for the Great Sand Dunes.

DESIRED CONDITIONS FOR THE DUNES AND FOR BIOLOGICAL DIVERSITY

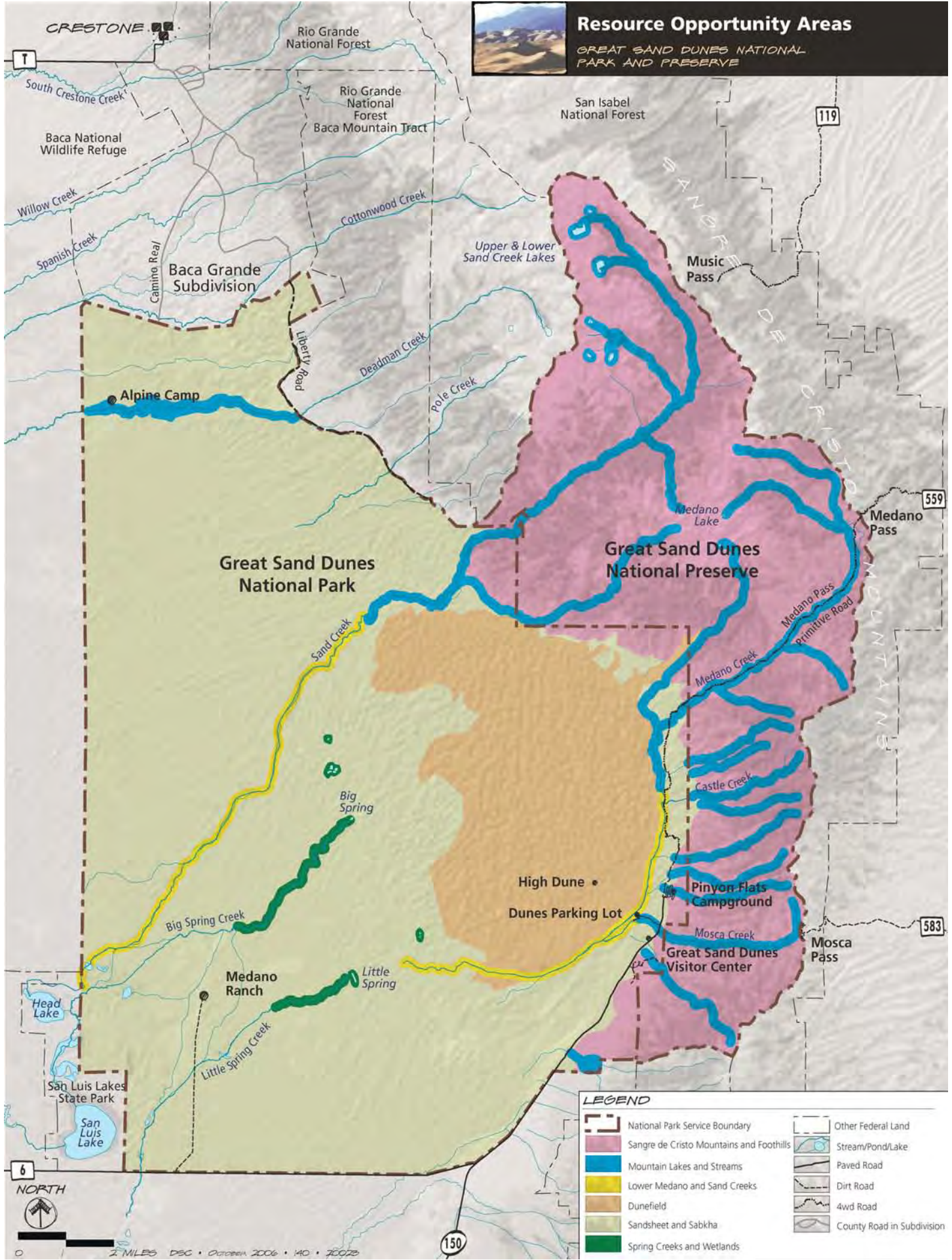
Ecosystem Management

The National Park Service is a leader in resource stewardship and conservation of ecosystem values within and outside the park. The dunes system is managed from an ecosystem perspective, considering both internal and external factors affecting visitor use, environmental quality, and resource stewardship. Management decisions about ecosystems are based on ongoing scholarly and scientific information. Resources and visitation are managed in view of the ecological and social conditions of the park and surrounding area. Park managers adapt to changing ecological and social conditions and are partners in regional land planning and management. The dunes system shows no lasting physical damage caused by humans.



Resource Opportunity Areas

GREAT SAND DUNES NATIONAL PARK AND PRESERVE



LEGEND

- National Park Service Boundary
- Sangre de Cristo Mountains and Foothills
- Mountain Lakes and Streams
- Lower Medano and Sand Creeks
- Dunefield
- Sandsheet and Sabkha
- Spring Creeks and Wetlands
- Other Federal Land
- Stream/Pond/Lake
- Paved Road
- Dirt Road
- 4wd Road
- County Road in Subdivision



Strategies

- Park staff will continue to participate in and encourage ongoing partnerships with local, state, and federal agencies and organizations in programs that have importance within and beyond park boundaries. Partnerships important to the long-term viability of critical natural resources include:
 - reintroduction of native fish species
 - Valleywide groundwater monitoring and trends
 - management of wildlife across human-created boundaries
 - combating nonnative invasive plants
 - wildland fire management
 - Central to ecosystem management is the long-term monitoring of changes in the condition of cultural and natural resources and related human influences. Improvement or degradation of resources and visitor experience cannot be determined with any certainty without a monitoring program. To protect, restore, and enhance park resources and to sustain visitor use and enjoyment within and around the park, park managers will:
 - Initiate or continue long-term monitoring of resources and visitor use, including use of the visitor experience and resource protection (VERP) framework or other carrying capacity process, as appropriate.
- Promote research to increase understanding of park resources, natural processes, and human interactions with the environment, with emphasis on fundamental park resources and values.
 - Practice science-based decision making and adaptive management, incorporating the results of resource monitoring and research into all aspects of park operations.
 - Identify lands outside the park where ecological processes, natural and cultural resources, and human use affect park resources or are closely related to park resource management considerations; initiate joint research, monitoring, management actions, agreements, or partnerships to promote resource conservation.
 - Provide education and outreach programs to highlight conservation and management issues facing the park and related lands, and to develop partners who assist with ecosystem stewardship.
 - Continue to participate in the Rocky Mountain Inventory and Monitoring Network and integrate the information that results into management decisions and identification and monitoring of vital signs.

Natural Resources and Diversity

The resources and processes of Great Sand Dunes National Park and Preserve retain their ecological integrity. Natural wind, sand, and water processes are understood and allowed to function. Management decisions about natural resources are based on ongoing scholarly and scientific information. Park resources and values are protected through collaborative efforts with neighbors and partners. Human impacts on resources are monitored and harmful effects are minimized or eliminated.

Biologically diverse native communities are protected and restored when possible. Particularly sensitive communities such as sand sheet wetlands and tundra are closely monitored and protected. Endemic species and habitats are fully protected, nonnative species are controlled or eliminated, and native species are re-introduced when conditions allow. Genetic integrity of native species is protected. Threatened and endangered species recovery is successful. Natural fire regimes are understood and supported. Grazing by domestic and wildlife species is managed so that natural plant and animal communities and cultural values are protected. Research natural areas may be designated to provide representative areas for long-term ecological baseline studies.

Strategies

Park staff and other scientists will:

- Continue to inventory park resources to quantify, locate, and document biotic and abiotic resources in the park and to assess their status and trends.

- Continue long-term systematic monitoring of resources and processes with neighbors such as the USFS and USFWS, to detect natural and human-caused trends, document changes in species or communities, evaluate the effectiveness of management actions taken to protect and restore resources, and to mitigate impacts on resources.
- Continue research that furthers understanding of the geology, sand, wind, and water processes that underlie the dunes system.
- Conduct or support natural history studies of endemic insects to support management and protection of these species.
- Identify ecological disturbance regimes (e.g., wildland fires and sand blowouts) and their extent, and determine the relative impact of human actions on them.
- Implement and keep current a cooperative wildlands fire management plan that maintains, to the extent possible, condition class I vegetative communities (i.e., within the natural range). This plan is developed with the input and cooperation of park neighbors and federal, state, and local agencies (e.g., Baca National Wildlife Refuge, The Nature Conservancy, and USFWS).
- Establish cooperative agreements and develop weed management area plans for prevention and control of nonnative plants with park neighbors, such as the USFS.

- Inventory and map cottonwoods in new areas of the park to determine whether they are unhybridized narrowleaf cottonwoods. Identify and implement management actions aimed at minimizing the likelihood of introduction of and hybridization with broadleaf cottonwoods.
- Continue to map and monitor sand sheet wetlands areas (springs, stream corridors, and interdunal ponds) to expand understanding of long-term water trends, surface water-groundwater relationships, sensitive species, and human impacts. Persistent problems may trigger restoration activities or management of visitor access.
- Inventory, map, and monitor vegetation, fauna, and soils in tundra areas, particularly adjacent to popular trails and alpine lakeshores. If resources are threatened, actions could include stronger delineation of trails, trail relocation, and/or site restoration. Persistent problems could trigger additional management actions such as use limits or closures, education, and mandatory permits.
- Inventory human-made structures and modifications, and remove structures or restore modifications that do not contribute to the purposes or management of the park, or have been determined not to have cultural significance, or are judged to be unsafe.
- Provide information on living with the park's natural processes, wildlife, critical habitats, and threats to its resources to adjacent homeowners and private land-owners. Information will include wildlife, wildfire, nonnative plants, etc.
- Conserve and restore habitats for threatened and endangered species such as the Rio Grande cutthroat trout.
- Continue to expand the park's data management systems (e.g., geographic information system (GIS), research database, and literature database) for analyzing, modeling, predicting, and testing trends in resource conditions.
- Continue to regularly update the park's resource stewardship plan and prioritize actions needed to protect, manage, and study park resources.
- Apply mitigation techniques to minimize impacts of construction and other activities on park resources.

Air Quality

Great Sand Dunes' class I air quality is maintained or enhanced. Naturally dark night skies and scenic views are substantially unimpaired.

Strategies

- The National Park Service will continue to work with appropriate state and federal agencies, industries, nearby communities, land managers, and the Western Regional Air Partnership to maintain park and regional air quality.

- Park staff and other scientists will continue to inventory and monitor the park's air quality and expand this program to detect and measure changes (improvement or deterioration) to the expanded park's airshed.
- Consistent with provisions of the Clean Air Act, the National Park Service will review, comment on, and recommend actions to minimize or reduce emissions from sources being proposed within 64 miles (103 kilometers) of Great Sand Dunes National Park and Preserve.
- Park managers will attempt to minimize the effects of in-park pollution sources on air quality. For example:
 - if warranted by data demonstrating degradation, emissions from burning wood in campgrounds and employee residences may be reduced by establishing nonburn days or by banning wood burning altogether
 - continue to require bus tour companies to comply with regulations that reduce air pollution levels (e.g., turning off engines when buses are parked)

Water Quality and Quantity

Great Sand Dunes water quality and quantity reflect natural conditions and support natural, recreational, and administrative uses. Outstanding water quality is protected and preserved. Water rights are managed to protect natural

systems. Existing water rights are used, maintained, and respected.

Strategies

- The National Park Service will continue to work to identify and obtain water rights required to fulfill the purposes of the national park and preserve, as authorized by Congress and the Secretary of the Interior.
- Park managers will continue to expand water quality monitoring associated with outstanding waters with the aim of understanding trends and possible management actions aimed at protecting water quality. They will also seek outstanding waters designations for other worthy streams within the park and preserve.
- Park staff will seek to bring water diversions on watercourses and wells within newly acquired park lands into compliance with state water law.
- The National Park Service will expand ongoing water quality and groundwater and stream flow monitoring programs into new park lands to more fully understand the status and trends of surface water and groundwater throughout the area.
- Park staff will develop a program to manage human waste in back-country areas, particularly near stream corridors and lakes.
- Park staff will educate visitors about techniques to prevent water pollution and to safely collect and

treat drinking water from natural sources.

- Park managers will work with adjacent landowners and managers and the Colorado Division of Water Resources to prevent water pollution and minimize the risk of water-borne diseases stemming from livestock and other sources.
- Park managers will participate in state and national water quality remediation and watershed planning programs.
- The National Park Service will work with partners and neighbors throughout the Valley to better understand groundwater systems, trends, and human influences. The National Park Service will also work with partners and neighbors throughout the Valley to protect groundwater resources.
- The National Park Service will attempt to acquire the transbasin water rights to the Hudson and Medano ditches if the owners are willing.
- Park staff will consider the needs of backcountry recreation users before eliminating any human-made water sources.
- The National Park Service will update its water resource management plan to reflect the resources and management issues of the expanded park.

Wildlife Management

Natural wildlife populations and systems are understood and perpetuated. Natural

fluctuations in populations are permitted to occur. Natural influences are mimicked, if necessary. The National Park Service works with neighbors and partners to achieve mutually beneficial goals.

Strategies

- The National Park Service will continue its elk/bison management study to determine the status and health of the elk and bison populations that use park lands.
- The National Park Service will continue to work with partners, including CDOW, the USFWS, USFS, The Nature Conservancy, and park neighbors to develop management strategies for elk and bison. Of particular interest is understanding and perpetuating the dynamic interaction of grazing animals, vegetation, sand sheet conditions, and dune migration in the greater ongoing natural processes of the Great Sand Dunes.
- The National Park Service will develop an elk management plan. This plan will be developed in consultation with partners, including CDOW, the USFWS, USFS, The Nature Conservancy, and park neighbors.
- The National Park Service will strive to identify species that have occupied the park and preserve in the past, and evaluate the feasibility and advisability of reintroducing extirpated species.
- The National Park Service will continue to cooperate with CDOW to learn more about population dynamics and determine

appropriate management actions for game species.

- Park managers will work with CDOW to address conflicts between hunters and other recreational users of the preserve.
- The park will investigate the feasibility of expanding the native fish reintroduction program into other streams in the park or preserve.

DESIRED CONDITIONS FOR HUMAN CONNECTIONS

Cultural Resources

Great Sand Dunes' cultural resources, especially archeological and ethnographic resources, are identified, evaluated, managed, and protected within their broader context. Visitors and employees recognize and understand the value of the park's cultural resources. Management decisions about cultural resources are based on ongoing scholarly and scientific information and consultation with native peoples, the Colorado state historic preservation officer (SHPO), and others. Culturally modified trees are managed to preserve their integrity and vitality. The historic integrity of properties listed in the NRHP (or eligible for listing in the NRHP, or meeting the NRHP eligibility criteria) is protected. Human impacts on cultural resources are monitored and harmful effects are minimized or eliminated.

Strategies

- Park staff, researchers, and partners will continue to collect information to fill gaps in the knowledge and understanding of

Great Sand Dunes cultural resources, to assess status and trends, and effectively protect and manage cultural resources.

- In accordance with the National Historic Preservation Act, as amended (NHPA), park managers will continue to locate, identify, and evaluate cultural resources throughout the park and preserve to determine if they are eligible for listing in the NRHP. In particular, the National Park Service will continue work to identify cultural landscapes and archeological sites within the expanded park and preserve.
- The National Park Service will continue to work closely with and consult the Colorado SHPO and other interested parties to identify, evaluate, and determine appropriate treatment for sites, historic structures, cultural landscapes, and other historic properties throughout the park and preserve.
- The National Park Service will use the best available scientific information and technology for making decisions about management of the park's cultural resources. Park managers will continue to use and expand its data management systems, including GIS and electronic databases, to analyze, model, predict, and test trends in resource conditions.
- The National Park Service will continue long-term monitoring of archeological sites to measure deterioration from natural and human sources and to evaluate the effectiveness of management actions to protect resources and

mitigate impacts. Park managers will rely on a variety of actions to minimize these impacts, including visitor education and interpretation, and use of patrols to enforce the Archeological Resource Protection Act. The park's archeological site disclosure policy will continue to be followed. Appropriate preservation actions for all cultural resources that are threatened or in danger of being lost will be developed, in consultation with the Colorado SHPO, American Indian tribes, and other consulting parties, in compliance with the NHPA. This could include measures such as removing the threat, stabilizing the resource, data recovery, documenting and researching, increasing ranger patrol and visitor education, or closure.

- To provide the public and park staff with optimum interpretive and resource management opportunities, park personnel will continue to research, document, and catalog the museum collection. Museum objects and archival materials will be conserved to professional and NPS standards. The park's museum conservation program will continue to provide the proper preservation and protection of the museum collection.
- Resource and maintenance staff will receive historic preservation training and will be made aware of and apply the most recent preservation technology and applications.
- Park managers will continue to regularly update the park's

Resource Stewardship Plan and prioritize actions needed to protect park resources.

Relations with Private and Public Organizations, Adjacent Landowners, and Governmental Agencies

Great Sand Dunes National Park and Preserve is managed holistically as part of a greater ecological, social, economic, and cultural system. Positive relations are maintained with adjacent landowners, surrounding communities, academia, and private and public groups that affect, and are affected by, the park. Great Sand Dunes is managed proactively to resolve external issues and concerns, to provide opportunities for appropriate independent research, and to ensure that park values are not compromised.

Strategies

- Park staff will continue to establish and foster partnerships with public and private organizations to achieve the purposes and mission of the park. Partnerships will be sought for resource protection, research, education, and visitor enjoyment purposes.
- To foster a spirit of cooperation with neighbors and encourage compatible adjacent land uses, park staff will keep landowners, land managers, local governments, and the public informed of park goals, management activities, and resource threats. Park staff will respond promptly to concerns that arise on adjacent lands over park management practices, visitor access, and proposed activities and development. Park managers will seek agreements with landowners

to encourage that their lands be managed in a manner compatible with park purposes, especially with close neighbors (e.g., the USFS and USFWS). Park staff will seek ways to provide landowners with technical and management assistance to address issues of mutual interest or concern.

- The National Park Service will work closely with local, state, and federal agencies, and tribal governments whose programs affect, or are affected by, activities at Great Sand Dunes. Park managers will continue to work closely with the USFS, USFWS, Colorado State Parks, CDOW, and The Nature Conservancy to achieve mutual management goals. Park managers will also pursue cooperative regional planning whenever possible to involve the park in issues of regional concern.
- The National Park Service will seek to resolve minor boundary discrepancies near San Luis Lakes State Park and at other locations through administrative action or legislation.

Relations between American Indian Tribes and Great Sand Dunes National Park and Preserve

The National Park Service and tribes culturally affiliated with Great Sand Dunes maintain positive, productive, government-to-government relationships. Park managers and staff respect the viewpoints and needs of the tribes, promptly address any conflicts that occur, and consider American Indian values in park management and operation. Traditional ethnographic needs and uses are understood,

and those uses that are consistent with protection of park resources and values are allowed to occur.

Strategies

- The National Park Service will continue to cooperate with tribes in conducting ethnographic studies to better understand which tribes are culturally affiliated with the park and to identify culturally significant resources. Regular consultations will occur with affiliated tribes to continue to improve communications and understand mutual concerns.
- Values and stories of affiliated tribes will be considered (in consultation with the tribes) in development of park interpretive programs and management decisions.

Contemporary Community Ties

Strong personal ties to the Great Sand Dunes and appropriate uses are recognized, fostered, and maintained. NPS staff, volunteers, and concession employees reflect the cultural diversity of the San Luis Valley and the region.

Strategies

- Park managers will recruit employees who reflect the cultural diversity of the San Luis Valley and region.
- The park will continue to partner with Friends of the Dunes to meet mutual goals related to park research, interpretation, and education, and to strengthen community ties.

- Park managers will continue to support and encourage volunteers who contribute to park programs.

DESIRED CONDITIONS FOR VISITOR OPPORTUNITIES

Visitor Use and Experience

Visitors from diverse backgrounds can experience a range of opportunities consistent with the purpose, significance, and fundamental resources and values of the park. Most visitors understand and appreciate the purpose and significance of the park and value their stewardship role in preserving natural and cultural features. They actively contribute to the park's preservation through appropriate use and behavior. Park programs and services are accessible to all audiences. All visitors understand park policies for use. Conflicts between different user groups are minimized.

Visitor use levels and activities are consistent with preserving park purpose, significance, and fundamental resources and values, and with providing opportunities for primitive recreation and/or solitude. Visitor use is also managed to minimize impacts on neighboring private and public lands. Management decisions are based on scholarly and scientific information. When such information is lacking, managers make decisions based on the best available information, adapting as new information becomes available. Regional recreation opportunities are coordinated among agencies for public benefit and ease of use.

Strategies

- By evaluating existing services and seeking opportunities for improve-

ment, the park will attempt to provide programs and facilities that are effective in reaching and serving diverse communities.

- The park will seek to collect data over time to monitor visitor experiences as part of an overall carrying capacity effort to protect desired resource conditions and visitor experiences. Methods will be designed to minimize the burden to staff and visitors.
- The National Park Service will strive to address threats to resources and the visitor experience by means other than placing limits or restrictions on use (e.g., by expanding or redirecting visitor education programs). If necessary, however, more restrictive methods may include requiring permits for certain uses or areas, placing limits on use, and closing areas, including trails or campsites. Restrictions on visitor use will be based on a determination by the park superintendent that such measures are consistent with the park's enabling legislation and NPS policies, and are necessary to prevent degradation of the purposes and values for which the park was established, to minimize visitor use conflicts, or to provide opportunities for quality visitor experiences.

Visitor Information, Interpretation, and Education

Interpretation and education services at Great Sand Dunes facilitate intellectual and emotional connections between visitors and park resources. Interpretive programs foster understanding of park resources, resource stewardship, and build a local and

national constituency. Outreach programs through schools, organizations, and partnerships build connections to the park. Curriculum-based education inspires student understanding and resource stewardship. Information about public use opportunities is coordinated among neighboring agencies for public benefit and ease of use. Visitors receive adequate information to orient themselves to visitor opportunities and to have a safe, enjoyable visit.

Strategies

- Park managers will continue to update and implement the park's long-range interpretive plan, with emphasis on providing information, orientation, and interpretive services in the most effective manner possible. Staff will use state-of-the-art technologies, including Internet Web-based programs, where appropriate.
- Park staff will stay informed of changing visitor demographics and preferences to effectively tailor programs for visitors. They will develop interpretive media supportive of park purposes, interpretive themes, and fundamental resources and values.
- Working with other federal agencies, the state of Colorado, and local communities, park staff will continue to improve pre-trip planning and provide en route information and orientation for park visitors. Park staff will work with local communities and other entities to provide information/orientation and interpretive services outside park boundaries, where appropriate. Park staff will seek partnerships with other state

and national parks, educational institutions, and other organizations to enrich interpretation and educational opportunities regionally and nationally.

- Staff will implement the park's education strategy plan, which outlines goals and actions for expanding the park's curriculum-based education program.

Viewsheds

Key scenic vistas are identified and protected. Park managers work with neighbors, local communities, and land managers to preserve scenic values.

Strategies

- The National Park Service will work with visitors, neighbors, and others to identify and preserve key viewpoints and vistas in and near the park. Managers will share viewpoint and vista preservation goals and concerns with neighboring management agencies, communities, and landowners so that these entities may share in stewardship of these fundamental park and regional values.
- Park managers will work with neighbors, partners, and others to preserve the rural, scenic character of park "gateway" (entrance) areas and corridors so that they complement the park's key viewpoints and vistas.

Night Sky

The naturally dark night sky is preserved. Artificial light sources within and outside

of the park do not impair opportunities to see the moon, stars, planets, and other celestial features.

Strategies

- Baseline data for the dark night sky is established through servicewide NPS programs.
- The National Park Service will continue to work with local communities to encourage protection of the night sky and will evaluate impacts on the night sky caused by facilities within Great Sand Dunes National Park and Preserve. To the extent possible, the staff will work within a regional context to protect night sky quality.
- If park staff determine that light sources within the park affect views of the night sky, they will study ways to further minimize light sources and eliminate any unnecessary ones.

Natural Sounds

The natural soundscape is preserved. Visitors have opportunities throughout most of the park to experience natural sounds. The sounds of civilization are generally confined to developed areas.

Strategies

- Park managers will continue to work with the Federal Aviation Administration, commercial businesses, and general aviation entities to minimize noise and visual impacts of aviation to the park. Pilots will be discouraged from overflying the park. Actions

taken to minimize aviation impacts could include identifying the park on aviation maps as a noise-sensitive area, educating pilots about park values, and encouraging pilots to fly in compliance with Federal Aviation Administration regulations and advisory guidance, in a manner that minimizes noise and other impacts. If demand for commercial air tours develops, the National Park Service will develop a commercial air tour management plan to address tours and their effects on the park.

- The National Park Service will continue to work with Department of Defense entities (e.g., Colorado Air National Guard) to minimize impacts from military flights in the vicinity of the park.
- Park managers will follow several strategies to control existing and potential land-based noise sources:
 - Continue to require bus tour companies to comply with regulations that reduce noise levels (e.g., turning off engines when buses are parked).
 - Encourage visitors to avoid the use of noisy generators.
 - Maintain existing quiet hours in campgrounds.
 - Continue to enforce existing noise policies in the backcountry.
- Park managers will minimize noise generated by their own management activities by regulating National Park Service and concession use of noise-producing machinery such as aircraft and motorized equipment. Noise will

be a consideration when procuring and using park equipment. In wilderness areas, the use of motorized equipment will conform to the requirements of the Wilderness Act “minimum requirements procedures” and related NPS policies (NPS Director’s Order – 41).

- The National Park Service will continue to collect baseline data on park soundscapes to understand characteristics and trends in natural soundscapes and to assist in management.

Wilderness

Wilderness areas retain their wilderness characteristics and values. Visitors find ample opportunities for primitive recreation and solitude. Wilderness areas are affected primarily by the forces of nature, and signs of people remain substantially unnoticeable. Visitors value and support wilderness preservation.

Strategies

- Within five years after approval of the GMP, park staff will complete a wilderness management plan that will include establishing specific carrying capacities for areas of concern. Managers will plan in coordination with the adjacent USFS wilderness area, seeking common goals, information sharing, joint planning, efficient and consistent management, and good visitor service. In the meantime, and in keeping with established NPS policies and Director’s Order – 41: *Wilderness Preservation and Management*, the park staff will continue to manage

wilderness areas and recommended wilderness areas as wilderness.

- The park’s wilderness plan will also provide guidance for minimum requirement assessments, as defined in Director’s Order – 41, to all activities affecting wilderness resources and character. A minimum requirement assessment will be used to determine whether or not a proposed management action is appropriate or necessary for the administration of the area as wilderness. If the project is deemed appropriate or necessary, the management method selected will be that which causes the least amount of impact to the physical resources and experiential characteristics of the wilderness. The park staff will also continue to take appropriate action to preserve wilderness character and limit visitor impacts on resources.

Park Accessibility

Buildings, facilities, programs, and services of Great Sand Dunes are accessible to and usable by all people, including those with disabilities. New and renovated facilities are designed and constructed to be universally accessible. Visitors with limited mobility have opportunities to experience the dunes, surrounding sands and waters, and enjoy representative portions of the backcountry.

Strategies

- The National Park Service will identify and modify existing facilities to meet accessibility standards as funding allows or as facilities are replaced or rehabili-

tated. New facilities will meet accessibility standards.

- Park managers will periodically consult with disabled persons or their representatives to increase awareness of the needs of the disabled and to determine how to make the park more accessible. Human-powered over-sand wheelchairs will continue to be available for visitors with special accessibility needs.

OTHER DESIRED CONDITIONS

Land Protection

Impacts from rights-of-way, inholdings, private mineral interests, agricultural uses, and other valid existing rights within the park are minimized to protect park resources and values.

Strategies

- Private property, mineral rights, and water rights within the park will continue to be recognized; however, such rights will be acquired or modified, where possible, to minimize impacts on park resources and values. Park staff will continue to communicate with private rights owners to understand each others' values and concerns and to address any potential impacts from each others' activities. Meetings will be held, as necessary, to address any concerns.
- Various techniques will be used to protect park values, including cooperative management agreements, acquisition of conservation and access easements, land

exchanges, donations, and purchase of fee title. Inholdings will be acquired, as possible, assuming conditions for transfer are acceptable and compatible with the purposes of the park. Management of such lands will revert to the zoning and wilderness status proposed in this GMP once land or water rights are acquired or relinquished, and nonconforming uses are removed.

- Federal regulations and laws will be applied to oil, gas, and mineral exploration and extraction activities to ensure protection of park resources.

Research

The National Park Service works with partners to learn about natural and cultural resources and associated values. Research priorities for the park and preserve are aligned with its purpose, significance, and fundamental resources and values.

Strategies

- Park managers will encourage and support basic and applied research through various partnerships and agreements to enhance understanding of park resources and processes, or to answer specific management questions.

Facilities and Services

Great Sand Dunes facilities and development are the minimum necessary to serve visitor needs and protect park resources for the long term. Visitor and management facilities are compatible with natural processes and surrounding landscapes,

aesthetically pleasing, and functional. Commercial services in the park are only those that are necessary, appropriate, and based on park purposes. In general, commercial services will be based outside the park rather than inside the park, if possible. Housing is managed to ensure an adequate level of protection for park resources, visitors, employees, and government property, and to provide necessary services. Adequate response (equipment and people) for visitor and facility protection, search and rescue, fire management, and safety is available. All decisions regarding park operations, facilities management, and development at Great Sand Dunes—from initial concept through design and construction—reflect principles of resource conservation and sustainability.

Strategies

- Facilities will be located, built, and/or modified according to the *Guiding Principles of Sustainable Design* (NPS 1993) or similar guidelines. Architectural character guidelines will be established and followed to ensure sustainability and compatibility with the natural and cultural environment. Park staff will properly maintain and upgrade existing facilities using sustainability principles where necessary to serve the park mission.
- Park managers will consider the availability of existing or planned facilities in nearby communities and adjacent lands, as well as the possibility of joint facilities with other agencies, when deciding whether to construct new developments in the park. This will ensure that any additional facilities in the park are necessary, appropriate, and cost-effective.
- The National Park Service will continue to strive to make affordable housing available within the park for emergency response staff, seasonal and entry-level employees, and support other park needs (housing support for researchers, etc.).
- Any new telecommunication structures will be carefully sited so as to not jeopardize the park’s purpose, significance, and fundamental resources and values (including viewsheds), and in consideration of the park’s management zones. New rights-of-way will be permitted only with specific statutory authority and approval by NPS managers, and only if there is no practicable alternative to such use of NPS lands.
- To support visitor opportunities, “The National Park Service will provide, through the use of concession contracts and commercial use authorizations, commercial visitor services within parks that are necessary and appropriate for visitor use and enjoyment. Concession operations will be consistent with the protection of park resources and values and demonstrate sound environmental management and stewardship” (NPS 2001). The following criteria were derived from NPS *Management Policies* to guide management of commercial services at Great Sand Dunes National Park and Preserve. Necessary and appropriate commercial services are generally identified under the management zones and alternatives sections of this GMP.

Criteria for Commercial Services

Commercial services are managed at Great Sand Dunes National Park and Preserve in accordance with NPS policies and to meet the following criteria for “necessary and appropriate”:

1. Necessary (meets one or more)
 - a. Enhances visitor understanding and appreciation of park mission and values.
 - b. Facilitates or complements the fundamental experiences of park visitors.
 - c. Assists the park in managing visitor use and educating park visitors in appropriate, safe, and minimum-impact techniques.
 - d. Is an essential visitor service or facility not available within a reasonable distance from the park.
2. Appropriate (meets all)
 - a. Services are consistent with the purposes and values for which the park was established, as well as applicable laws, regulations, and policies.
 - b. Services do not compromise public health, safety, or well-being.
 - c. Services do not significantly impact important park resources and values.
 - d. Services do not unduly conflict with other authorized park uses and activities or services outside the park.
 - e. Services do not monopolize limited recreational opportunities at the expense of the general public.

PLANNING ISSUES AND CONCERNS

Early in the planning process, the planning team identified the primary issues and concerns facing Great Sand Dunes National Park and Preserve with assistance from the public, the Great Sand Dunes National Park Advisory Council, park staff, and neighboring agencies and organizations. Many issues relate to protection of natural and cultural resource values or providing for quality experiences. This section summarizes the main issues or concerns to be addressed by the GMP / wilderness study.

PROTECTION OF FUNDAMENTAL RESOURCES AND VALUES

The National Park Service must identify fundamental resources and values that deserve primary consideration in planning and management for the national park and

preserve, and strategies to protect those values. Similarly, the National Park Service must identify what visitor opportunities or experiences fit with the purposes and maintain the significance of the park and preserve, and develop strategies for enhancing those opportunities. (Note: these determinations are now documented in the “Fundamental Resources and Values” section above.) The National Park Service must also decide how to manage specific areas of the park (through management zoning) to protect and provide these different natural, cultural, and visitor experience values. The National Park Service must resolve whether certain kinds of recreational activities (e.g., dogs, pack animals, and off-highway vehicle use) and commercial services are consistent with protecting these resources and values, and

where they should occur within the park (if they should occur at all).

MANAGEMENT OF NEW PARK LANDS

The Great Sand Dunes Act of 2000 expanded the size of Great Sand Dunes National Monument by nearly four times. Some of the new land is now Great Sand Dunes National Park, and some is now Great Sand Dunes National Preserve. The National Park Service must decide how to manage natural resources, cultural resources, and visitor use on the park expansion lands. Of particular concern is management of former Baca and Medano ranch lands that are now within the boundaries of the national park. Examples include: determining the fate of ranch infrastructure such as buildings and roads, deciding whether to continue to allow bison on park lands, and resolving how to protect sensitive resources and manage visitor use on new lands.

ACCESS TO NATIONAL PARK SERVICE AND OTHER FEDERAL LANDS

Comments provided by the public and neighboring agencies indicate that access to new NPS lands and adjacent federal lands is of great interest and concern. People are concerned about whether there will be new road or trail access to the dunes from the north. Hunters are concerned about how to get to the national preserve and to USFS lands, where hunting is allowed. There is also interest in whether the National Park Service or other land managers will provide new trails or trailheads to stream drainages north of the former national monument. Neighbors in the Crestone / Baca Grande community are concerned that potential new routes of access could affect their quality of life. The National Park Service must decide what routes and means of

access are appropriate in different areas of the park and preserve, given resource protection and visitor experience needs.

CROWDING AND OVERUSE

Some visitor facilities and frontcountry and backcountry areas within the park and preserve are crowded or congested, even at times other than peak visitor weekends. The GMP must deal with issues of crowding and give general management direction for addressing visitor carrying capacity in the park and preserve.

WILDERNESS

Great Sand Dunes National Park includes the Great Sand Dunes Wilderness Area, and the national preserve includes a portion of the Sangre de Cristo Wilderness Area. Lands added to the national park when the park was expanded in 2000 have not previously been considered for wilderness designation by the National Park Service. The National Park Service needs to determine the general direction of wilderness management for existing National Park Service wilderness areas, and determine whether any additional lands should be proposed for inclusion in the National Wilderness Preservation System.

WILD AND SCENIC RIVERS

The Wild and Scenic Rivers Act of 1968, and NPS *Management Policies* require park managers to assess whether watercourses within national park units are suitable for inclusion in the national wild and scenic river system. The streams of the park and preserve have not previously been considered for wild and scenic river status. The National Park Service must determine whether to recommend streams within the

park as part of the wild and scenic rivers system (appendix H).

DEVELOPMENT AND USES IN AND NEAR THE PARK

Some areas of the San Luis Valley are gradually becoming more developed by residential, commercial, and other uses. Agricultural and domestic demand for additional water has the potential to draw down the groundwater aquifer that

underlies the dunes system. Oil and gas exploration activities are being conducted on lands within the national park. These and other activities could degrade park resources and values such as scenic views, the night sky, ambient sound levels, opportunities for solitude, and native plant and animal communities. Park managers must determine how to work with park neighbors to protect park resources in light of changes and activities that are occurring in the Valley.

PLANNING CONSIDERATIONS AND CONSTRAINTS

This section explains planning considerations and constraints related to implementation of some actions in the GMP alternatives.

MEDANO RANCH

The Nature Conservancy owns all private lands within Medano Ranch, and may eventually transfer the ranch portion within the national park boundary to the federal government. This could happen in phases or all at once, but this transfer is generally expected to be completed within the life of this GMP. Until the transfer takes place, implementation of some alternative actions, especially those related to Medano Ranch facilities and access onto or through Medano Ranch lands, will be contingent on agreement and cooperation with The Nature Conservancy.

PUBLIC VEHICLE ACCESS TO THE BACKCOUNTRY ACCESS ZONE IN

NORTHERN PORTION OF NATIONAL PARK

When the Great Sand Dunes National Park and Preserve was established in 2004, the federally acquired Baca Ranch lands within the NPS boundary became open to the public via pedestrian access, but not via public vehicle access. Public pedestrian access to new NPS lands now occurs where public rights-of-way touch the NPS boundary. A key issue in this plan is whether or not to provide public vehicle access to the newly acquired northern public lands. Some alternatives in this GMP propose public vehicle access to a small trailhead, parking area, and in one alternative, a small primitive campground. There are a number of planning considerations and constraints regarding such access that involve existing agreements, Saguache County and its residents, and other federal agencies. While this plan has alternatives and a proposal for a backcountry access zone to provide public vehicle access to the northern portion of the park for backcountry use, this GMP does not resolve the question of how such access might ultimately be achieved. It instead leaves

flexibility, allowing for ongoing collaboration and planning with the many entities involved.

COW CAMP ROAD

Cow Camp Road (sometimes referred to locally as Lexam Road) is an improved gravel road located within the Baca National Wildlife Refuge and the northern portion of Great Sand Dunes National Park. Some alternatives in this GMP propose that segments of Cow Camp Road within the national park be designated a backcountry access zone to allow public vehicle access to a small trailhead, parking area, and in one alternative, a campground. Lexam Explorations, Inc. (Lexam), has a surface-use agreement permitting the company to use Cow Camp Road to exercise its subsurface mineral rights within the former Baca Ranch. Lexam's surface-use agreement will expire in the year 2011, unless Lexam begins producing oil, gas, or minerals on the former Baca Ranch. In that case, the surface-use agreement could be extended beyond the life of this GMP. The surface-use agreement contains language relieving Lexam of liability for others' use of Cow Camp Road. To allow acquisition of Baca Ranch by the federal government, The Nature Conservancy assumed liability for the federal government's use of the road. The Nature Conservancy does not wish to assume liability for public vehicle use, so such use would not be allowed until expiration of the Lexam surface-use agreement.

COUNTY ROADS AND BACA GRANDE SUBDIVISION

Saguache County public roads through the Baca Grande subdivision provide the current public pedestrian access to the new northern NPS lands. Camino Real ends 0.2

mile short of the NPS boundary; however, the public right-of-way continues to the NPS boundary. If the county completed the 0.2 mile road to the NPS boundary, the National Park Service could construct a connection to Cow Camp Road or an existing primitive road in the backcountry access zone shown in the proposal and some of the alternatives. Public roads within the subdivision do connect to Liberty Road, currently gated and closed to public vehicle use at the NPS boundary (more on Liberty Road below). Residents and others currently park on the county rights-of-way and walk into the national park at the end of Camino Real and Liberty Road. Residents of the subdivision and numerous spiritual retreat centers are concerned about traffic and associated impacts that may occur if public vehicle access on federal lands is developed via one of these public rights-of-way.

BACA NATIONAL WILDLIFE REFUGE

As described above, some alternatives in this GMP propose that segments of Cow Camp Road within the national park be designated a backcountry access zone to allow public vehicle access for backcountry use. Cow Camp Road does extend through the Baca National Wildlife Refuge and was considered during the draft GMP for providing public vehicle access to the park. Early in the NPS planning process there was a possibility of vehicle access for wildlife-dependent public use of the refuge that could also provide national park access. However, the USFWS clarified later in the planning process that at least for the life of the GMP, the USFWS does not plan to develop wildlife-dependent public use on the east side of the refuge that would require visitors to traverse substantial amounts of refuge habitat and that would facilitate access to the proposed backcountry access zone of the park. Thus, the

USFWS ultimately decided that public use of Cow Camp Road or other roads across the refuge to directly access the park would not meet USFWS policy. However, there is an existing Baca Grande emergency egress easement that could be developed to provide indirect access to the park.

LIBERTY ROAD

For the last several decades, Liberty Road has been a Baca Ranch road. As the Baca Grande subdivision was purchased and developed, roads within the subdivision leading to the Liberty Road gate became Saguache County public roads. The roads traverse one of the most densely developed portions of the subdivision and are adjacent to several spiritual retreat centers.

The federal government obtained the remainder of the Baca Ranch and Liberty Road in 2004. Prior to 2004, Liberty Road, from the park/subdivision boundary south, was privately owned and not open to public use. The first 0.7 mile of Liberty Road crosses NPS land and the road then roughly forms the boundary for about 6.0 miles between the park and the Baca Mountain Tract of the Rio Grande National Forest, with the road crossing USFS lands. The road ends at the Liberty town site.

When the National Park Service obtained jurisdiction over the first 0.7 mile, the agency installed a gate and the road has since been an administrative road only. The

National Park Service and the USFS, as well as private landowners to the south, have vehicle access, but the general public does not. The National Park Service allows pedestrian access along Liberty Road. Pedestrians typically park their vehicles on the county road outside the park. To avoid parking congestion from horse trailers, the National Park Service does not currently allow horse access at the northern park boundary.

County roads to the Liberty Road gate provide the only existing public vehicle access up to the park boundary, but there are concerns about opening the Liberty gate to provide public vehicle use on public lands. As stated above, county roads to the Liberty gate traverse a densely developed area in the Baca Grande subdivision and several spiritual retreat centers whose residents are concerned about potential impacts of traffic. Liberty Road crosses sensitive riparian areas and then becomes loose sand farther south of those crossings. With regular vehicle use, Liberty Road would quickly become impassable to all but four-wheel-drive vehicles due to the sandy conditions. The USFS has not finished planning for the Baca Mountain Tract, so the potential uses in this new USFS area are still unknown. Therefore, the National Park Service cannot analyze the impacts of new uses, and this GMP does not resolve the question of Liberty Road as an access option to the area. Instead it encourages ongoing collaboration and planning to determine the best option.

RELATIONSHIP OF THE GENERAL MANAGEMENT PLAN TO OTHER PLANNING EFFORTS

RESOURCE MANAGEMENT STRATEGY, GREAT SAND DUNES NATIONAL MONUMENT

The 1994 “Resource Management Strategy for Great Sand Dunes National Monument” formulated a strategy that prompted park managers to move from a reactive to a proactive method of resource management. The strategy consists of five parts or steps: (1) define the Great Sand Dunes ecosystem, (2) understand the system, (3) monitor the system, (4) manage the system, and (5) evaluate actions.

Since the strategy was developed, park managers have made great strides in implementing it. First, progress toward defining and understanding the system provided scientific background and support for the 2000 park expansion legislation. Second, resource managers have answered certain key questions about physical, biological, and cultural components of the Great Sand Dunes system that were identified in the 1994 strategy, and are still working proactively to answer others. Third, managers are using the information gained to make informed management decisions. Increased understanding of the dunes system and its components has supported and guided the GMP in important ways, including helping to define fundamental resources and values; identifying resource threats and sensitive area locations within the park; and underscoring the need to involve neighbors, partners, and the interested public in planning for the expanded park.

CONCEPTUAL MANAGEMENT PLAN, COMPREHENSIVE CONSERVATION PLAN, BACA NATIONAL WILDLIFE REFUGE

The USFWS administers the recently established Baca National Wildlife Refuge, located west of Great Sand Dunes National Park. The USFWS published a conceptual management plan for the Baca refuge in May 2005. This plan provides a broad overview of that agency’s proposed management approach to wildlife and relative habitats, public uses, facilities, interagency coordination, and other operational needs. The plan acknowledges that a big issue for the National Park Service and the public is vehicle access to the northern portion of the expanded national park.

The conceptual management plan of the USFWS does not provide detailed information about where new facilities (if any) would be located or how visitor services would be implemented. However, it outlines requirements for any public uses on a national wildlife refuge as follows: (1) the use must be determined compatible with the purpose of the refuge; and (2) sufficient resources must be available for the development, operation, and maintenance of the permitted public use. The conceptual management plan indicates that the USFWS intends to develop a visitor services plan to address issues related to public access and wildlife-dependent activities on the refuge. Also, a comprehensive conservation plan for the refuge will provide a detailed analysis of current and future refuge management activities—this effort has yet to be scheduled (USFWS 2005). The USFWS has stated that public

use of a road across the Baca National Wildlife Refuge to access the national park's backcountry access zone does not satisfy the criteria in USFWS policy for appropriate uses of refuges because: (1) the use is not manageable with available budget and staff, (2) the use is not manageable in the future within existing resources, and (3) the use does not contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, nor does the use benefit the refuge's natural or cultural resources.

The USFWS has been cooperating extensively in planning for the Great Sand Dunes, and the National Park Service expects to be closely involved in planning for its refuge neighbor.

PLANNING FOR LANDS ADDED TO RIO GRANDE NATIONAL FOREST IN THE YEAR 2000

The Great Sand Dunes Act of 2000 added a new area to the Rio Grande National Forest—the Baca Mountain Tract. This area is located immediately east of the Baca Grande subdivision, and north of the national park. The USFS will be amending their forest plan to designate the newly acquired USFS system lands into management prescriptions. This planning process began in 2006 and will include public and other agency involvement. The Rio Grande National Forest will likely consider an alternative that would provide public motorized access across the park to the national forest, specifically on Liberty Road, and has asked the National Park Service to be a cooperating agency in their planning process.

INTERAGENCY LAND EXCHANGE, GREAT SAND DUNES NATIONAL PARK AND PRESERVE, BACA

NATIONAL WILDLIFE REFUGE, BUREAU OF LAND MANAGEMENT, AND COLORADO STATE LAND BOARD

A land exchange involving the National Park Service, the State Land Board of Colorado, the Bureau of Land Management (BLM), and the USFWS is being pursued. With expansion of the national park and creation of the Baca National Wildlife Refuge (Great Sand Dunes Act of 2000) came the authority to acquire private lands within the boundary through purchase, donation, or exchange. The legislation specifically authorizes that lands or interests therein owned by the state of Colorado may only be acquired by donation or exchange. The interagency land exchange involves exchanging a number of state-owned land parcels within the expanded boundaries of the national park and the Baca National Wildlife Refuge for BLM land parcels lying outside the park refuge boundaries. The proposed exchange meets state and federal goals of consolidating dispersed parcels to achieve better and more efficient management. All agencies are actively involved in working out the complexities of the exchange. The GMP for the Great Sand Dunes considers how lands within the park (acquired via the land exchange) should be managed.

GREATER SAND DUNES INTERAGENCY FIRE MANAGEMENT PLAN

The *Greater Sand Dunes Interagency Fire Management Plan* was prepared cooperatively by and for Great Sand Dunes National Park and Preserve, Baca National Wildlife Refuge, and The Nature Conservancy's Medano-Zapata Ranch in 2005. The plan describes a cross-boundary, interagency fire management program for

the Greater Sand Dunes landscape that aims to conserve ecological systems, biodiversity, and wildlife, while protecting human life, property, and other resources. The plan provides direction for fire management across the study area, while still allowing each agency to meet its own protection and resource management

objectives. The agencies plan to update the plan regularly; thus, there will be opportunities to adjust the interagency fire management plan, as needed, to incorporate elements of the Great Sand Dunes National Park and Preserve GMP, once the latter is approved.



Chapter Two: Alternatives

INTRODUCTION

This chapter presents four alternatives, including the National Park Service preferred alternative, for future management of Great Sand Dunes National Park and Preserve. The four alternatives are labeled: no-action, NPS preferred, dunefield focus—maximize wildness, and three public nodes.

The alternatives, each of which is consistent with the park’s purpose, significance, and fundamental resources and values, present different ways to manage resources, visitor use, and facilities within the park. The no-action alternative is included as a baseline for comparing the environmental consequences of implementing each “action” alternative.

This chapter also includes a table that summarizes key differences between the alternatives. Key differences in the expected impacts of implementing the alternatives are summarized in table 26, chapter four. The summary of the impacts table is based on the analysis in Chapter Four: Environmental Consequences.

INTRODUCTION TO THE ALTERNATIVES

As noted in chapter one (“Foundation for Planning and Management section”), the National Park Service would continue to follow special park mandates and service-wide laws and policies, regardless of the alternative considered in this GMP. These special mandates, laws, and policies are not repeated here.

Similarly, the parkwide desired conditions (and management strategies to achieve those conditions) for the Great Sand Dunes discussed in chapter one apply regardless

of the alternative considered in this GMP. Those desired conditions cover four main topic areas: *Dunes and Biological Diversity* (includes ecosystem management, natural resources and diversity, air quality, water quality and quantity, and wildlife management); *Human Connections* (cultural resources; relations with private and public organizations, adjacent landowners, and governmental agencies; relations between American Indian tribes and Great Sand Dunes National Park; and contemporary community ties); *Visitor Opportunities* (visitor use and experience; visitor information, interpretation, and education; viewsheds; night sky; natural sounds; wilderness; and park accessibility); and *Other* (land protection, research, and facilities and services). The desired conditions and management strategies are not repeated in this chapter.

The primary focus of this chapter, and of the EIS, is actions that would differ among the GMP alternatives. The GMP alternatives are intended to be specific enough to provide clear management direction for park staff, while still allowing flexibility to adapt to changing future conditions and situations. They outline alternate visions of the future that would guide day-to-day and year-to-year management of the park. Implementation of the NPS preferred alternative will depend on future funding, resource protection priorities, and environmental and cultural compliance. Full implementation could take many years.

To develop the GMP alternatives in this chapter, the National Park Service planning team and the Great Sand Dunes National Park Advisory Council first gathered information about existing visitor use and

the condition of park facilities, areas, and resources. They considered which areas of the park attract visitors and which have sensitive resources. They then developed seven management zones for guiding the preservation, appreciation, and use of the Great Sand Dunes. The management zones are applied in varying combinations and

locations in the GMP alternatives (except for the no-action alternative). Thus, the management zones form the main basis for the GMP alternatives. These zones are discussed in detail after the following section, which introduces the concept of carrying capacity.

CARRYING CAPACITY

General management plans are required to address visitor carrying capacity for national park units. The National Park Service defines visitor carrying capacity as “the type and level of visitor use that can be accommodated while sustaining desired resource conditions and visitor experiences in the park.” Carrying capacity does not necessarily involve identifying a “magic number” for visitor use, nor does it necessarily imply closures or use limits.

The carrying capacity process for national parks typically involves the following steps (more detail on these steps is provided in appendix D):

1. Identify desired conditions (goals) for resources and visitors.
2. Identify indicators (things to monitor to determine whether desired conditions are being met).
3. Identify standards (limits of acceptable change) for the indicators.
4. Monitor indicators.
5. Take management action, as necessary, to ensure that standards are met.

6. Regularly evaluate and make adjustments based on new information and lessons learned.

This GMP addresses carrying capacity in the following ways:

- It identifies desired resource and visitor experience conditions for each management zone.
- It identifies the principal resource and visitor experience concerns for each management zone (and related indicators) so that park managers can collect baseline data that will assist with setting preliminary standards.
- For each resource concern, it lists potential management actions that might be used to address deteriorating trends or unacceptable conditions.
- It identifies specific geographic areas for special monitoring attention.
- It evaluates the tradeoffs of having different proportions and distributions of management zones, via the GMP alternatives.

- It explores different scenarios (solutions) for what to do when frontcountry parking areas become full, via the GMP alternatives.

A wilderness management plan, tiered off this GMP, will provide more specific direction for addressing carrying capacity.

With limited NPS personnel and budgets, park managers must focus carrying capacity efforts on areas where there are definite concerns and/or clear evidence of problems. This means that monitoring should concentrate on areas where: conditions violate standards (or threaten to), conditions are changing rapidly, specific and important values are

threatened by visitation, or effects of management actions or visitation are unknown. At the Great Sand Dunes, the following areas deserve special carrying capacity attention: the Upper and Lower Sand Creek Lakes areas, portions of Deadman Creek, Sand Creek, and Castle Creek corridors located within the national park, Big and Little Springs, the area north of Cow Camp Road, and the area around the dunes parking lot.

Since some of these resource areas (and visitor use of them) begin or end outside the park, opportunities to cooperate with other land-managing neighbors would be pursued, as appropriate.

MANAGEMENT ZONES

Management zones define specific resource conditions, visitor opportunities, and management approaches to be achieved and maintained in each area of the park. Similar to city or county zoning, management zones provide predictable expectations for the condition of areas of the park. Seven management zones have been developed for Great Sand Dunes National Park and Preserve, and these zones are applied to different areas of the park in each action alternative:

1. frontcountry
2. dunes play
3. backcountry access
4. guided learning
5. backcountry adventure
6. natural/wild
7. administrative

The management zones are described in more detail in the following sections.

The Superintendent's Compendium is a list of designations, closures, permit requirements, and other restrictions imposed under the discretionary authority of the park superintendent as provided for in Title 36 of the *Code of Federal Regulations* (CFR). In addition to the management zones, park managers would continue to use the Superintendent's Compendium to effect limitations or closures, as necessary, to protect resources and wilderness values.

FRONTCOUNTRY ZONE

Overview

Primary features, facilities, and programs provide opportunities for large numbers of people to enjoy and learn about the park. This zone does not occur in wilderness.



FIGURE 1. FRONTCOUNTRY ZONE

Resource Condition

Natural processes and landscapes are unaltered, except within or directly adjacent to the limited number of developed sites or areas. In frontcountry zone developed areas, natural processes and landscapes may be altered or manipulated to restore damaged areas, to preserve or maintain cultural resources, or to direct visitor use to avoid resource impacts. Alterations are designed to blend with the natural landscape as much as possible.

Visitor Opportunities

These easily accessible, high-use areas focus on a connection with and appreciation of special park resources. Visitors are offered a variety of opportunities for onsite interpretation and education; understanding park themes is a priority. Sights and sounds of people and/or vehicles are expected. Encounters with others, including park staff, are likely, especially around developed facilities. Basic necessities and conveniences are provided, so visitors don't need a high degree of self-reliance or outdoor skills. This zone is popular and well-suited for family recreation.

Facilities and Activities

Common visitor activities include scenic driving, viewing scenic vistas, taking short walks on designated trails, camping, and picnicking. Interpretive and educational programs may be provided. Horse or pack animal use is not permitted, but loading and unloading of stock and trailer parking is allowed. Culturally significant resources, including historic structures, may be used for visitor or administrative purposes. Appropriate kinds of facilities include visitor centers, visitor entrance stations, slow-speed paved or gravel roads, parking areas, horse loading and unloading areas, trailer parking, formal campgrounds, picnic areas, amphitheaters, surfaced trails, communications facilities, and operational facilities (offices, NPS housing, horse corrals, etc.). Appropriate commercial services include limited convenience concessions, modest shuttle services, horseback riding tours, and dog boarding.

Carrying Capacity

Principal resource concerns and indicators for the frontcountry zone:

- When the dunes parking lot fills, visitors park along the shoulders of the dunes lot access road and portions of the main park road. Parking on road shoulders and other undesignated areas compacts soils and damages vegetation. Possible indicator: vegetation damage along road shoulders; number of vehicles parking along roadside may be an easy to monitor surrogate indicator. Possible management actions to address this concern: parking lot reconfiguration (underway), continue to publicize park busy times so visitors can avoid them, provide

modest shuttle service, redirect visitors to other areas of the park.

- There is a proliferation of social trails along the east side of Medano Creek, between the north dunes lot and the campground. Possible indicator: linear feet of social trails. Possible management actions to address this concern: install hiking/biking path from campground to dunes lot.

Principal visitor experience concerns and indicators for the frontcountry zone:

- When the dunes parking lot fills, visitors park along the shoulders of the dunes lot access road and portions of the main park road. Visitors then walk along the road to reach dunes access points. This is a visitor experience and safety concern. Possible indicator: proportion of visitors who encountered people walking along the road and perceived it to be a problem (exit survey), number of vehicles parking along roadside may be an easy to monitor surrogate indicator. Possible management actions to address this concern: same as for resource conditions concerns (see above).

DUNES PLAY ZONE

Overview

These are natural areas for visitor enjoyment of the dunes and Medano Creek, two of the park's prime resources. This zone occurs primarily in wilderness.



FIGURE 2. DUNES PLAY ZONE

Resource Condition

Natural processes are unaltered. Lasting evidence of recreational use is not apparent (evidence is temporary).

Visitor Opportunities

Experiencing Medano Creek and the high dunes are a focus of this zone. Visitors have opportunities for primitive and unconfined recreation and a sense of freedom in a natural landscape. There is a low expectation for solitude because this is a key area for park visitors, but it's possible to find solitude within 0.25 mile of the dunes parking lot. This zone is popular and well-suited for family recreation.

Facilities and Activities

Common visitor activities include wading, climbing and sliding on the high dunes, sand and water play (the latter when the creek is flowing), and guided interpretive and educational programs. No facilities except small signs. No trails, camping, horseback riding, or motorized vehicles. In designated wilderness, management is consistent with NPS wilderness management policies. No commercial services would be appropriate in this zone.

Carrying Capacity

Principal resource concerns and indicators for the dunes play zone:

- Medano Creek water quality—waste from horses upstream, humans (from babies and discarded diapers), and dogs in the creek is a concern. (Note: this is also a visitor experience concern.) Possible indicator (underway): fecal coliform counts in/near the dunes play area. Possible management actions to address this concern: establish limits on numbers (or duration of stay) of horses upstream, close area temporarily to dogs and/or visitors if public health standards are exceeded, prohibit dogs in the creek area altogether, establish special area downstream where dogs are allowed, require special swim diapers for babies.

Principal visitor experience concerns and indicators for the dunes play zone:

- Some visitors indicate that they are bothered by crowding. Possible indicator: proportion of visitors who say they feel crowded in the dunes play area (exit survey). Possible management actions to address this concern: provide information about where to go in this zone to find solitude, continue to publicize park busy times so visitors can avoid them, install a Web camera in the dunes parking lot so potential visitors can tell when the area tends to be busy.
- Park staff occasionally receive complaints about dogs who are aggressive and/or off-leash.

Possible indicator: number of complaints received per week, proportion of visitors who encountered problem dogs (exit survey). Possible management actions to address this concern: prohibit dogs in this area.

BACKCOUNTRY ACCESS ZONE

Overview

This zone provides access to backcountry adventure or natural/wild zones by providing vehicle travel routes and/or trailheads. This zone does not occur in wilderness.



FIGURE 3. BACKCOUNTRY ACCESS ZONE

Resource Condition

These are unpaved vehicle travel routes or trailheads from which backcountry adventure or natural/wild zones can be accessed. Parts of the natural landscape may be altered to protect resources from impacts (e.g., installing culverts under roads). Alterations are designed to blend with the natural landscape. There is little to no roadside damage to vegetation and soils from vehicles passing each other. Resources may be manipulated when necessary to restore damaged areas, to preserve or maintain cultural resources, or

to direct visitor use to avoid resource impacts.

Visitor Opportunities

Travel is generally by passenger vehicle, horseback, or bicycle. Visitors have opportunities to view or access some of the park's prime resources from roads or trailheads. There is a sense of being in a natural landscape. There are some opportunities for adventure and discovery. The expectation for solitude is low during peak visitor periods, but congestion due to numbers of vehicles occurs only on summer holiday weekends. Visitors are somewhat self-reliant and need basic outdoor skills. There may be limits on numbers of people or vehicles to protect resources or visitor experiences.

Facilities and Activities

Common visitor activities include scenic driving, horseback riding, and bicycling. Appropriate kinds of facilities include unpaved roads, trailheads, horse loading areas, primitive campgrounds, vault or composting toilets, and information/entrance kiosks. Appropriate commercial services include guided activities: hunting (preserve only), fishing, hiking, horseback riding, photography, bird/wildlife viewing, and backcountry four-wheel-drive tours (beginning and ending outside the park) on designated routes.

Carrying Capacity

Principal resource concerns and indicators for the backcountry access zone:

- Most drivers keep to road corridors, but a few drive off illegally, damaging soils and plant

life outside the road corridor. Possible indicator: amount of vegetation damage outside the road corridor. Possible management actions to address this concern (some underway): install special fabric in areas of deeper sand to provide a stable base and improve traction, install posts along the road to better delineate road corridor, install signs encouraging drivers to stay on the road, increase visitor contacts, work with user groups to enhance understanding of impacts and how to avoid them, alternate traffic flow during busy times to reduce/eliminate the need for cars to pass, inform drivers at entrance station about dry sand conditions, require permits for road use (excluding Medano Pass primitive road).

Principal visitor experience concerns and indicators for the backcountry access zone:

- Crowding and congestion in certain areas. Possible indicators: proportion of road users who say they felt crowded (exit survey); number of times parking areas fill (parking lot use is closely correlated with road use, and parking lots are simpler to monitor). Possible management actions to address this concern: continue to publicize busy times so visitors can avoid them, and work cooperatively with the USFS regarding capacity and management in large areas with a common boundary.
- Crowding at backcountry campsites in the national preserve (some individual sites get crowded when people try to park as many as seven or eight cars at one site). Possible indicators: proportion of campers

who say they felt crowded (exit survey), number of vehicles counted during patrols (easy to count surrogate). Possible management actions to address this concern (underway): use barriers or better delineate sites to prevent extra vehicles, create regulatory limit on number of vehicles that can park at each site.

GUIDED LEARNING ZONE

Overview

Protecting sensitive resources is the focus of this zone. Learning about these resources is important and protection is provided by guiding or escorting visitors. This zone occurs in wilderness or nonwilderness.



FIGURE 4. GUIDED LEARNING ZONE

Resource Condition

These are areas where visitor use is permitted only with a guide or escort to protect particularly sensitive resources. Travel is via horseback or foot (or vehicle in nonwilderness areas). Parts of the natural landscape may be altered (e.g., designated trails and backcountry toilets installed) to protect resources from negative impacts. Resources may be manipulated when necessary to restore

damaged areas, to preserve or maintain cultural resources, or to direct visitor use to avoid resource impacts. Alterations are designed to blend with the natural landscape.

Visitor Opportunities

Opportunities to learn about these special resources while protecting them are provided by guiding or escorting visitors. Visitors have a sense of being in a natural landscape. There are low expectations for solitude since visitors generally travel in groups. Opportunities for discovery are great since facilitated learning and enjoyment are the primary focus of this zone. Visitors do not need a high degree of self-reliance or outdoor skills since basic necessities are provided. There may be limits on group size or numbers of groups to protect resources and enhance visitor experience.

Facilities and Activities

Visitor activities include guided interpretive and educational tours on horseback, by foot, or (in nonwilderness areas) by vehicle. Appropriate kinds of facilities include unpaved roads, trails, wayside exhibits, vault or composting toilets, and information kiosks. Appropriate commercial services include concession-operated guided vehicle, horseback, and hiking tours. In designated wilderness, management is consistent with NPS wilderness management policies.

Carrying Capacity

Principal resource concerns and indicators for the guided learning zone:

- Potential damage to archeological sites and sensitive wetlands areas. (Note: the intent is to minimize this concern by using guided tours.) Possible indicators: amount of soil disturbance, erosion, loss of artifacts, etc., as measured by photo comparisons and/or survey plots. Possible management actions to address this concern: limit visitor use in terms of group size, tour frequency, time (daily or seasonally), and space as needed to protect sensitive resources.

Principal visitor experience concerns and indicators for the guided learning zone:

- The National Park Service desires that visitors enjoy and are satisfied with guided tours. Possible indicator: proportion of visitors satisfied with their guided tour (end-of-tour survey). Possible management actions to address this concern: alter tour details, within limits, to correct deficiencies (ongoing problems would not be expected).

BACKCOUNTRY ADVENTURE ZONE

Overview

These are natural landscapes with a few facilities such as designated trails, backcountry campsites, and backcountry patrol cabins. This zone occurs in wilderness or nonwilderness.

Resource Condition

Natural systems and processes prevail, with minimal human alteration. Segments of the natural landscape may be altered (e.g.,

campsites defined, water bars and privies installed) to protect resources from negative impacts. Resources may be manipulated when necessary to restore damaged areas, to preserve or maintain cultural resources, or to direct visitor use to avoid resource impacts. Alterations are designed to blend with the natural landscape.



FIGURE 5. BACKCOUNTRY ADVENTURE ZONE

Visitor Opportunities

Travel is by foot or horseback. Visitors have a sense of being in the natural landscape and opportunities to view, access, and experience some of the park's prime resources. Encounters with other visitors are common on trails during park busy periods, but solitude can always be found in off-trail areas. Visitors are somewhat self-reliant and need basic outdoor skills. There are some opportunities for adventure and discovery. Visitors have opportunities to experience natural soundscapes and lightscapes. There may be limits on numbers of visitors, length of stay, group size, and overnight use to protect resources or visitor experience. A visitor permit system may be implemented if needed to protect resources.

Facilities and Activities

Common visitor activities include hiking, backpacking, hunting (in the preserve only), fishing, backcountry camping, and horseback riding (bicycles are not permitted). Visitor access is by foot or horseback. Appropriate kinds of facilities include primitive or maintained trails, trails marked by cairns or markers, backcountry campsites, backcountry privies, and patrol cabins. In designated wilderness, management is consistent with NPS wilderness management policies. Appropriate commercial services include guided activities: hunting and fishing, hiking, horseback riding, pack animal trips, photography, bird/wildlife viewing, and mountaineering/climbing.

Carrying Capacity

Principal resource concerns and indicators for the backcountry adventure zone:

- There is concern about invasive nonnative plants becoming established, especially in more accessible areas of the expanded national park that are newly open to public use (e.g., the northernmost portion of the national park, and Deadman and Sand Creek corridors). Possible indicators: incidence of such plants in new areas. Possible management actions to address this concern: require use of weed-free hay, increased education, and other visitor-oriented measures to limit spread of weed seeds.
- There is concern about soil compaction, social trails, erosion, vegetation trampling and loss, and tree damage in areas of heavy visitor/ equestrian use (e.g., around

Upper Sand Creek Lake) and in areas of new visitor use (e.g., northernmost portion of the national park). This is also a visitor experience concern. Possible indicators: linear feet of social trails, number and size of problem sites (e.g., denuded areas, wide muddy spots on trails), number of damaged trees. Possible management actions to address this concern: rehabilitate disturbed areas, create designated campsites, install planking across wet areas, require “leave-no-trace” practices, allow stoves only (no wood fires), require backcountry permits, limit number (or duration of stay) of horses.

- There is a human waste problem—a health, water quality, and visitor experience concern—from visitors who do not adhere to the park’s sanitary regulations, particularly in the Upper and Lower Sand Creek lakes area. Possible indicators: fecal coliform counts in nearby lakes and streams, toilet tissue “counts” or surveys. Possible management actions to address this concern: provide primitive toilets in problem areas, require visitors to pack waste out, expand education efforts.
- Wildlife concerns include bears becoming habituated to humans, declining bighorn sheep numbers (unknown cause), and fishing impacts on reestablished native fish populations. Possible indicators: fish surveys, number of human/bear encounters, bighorn sheep population size/health. Possible management actions to address these concerns: require use of bear canisters/lockers for food (under-

way); fishing restrictions designed, in consultation with CDOW, to protect native fishes, bighorn sheep research conducted jointly by the National Park Service and CDOW.

Principal visitor experience concerns and indicators for the backcountry adventure zone:

- In this zone, solitude is a desired condition in off-trail areas, but the zone allows for frequent encounters along trails during busy visitor periods. The Upper and Lower Sand Creek lakes areas are of particular concern; use is increasing so that it's difficult at times to find solitude and good camping locations. Possible indicator: proportion of visitors who saw or heard too many other visitors in off-trail areas (exit survey). Possible management actions to address this concern: tighter restrictions on camping around lakes, create designated campsites, require visitor permits, work cooperatively with the USFS regarding capacity and management in large areas with a common boundary.

NATURAL/WILD ZONE

Overview

This is the wildest zone. It protects natural resources and provides opportunities for physical challenge, adventure, and solitude. This zone occurs in wilderness or nonwilderness.



FIGURE 6. NATURAL / WILD ZONE

Resource Condition

Natural systems and processes prevail, and natural and cultural resources are generally unaltered and unaffected by human influences. Evidence of recreational use is not readily apparent. Resource inventory and monitoring activities help to identify and protect resources. Rare or special plant communities receive management emphasis for preservation and protection. Archeological sites are protected in place. Natural soundscapes and the dark night sky predominate.

Visitor Opportunities

Visitors explore and enjoy relatively remote areas in a natural setting by foot or horseback. Opportunities for solitude, independence, closeness to nature, and adventure are readily available. Expectation for solitude is high and it can be found in most areas of this zone; there are few encounters with other people. Visitors are self-reliant and require good outdoor skills because these areas are without comforts or conveniences. Visitors have opportunities to experience natural soundscapes and lightscapes. There may be limits on numbers of visitors, length of stay, and overnight use. A visitor permit system may

be implemented if needed to protect resources or visitor experience.

Facilities and Activities

Common visitor activities include off-trail hiking, backcountry camping, horseback riding, guided or unguided hunting (within the national preserve only), and fishing. Visitor access is by foot or horseback (bicycling is not permitted). Overnight use may be limited in certain areas. Management activities include research and monitoring, and stabilization and restoration of natural and cultural resources. There are generally no facilities (examples of exceptions: unmaintained historic structures, research plots, and monitoring wells). In designated wilderness, management is consistent with NPS wilderness management policies. Occasional administrative use of mechanized tools or transport may be used, as necessary, outside of wilderness. Appropriate commercial services include guided activities: hunting and fishing, hiking, horseback riding, pack animal trips, photography, bird/wildlife viewing, and mountaineering/climbing.

Carrying Capacity

Principal resource concerns and indicators for the natural/wild zone:

- Same as for the backcountry adventure zone.

Principal visitor experience concerns and indicators for the natural/wild zone:

- In this zone, a desired condition is that solitude can be found and there are few encounters with other people. The Upper and Lower Sand Creek lakes areas are

of particular concern; use is increasing so that it's difficult at times to find solitude and good camping locations. Possible indicator: proportion of visitors who saw or heard too many other visitors in off-trail areas (exit survey). Possible management actions to address this concern: tighter restrictions on camping around lakes, require visitor permits, work cooperatively with the USFS regarding capacity and management in large areas with a common boundary.

ADMINISTRATIVE ZONE

Overview

This zone is primarily to support management and administration of the park or other mandated activities such as the Closed Basin Project. This zone does not occur in wilderness.



FIGURE 7. ADMINISTRATIVE ZONE

Resource Condition

Natural processes and resources are in good condition, but may be altered to support park operations (or other mandated activities such as the Closed

Basin Project); the degree of alteration is dependent on need. Resources may also be altered or manipulated to preserve/maintain cultural resources, restore damaged areas, or to direct use to prevent additional resource impacts. Alterations blend in visually with the surrounding landscape or facilities to the extent possible.

Visitor Opportunities

This zone is intended primarily to serve NPS operational and administrative needs, but accommodates some visitor activities. Generally, it may be used as a hiking or horseback travel route for visitors with or without guides, and as a vehicle travel route for visitors traveling with NPS-approved guides. Hunters may use this zone as a vehicle travel route if they have special permission and/or are accompanied by land management agency staff. However, there may be specific cases (e.g., near Medano Ranch headquarters or Big and Little Spring) where there are some visitor limitations.

Facilities and Activities

Visitor activities include environmental education programs, guided interpretive and educational tours on horseback, by foot, or (in nonwilderness areas) by vehicle. Appropriate kinds of facilities include visitor information signs; structures serving as a base for management or maintenance activities (offices, shops, storage buildings, patrol cabins); housing; communications facilities, outdoor storage areas; environmental education, interpretation, and research facilities; unpaved roads, fences, and ditches. Management activities include maintenance, planning, and overseeing operations, research, monitoring resources

and visitor activities, and vehicle travel to remote park areas. Appropriate commercial services include guided activities: hiking, horseback riding, and vehicle tours on designated routes (in nonwilderness), including backcountry four-wheel-drive tours originating outside the park.

Carrying Capacity

Principal resource concerns and indicators for the administrative zone:

- This zone is located in disturbed areas (established roads and trails, Medano Ranch headquarters, etc.), so the main resource concern is use-related impacts to historic structures at Medano Ranch. Possible indicators: damage or wear and tear on adaptively used historic structures. Possible management actions to address this concern: limit visitor use (group size, tour frequency, area, etc.), reinforce or protect structures to protect historic integrity.

Principal visitor experience concerns and indicators for the administrative zone:

- The National Park Service desires that visitors enjoy and are satisfied with interpretive and educational activities (at Medano Ranch). Possible indicator: proportion of visitors satisfied with such activities (exit survey). Possible management actions to address this concern: alter interpretive and educational activities and services to correct deficiencies.

NO-ACTION ALTERNATIVE

The no-action alternative was developed to provide a baseline for evaluating changes and impacts of the three action alternatives. This baseline is characterized primarily by conditions in December 2004, roughly two months after ownership and management of the Baca Ranch was transferred to the U.S. government, and by continuation of current management practices into the future. There are funded projects planned for the near future—these are included in the no-action alternative.

In the no-action alternative, management and use at the Great Sand Dunes would be similar to that existing in December 2004. Most visitor use would continue to be focused in or near the eastern edge of the dunefield. The developed area east of the dunes (main park road, visitor center, and campground) would remain essentially the same. However, the dunes parking area would undergo minor expansion (~5% additional paved surface) and reconfiguration to improve circulation and increase capacity. The main park roads and parking areas would be rehabilitated. The horse loading area and recreational vehicle (RV) dump station would be relocated from the amphitheater parking lot.

Some visitors would continue to explore backcountry areas of the park and preserve via designated trails and roads, and cross-country horseback riding and hiking use would also continue. Some people would enter the north part of the park on foot from the Baca Grande subdivision via the two county roads that end at the park boundary, but this route of access would not be shown on NPS maps. Alpine Camp would serve as a backcountry patrol cabin for administrative use.

New park lands that were not open to public use before December 2004 would be managed in a very conservative manner. That is, visitor use would be managed so as to not establish new practices for camping, types and routes of access, etc. New park areas would be inventoried for natural and cultural resources and managed according to NPS policies that emphasize natural processes (for example, nonnative species, interior pasture fences, and artificial water holes and sources would be removed).

Existing trails and trailheads in the park and preserve would be maintained. There would be no new trails or trailheads. Visitors would be able to enjoy most portions of the park via foot or horseback (select areas would remain off-limits to horses).

The Nature Conservancy would continue to manage Medano Ranch, including Medano Ranch headquarters. There would be no public use of Medano Ranch. Bison grazing would continue within the park on lands leased or owned by The Nature Conservancy.

Historic structures within new park lands (that is, lands added by the Great Sand Dunes National Park Act of 2000), would be evaluated for their historic significance, but may not be actively maintained. If acquired by the National Park Service, the Sand Creek Stamp Mill complex would be evaluated for its historic significance, and decisions regarding management would be made based on that evaluation. Other unused structures (e.g., Three Cabins and a cabin on Mosca Pass) would be evaluated and documented, if appropriate; but they may not be maintained. If the structures



No Action Alternative

GREAT SAND DUNES NATIONAL PARK AND PRESERVE



LEGEND

- National Park Service Boundary
- Other Federal Land
- Stream/Pond/Lake
- Paved Road
- Dirt Road
- 4wd Road
- County Road in Subdivision
- Trail
- Designated Wilderness

6

NORTH



150

became a health or safety hazard, they would be individually assessed to determine whether they should be removed. Decisions regarding whether or not to remove structures and resources would be made in consultation with the Colorado SHPO and other consulting parties in compliance with section 106 of the NHPA.

Leashed dogs would generally be allowed within the park and preserve. Off-leash dogs would continue to be allowed for hunting, which is permitted only within the national preserve. A route or routes for hunter access across NPS land would not be provided from the north. Use of off-highway vehicles that do not conform to requirements for use on Colorado state roads would not be allowed in the park or preserve. There would be no limit on numbers of visitors entering the park, preserve, or any particular area, but existing group size limits, backcountry permit requirements, pack stock regulations, etc., would remain.

Necessary and appropriate commercial services would continue to include providing firewood and incidental camper supplies in the vicinity of the campground via a concession contract. Horseback riding, pack trips, guided hunting, guided hiking, photography workshops, and four-wheel-drive tours would continue to be provided in appropriate zones through commercial use authorizations (formerly known as incidental business permits). These activities would begin and end outside the park.

APPLICATION OF MANAGEMENT ZONES

Management zones, which are *prescriptive* (that is, they describe desired conditions for the future) have not been applied for the no-action alternative.

WILDERNESS

No new areas would be proposed for wilderness designation in the no-action alternative.

STAFFING AND COSTS

Under the no-action alternative, the park staffing level would be 28 full-time equivalents (FTEs); this number, which was used to develop the cost estimate and impacts of the no-action alternative, is equal to the December 2004 staffing level. (If the park were fully staffed under this alternative, there would be 33 FTEs.) Volunteers would continue to be a key component of park operations.

The cost estimates provided here are for alternatives comparison purposes only—they are not to be used for budgeting purposes. Capital costs for the no-action alternative, which include planned improvements to parking areas and roads, utilities, exhibits, etc., are estimated at \$5.4 to \$6.8 million. Life-cycle costs over 25 years, which include staff, maintenance, and operations costs (as well as capital costs), are estimated at \$28.1 to 29.5 million. More information on costs is provided in appendix F.

BOUNDARY ADJUSTMENTS

Due to the Great Sand Dunes Act of 2000 and the major park boundary expansion that followed, this GMP addresses only minor, technical boundary adjustments. The National Park Service would pursue, through legislation or administrative action, minor boundary corrections, including one to address boundary discrepancies near San Luis Lakes State Park.

ELEMENTS COMMON TO THE THREE ACTION ALTERNATIVES

- Park staff would continue to work with park neighbors, public and private, to achieve the purposes of the park and to protect fundamental resources and values (see “Desired Conditions and Strategies” section of this document for more information).
- The acquisition of mineral rights throughout the park from willing sellers would be pursued.
- For several reasons (see “Written Comments” section in chapter five), a NPS-managed free-roaming bison herd is not feasible for the life of the GMP. If additional bison habitat becomes available at some time in the future, this option can be reconsidered by the National Park Service.
- If and when The Nature Conservancy ceases agricultural uses (e.g., bison grazing and forage production) on their owned and leased lands, and transfers the lands to the National Park Service, surface irrigation of meadows would be discontinued and the bison fence would be removed. Before surface irrigation is discontinued, a study would be conducted to better understand how this action might affect wetlands, groundwater supplies, downstream water users, federal water rights, the Closed Basin Project, etc.
- Use of off-highway vehicles that do not conform to requirements for use on Colorado state roads would not be allowed in the park or preserve.
- A route or routes across NPS land would be designated (via the Superintendent’s Compendium) for hunter access to the national preserve and USFS lands, where hunting is permitted. (According to the *Code of Federal Regulations* [36 CFR 24] provision for such access may be provided when other access is impracticable; hunters must stay on the designated routes and firearms must be broken down or disassembled so as to prevent their ready use). Such routes would be identified cooperatively with CDOW and the USFS. The permitting process for this activity would be made as convenient as possible.
- Roads that the National Park Service does not intend to use for public or administrative purposes would be abandoned and not maintained, but there would be no active elimination and revegetation of roads. Depending on the alternative, abandoned roads would include Cow Camp Road, Medano Ranch roads, and/or other minor roads and “two-tracks.”
- Historic structures in backcountry areas would be documented, but not maintained. If the structures became a health or safety hazard, they would be individually assessed to decide whether they should be removed. Decisions regarding whether or not to remove structures and resources would be

made in consultation with the Colorado SHPO and other consulting parties in compliance with section 106 of the NHPA.

- Toilets would be installed if/when visitor use levels are high enough that human waste disposal and sanitation is a concern, and if a more suitable solution does not exist.
- Alpine Camp would serve as a backcountry patrol cabin.
- Due to the Great Sand Dunes Act of 2000 and the major park boundary expansion that followed, this GMP addresses only minor, technical boundary adjustments. The National Park Service would pursue, through legislation or administrative action, minor boundary corrections, including one to address boundary discrepancies near San Luis Lakes State Park.

NATIONAL PARK SERVICE PREFERRED ALTERNATIVE

In the NPS preferred alternative (NPS “Preferred Alternative” map), options would be created for dispersed hiking and horseback riding in the park and preserve. Longer day-use options and overnight linking or loop options would be emphasized. A few new trails would be provided, and links to trails on adjacent lands would be a priority. Carefully located access routes near the park’s perimeter would provide new visitor opportunities with minimal new facilities, keeping most new lands free for natural processes to continue. Cooperative or joint facilities (such as access routes, trailheads, and ranger stations) with neighboring management agencies or private partners would be emphasized and appropriate consultation conducted. A large portion of the park expansion lands that are not already designated as wilderness would be recommended for future designation as wilderness. (See the appendix E section titled “Rationale for the Preferred Alternative” for more information about why this alternative was selected as the NPS preferred alternative.)

Examples of potential cooperative opportunities include the following:

- The Oasis area (private lodge, store, and campground near the main park entrance) could serve as a trailhead base for guided or unguided horseback riding or hiking trips, and as a shuttle staging area.
- San Luis Lakes State Park and/or Wildlife Area could serve as a base for hiking and horseback visits to

the national park if the state agrees this is a reasonable idea.

- The National Park Service and USFWS could operate a joint visitor contact station (e.g., on the refuge at the former Baca Ranch headquarters or along State Highway [SH] 17).

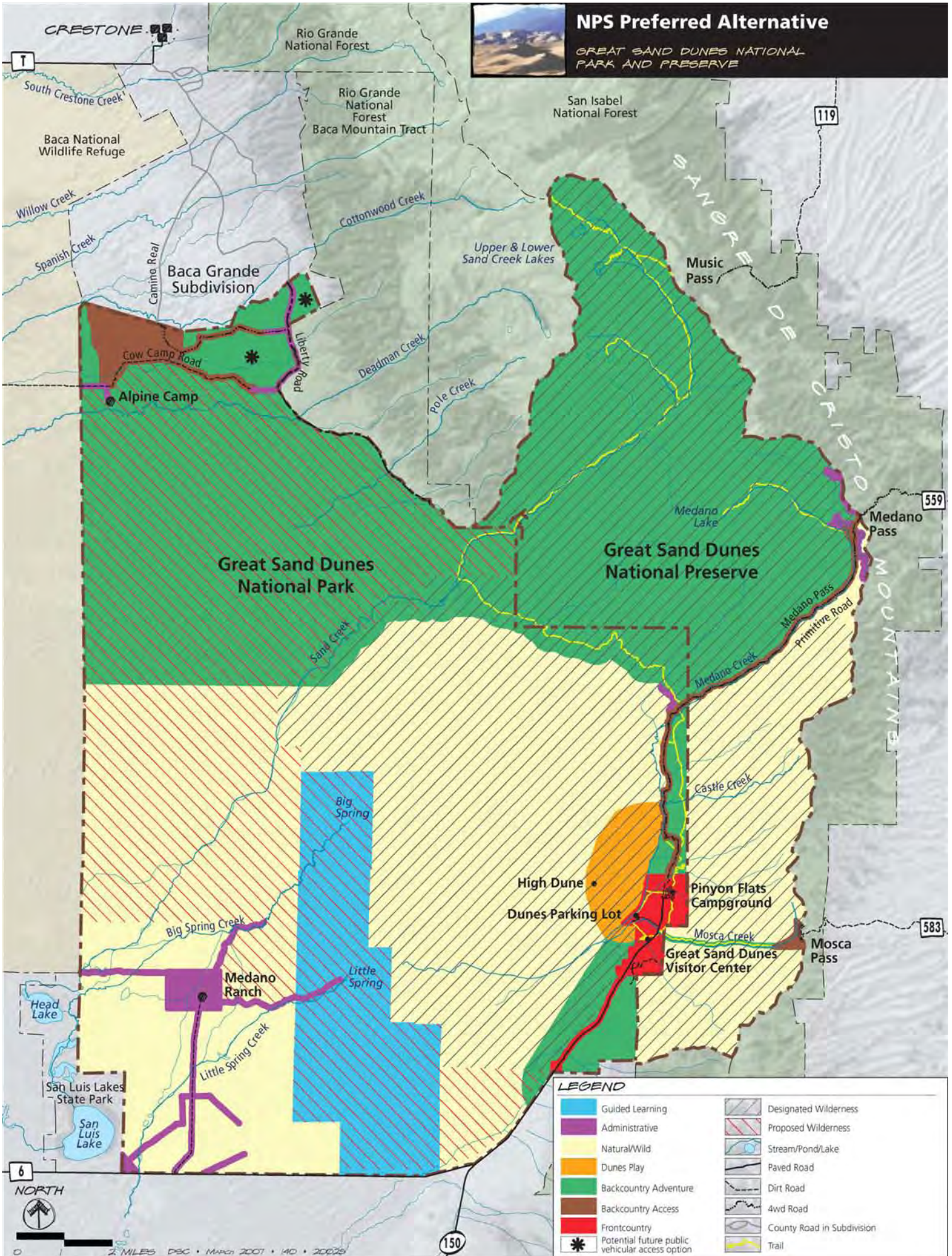
The existing developed area east of the dunes (main park road, visitor center, dunes parking area, and campground) would remain essentially the same, providing a base for most park visitation. To address existing and growing vehicle congestion in parking areas on peak summer weekends, the park would pursue managing traffic and possible transportation solutions, rather than building additional parking or limiting use. On peak summer weekends, the park may operate a temporary shuttle service, such as the modest shuttle system operated on a trial basis in the summer of 2005. If congestion becomes a more persistent problem, transportation studies would be undertaken to determine the need, configuration, and feasibility of a more formal transportation system.

The park’s nonhistoric entrance station would be located closer to the park boundary, near the Oasis. The new location would better accommodate a modest shuttle system and overflow parking, and reduce congestion near park headquarters. Bike lanes would be added to the main entrance road from the park boundary to the dunes parking lot. A hiking/biking path would connect the Pinyon Flats campground to the dunes parking lot and visitor center.



NPS Preferred Alternative

GREAT SAND DUNES NATIONAL PARK AND PRESERVE



LEGEND

	Guided Learning		Designated Wilderness
	Administrative		Proposed Wilderness
	Natural/Wild		Stream/Pond/Lake
	Dunes Play		Paved Road
	Backcountry Adventure		Dirt Road
	Backcountry Access		4wd Road
	Frontcountry		County Road in Subdivision
	Potential future public vehicular access option		Trail

6

NORTH



The National Park Service would seek acquisition of Medano Ranch, and upon acquisition, would use the ranch headquarters area for the following:

- Administrative use such as offices, housing, storage, and research support.
- Scheduled, guided public activities such as interpretive programs, environmental education, a base for guided hiking or horseback tours, and special events. Visitor activities may be guided by the National Park Service, concessioners, or other partners under direction of the National Park Service. Because of concerns about sensitive resources, staffing costs, and visitor safety, the Medano Ranch area and adjacent guided learning zone would not be open to general public visitation and use.

The National Park Service would adaptively use and maintain Medano Ranch historic structures for the above uses. The agency would not necessarily keep all historic structures, but would maintain certain ones based on adaptive use potential, efficiency, and historic significance. Partnership support would be needed to bring these facilities up to NPS standards, to maintain them over time, and to provide opportunities for visitors. Decisions regarding whether or not to remove structures and resources would be made in consultation with the Colorado SHPO and other consulting parties in compliance with section 106 of the NHPA.

Leashed dogs would be allowed within the national park (within the frontcountry, dunes play, and backcountry access zones, and the Liberty Road administrative zone only), and within the national preserve. Within the national preserve, unleashed

dogs would continue to be allowed for hunting (see chapter three, “Health and Safety—Dogs” section for details). Within the national park, no dogs would be permitted within the natural/wild, backcountry adventure, or guided learning zones, or the administrative zone (other than Liberty Road). If dogs became more of a problem over time, adjustments to the latter policy would be addressed in the Superintendent’s Compendium. To assist visitors with complying with dog regulations, a commercial service to provide dog boarding in the vicinity of the main dunes area would be sought.

Necessary and appropriate commercial services would continue to include providing firewood and incidental camper supplies in the vicinity of the campground through a concession contract. Pending a study of financial feasibility, a determination may be made to seek the following new commercial services: (1) dog boarding within the main dunes area frontcountry zone, (2) guided tours by horseback, jeep, or hiking from Medano Ranch (provided primarily from outside the park with a minimal base of operations at the ranch), and (3) modest shuttle services. These activities and services are necessary and appropriate to achieve resource protection and visitor use goals for the park. Horseback riding, pack trips, guided hunting, guided hiking, photography workshops, and four-wheel-drive tours are appropriate activities and would continue to be authorized. The National Park Service would consider other potential commercial activities on a case-by-case basis to determine if they were necessary and appropriate before any new contracts or authorizations would be issued (see “Criteria for Commercial Services” section in chapter one).

The preferred alternative identifies a small trailhead/parking area for 10 to 15 vehicles

to provide access for hikers, backpackers, horseback riders, and hunters in the northwest portion of the national park near the foot of the mountains, but away from sensitive riparian environments. This is intended to satisfy the general public's desire for a new, closer access point for backcountry recreation on the nearby national forest, the preserve, and new public lands within the national park. There are no plans for paved roads through new park lands to access the dunes or other high-use destinations. The wilderness recommendation in the preferred alternative ensures most new lands within the park boundary will remain wild and undeveloped.

The NPS preferred option for access is a road that would enter the park from the Baca Grande subdivision at some point contiguous with the backcountry access zone shown on the NPS "Preferred Alternative" map. Implementation of that connection for vehicle access across the boundary requires ongoing collaboration (see the following section "Public Vehicle Access to Federal Lands in the North—Ongoing Collaboration").

From that point, a high clearance, two-wheel drive road would connect to an existing two-track or Cow Camp Road, follow one of these roads eastward toward the mountains, and terminate in a trailhead/parking area. The road and trailhead would be located north and outside of the Deadman Creek riparian corridor. A trail or trails from the trailhead to the mountain front would avoid the Deadman Creek riparian corridor (see NPS "Preferred Alternative" map).

The size of the backcountry access zone in the northwest corner of the park is designed to allow maximum flexibility for siting a public vehicle access route. Within this zone, no new facilities beyond the

access road and trailhead mentioned above are proposed. When the facilities above are sited, the remainder of primitive roads not needed for public access would be zoned administrative or reclaimed, and the remainder of the backcountry access zone would be converted to backcountry adventure zone.

The trailhead would include a small parking area with a capacity of 10 to 15 vehicles and would accommodate equestrian use. This trailhead would be designed to discourage parking outside of designated spaces. The capacity of the trailhead would not be increased during the life of this GMP. If demand for use of this trailhead routinely exceeded capacity, the National Park Service would manage trailhead use (e.g., require permits) rather than expand the trailhead. A previously disturbed site, such as an existing drill pad, would be sought for the trailhead location to minimize natural resource impacts.

If no public vehicle access to the north part of the park could be found over the long term so that trailering horses into the north part of the park was not possible, the National Park Service would provide gates for horses at the north park boundary at Camino Real and Liberty Road, and a partner would be sought to provide a equestrian trailhead facility outside the park.

PUBLIC VEHICLE ACCESS TO FEDERAL LANDS IN THE NORTH—ONGOING COLLABORATION

There is general public desire for backcountry access to the northern part of the expanded park and preserve, as well as to new USFS lands. The National Park Service has determined that it is desirable to have a small trailhead/parking area for 10 to 15 vehicles to provide access for hikers, back-

packers, horseback riders, and hunters near the foot of the mountains, but away from sensitive riparian environments. The NPS preferred alternative in this GMP proposes to develop such access via the backcountry access zone shown on the map. However, implementing a vehicular connection to that zone depends on the ongoing planning and collaboration with the community, Saguache County, and other agencies.

The USFWS has not begun planning for the new Baca National Wildlife Refuge. The agency's comments on the draft GMP indicate that for the life of this GMP, the USFWS will not develop any wildlife-dependent public use on the east side of the refuge that would facilitate access to the park.

There are strong community concerns regarding any public vehicle access through the Baca Grande subdivision. It is important to note that while the NPS boundary and backcountry access zone join a public right-of-way at Camino Real, allowing public pedestrian access to the national park, this county road ends 0.2 mile short of the NPS boundary. The National Park Service cannot provide vehicle access to the backcountry access zone through the Baca Grande subdivision unless the county chooses to extend Camino Real or create another public route.

The USFS has not completed planning for the Baca Mountain Tract and would like to preserve options for public vehicle access to the mountain front. The USFS, with the National Park Service as a cooperating agency, may study the need for (and impacts of) providing public vehicle access to USFS lands via Liberty Road or a route through the park. These options are marked with asterisks on the NPS "Preferred Alternative" map as "potential future public vehicular access option."

These options are not evaluated in this GMP and would require a separate joint (NPS/USFS) environmental analysis study that would include public participation. (See chapter one, "Relationship of the General Management Plan to Other Planning Efforts: Planning for Lands Added to Rio Grande National Forest in the Year 2000" for more information about USFS planning efforts.) If the results of this subsequent joint NPS/USFS environmental analysis should determine some form of public vehicle access to federal lands via Liberty Road is the best option, the National Park Service would not need the backcountry access zone or use of a primitive road in the park. In this case, the parking area could be sited on USFS land. If the joint analysis should determine public vehicle access via a primitive road in the park is the best option, the selected route could be extended to Liberty Road and the parking area could be sited on USFS land in this case also.

It may take time after the completion of the GMP to collaboratively determine a public access solution that creates a balance between demand for backcountry access, protection of ecological values, and the values of park neighbors. Ongoing planning efforts (including a joint NPS/USFS public planning process to study access to the mountain front, comprehensive planning for the Baca National Wildlife Refuge, and community planning in the Baca Grande subdivision) will continue for the agencies and the community, giving all parties the opportunity to learn more about actual use and issues.

Upon completion of this GMP, no road or parking area would be constructed in the backcountry access zone unless a collaborative solution of the county and agencies was reached regarding an acceptable route of access.

APPLICATION OF MANAGEMENT ZONES

Most of the northern half of the park would be zoned backcountry adventure, as would existing trails, to allow for resource protection and appropriate facilities. The backcountry access zone along the north boundary of the park would permit motorized access to the area. The Medano Pass primitive road would also be zoned backcountry access. Much of the southern half would be zoned natural/wild to protect resources and allow the area to remain undeveloped. The frontcountry zone, east of the dunefield, would allow bicycle lanes, a new hiking/biking path from the campground to the dunes lot, existing facilities, and relocation of the entrance station. There would be a guided learning zone southwest of the dunefield for guided visitor use of sensitive areas. The dunes play zone would cover a portion of the dunefield closest to the dunes parking lot. Administrative zones would be located in various places around the park and preserve, primarily for NPS operational access. Medano Ranch headquarters, also zoned administrative, would be open for scheduled public activities. The administrative zone road corridors in the Medano Ranch area are needed to provide access for annual maintenance of diversion, monitoring structures, and irrigation ditches that are likely to remain for the foreseeable future. Some of these roads are deeded easements for the Closed Basin Project canals, production wells, and other infrastructure maintenance. A similar situation exists on Medano Pass with the Medano/Hudson ditches.

WILDERNESS

Almost all of the lands identified as suitable/eligible for wilderness would be

recommended for wilderness designation in this alternative (see NPS “Preferred Alternative” map). A setback (200 feet in width from the road centerline) along County Lane 6 and SH 150 was excluded to allow for any underground and future utility, drainage, fence, or roadway improvements, and administrative roads in the Medano area. The area recommended for wilderness would be contiguous with the existing Great Sand Dunes Wilderness, extend west to the NPS boundary, north to Cow Camp Road, and reach south toward Medano Ranch, but exclude the ranch headquarters area and structures associated with the Closed Basin Project. The rest of the areas (north of Cow Camp Road and south and west of Medano Ranch) are too small to manage effectively and/or contain Closed Basin Project structures, overhead utility lines, wells, irrigation ditches, and other structures that need to remain for the foreseeable future. A total of 53,013 acres would be recommended for wilderness designation (see appendix G).

STAFFING AND COSTS

Full staffing level under the NPS preferred alternative would be 36 FTEs. Volunteers would continue to be a key component of park operations. If funding and staffing for some elements of the preferred alternative were unavailable from federal sources, park managers would consider other options such as expanding the park volunteer program or developing partnerships with other agencies, organizations, or businesses to accomplish these elements.

The cost estimates provided here are for alternatives comparison purposes only—they are not to be used for budgeting purposes. Capital costs for the NPS preferred alternative are estimated at \$16.5 to \$21.2 million. In addition to items

mentioned for the no-action alternative, this includes costs for a new trailhead, trails, access road, improvements at Medano Ranch, cooperative entrance station, fee booth, associated utilities, and bison fence removal. Life cycle costs over

25 years, which include staff, maintenance, and operations costs (as well as capital costs), are estimated at \$44.9 to \$49.6 million. More information on costs is provided in appendix F.

DUNEFIELD FOCUS—MAXIMIZE WILDNESS ALTERNATIVE

In this alternative, most visitor use and visitor activities would be focused in or near the eastern edge of the dunefield. Most of the rest of the park and preserve would remain wild and undeveloped, allowing natural processes to continue with minimal human influence. Backcountry areas would be primitive and rugged, providing outstanding opportunities for solitude and adventure. As in the preferred alternative, a large proportion of newly added lands not already designated as wilderness would be recommended for future designation as wilderness.

Existing trails and trailheads would be maintained. Most visitors would continue to visit the main dunefield area (main park road, visitor center, dunes parking lot, and picnic area). Parking and related support facilities such as restrooms could be expanded in the frontcountry zone if dunes parking areas filled too often. A new multiuse trail for bicyclists and pedestrians would extend from near the park's main entrance (near the Oasis) to the visitor center, dunes parking lot / picnic area, and to the Pinyon Flats campground.

A gate for equestrian access would be provided on the north boundary of the park, where Camino Real (a Saguache County public road) intersects the park boundary. Alpine Camp, located in the northwest portion of the park, would serve as a backcountry patrol cabin for NPS administrative purposes; there would be a couple of options for administrative access to this site.

The National Park Service would encourage the USFS to not expand the capacity or standard of Music Pass trailhead parking or the standard of the

four-wheel-drive access road on the east side of the Sangre de Cristo Mountains. This would help keep visitor numbers from increasing in the Upper Sand Creek drainage (zoned natural/wild in this alternative).

The National Park Service would seek acquisition of Medano Ranch. In the interim, The Nature Conservancy would continue to graze bison on lands they lease or own, and they would continue to use ranch structures. After National Park Service acquisition, Medano Ranch structures would be documented, but not maintained (or they would be removed after documentation). Surrounding lands would be managed as part of the natural/wild zone, allowing visitors to explore by foot or by horseback.

Leashed dogs would be restricted to parking areas, picnic areas, and car campgrounds within the national park; they would not be permitted in the national preserve. Unleashed dogs would still be allowed for hunting, which is permitted only within the national preserve. To assist visitors in complying with dog regulations, a commercial service to provide dog boarding in the vicinity of the main dunes area would be sought.

Necessary and appropriate commercial services would continue to include providing firewood and incidental camper supplies in the vicinity of the campground through a concession contract. Pending a study of financial feasibility, a determination may be made to seek a commercial service to provide dog boarding within the main dunes area frontcountry zone. Horseback riding, pack trips, guided hunting, guided hiking, photography workshops,

and four-wheel-drive tours would continue to be authorized in appropriate zones.

APPLICATION OF MANAGEMENT ZONES

Most of the park and preserve, including Medano Ranch, would be zoned natural/wild (natural conditions prevail and trails disallowed). The frontcountry zone east of the dunes would be fairly large, which would provide potential future expansion of parking and a new hiking/biking path. The Medano Pass primitive road would be zoned backcountry access. Existing trails would be zoned backcountry adventure. There would be no guided learning zone in this alternative. Administrative zones would be located in various places around the park and preserve, primarily for NPS operational access.

WILDERNESS

Almost all of the lands identified as suitable/eligible for wilderness would be recommended for wilderness designation. A setback (200 feet from the road center-line) along County Lane 6 and SH 150 was excluded to allow for any future

underground utility, fence, or roadway improvements. A total of 50,951 acres would be recommended for wilderness designation (see appendix G).

STAFFING AND COSTS

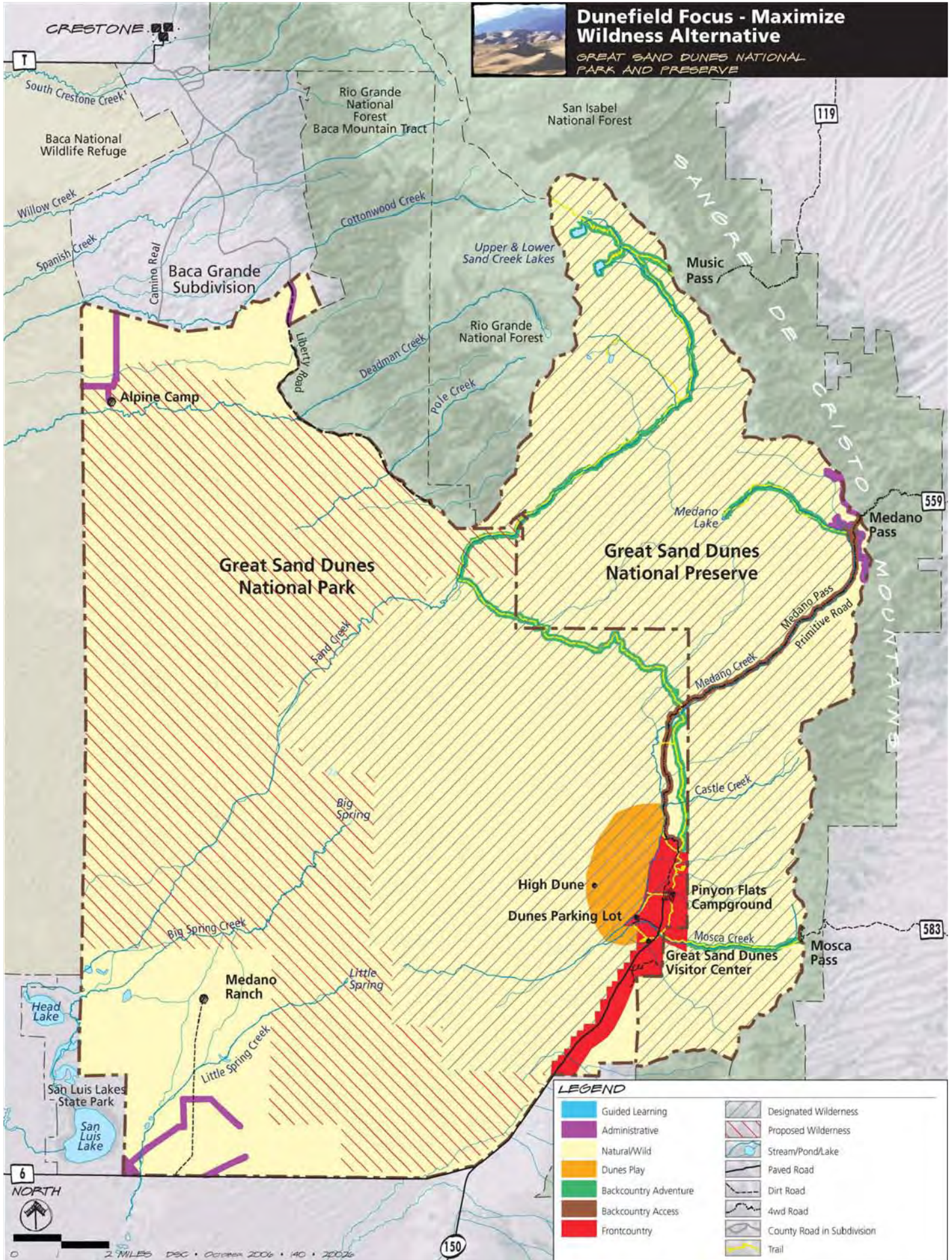
Full staffing level under the dunefield focus—maximize wildness alternative would be 33 FTEs. Volunteers would continue to be a key component of park operations.

The cost estimates provided here are for alternatives comparison purposes only—they are not to be used for budgeting purposes. Capital costs for the dunefield focus—maximize wildness alternative are estimated at \$8.2 to \$10.6 million. In addition to items mentioned for the no-action alternative, this includes costs for new paths and trails, expansion of frontcountry zone parking and restrooms, and bison fence removal. Life-cycle costs over 25 years, which include staff, maintenance, and operations costs (as well as capital costs), are estimated at \$35.6 to \$36.7 million. More information on costs is provided in appendix F.



Dunefield Focus - Maximize Wildness Alternative

GREAT SAND DUNES NATIONAL PARK AND PRESERVE



NORTH



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583

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THREE PUBLIC NODES ALTERNATIVE

Note: The USFWS decision that eliminated the potential for access across the Baca Grande Wildlife Refuge to the north portion of the park is not reflected in this alternative. This alternative reflects the April 2006 presentation of the Draft GMP/WS/EIS for this alternative. This was done intentionally to document the alternative in the administrative record.

In this alternative, most visitors would gain access to the park and preserve via three areas or “nodes.” The first node, located at the existing developed area east of the dunes, would remain essentially the same. The second node would be located at Medano Ranch headquarters. The third node would be a backcountry access zone in the north part of the park. Visitor facilities and trails would be concentrated in or near the three nodes, and the rest of the park and preserve would remain largely undeveloped, allowing natural processes to occur. This alternative would provide fairly diverse options for visitors to experience different portions of the dunes system. No new wilderness would be recommended.

The backcountry zone at the third node would include a backcountry trailhead and a primitive campground if an appropriate public vehicle access route into the national park could be identified. The zone would follow Cow Camp Road from a public access point eastward toward the mountain front to the point where the improvement of Cow Camp Road ends. The intent of this zone would be to provide public vehicle access to the north part of the park while discouraging visitor use in the adjacent Deadman Creek riparian corridor (an ecologically special and sensitive area). The trailhead would have a capacity of about 15

to 20 vehicles and would accommodate equestrian use. The primitive campground would be small (10 or fewer campsites). The trailhead and campground would be located at the easternmost “tail” of the backcountry zone, at the point where the improved road ends.

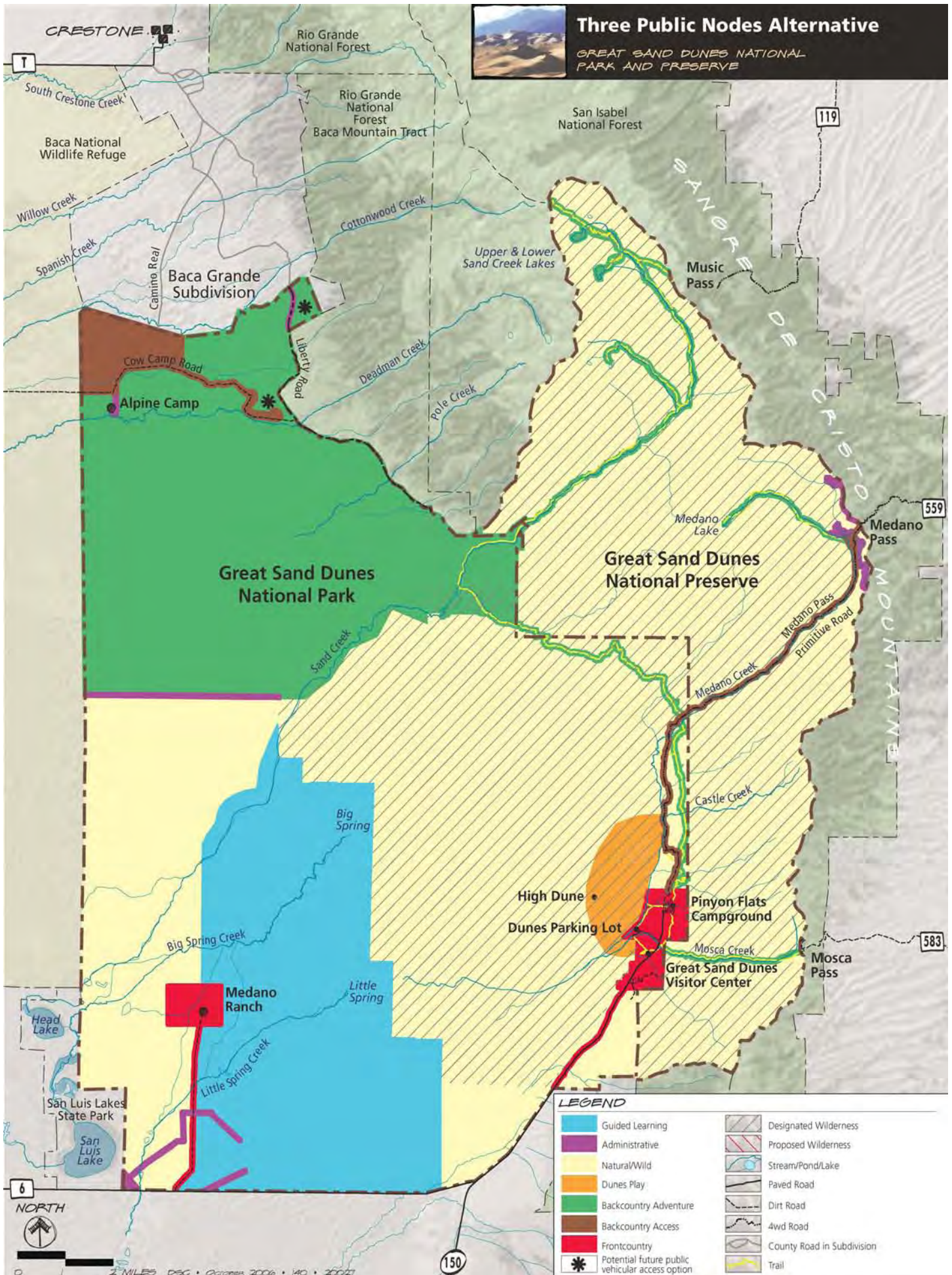
This backcountry zone would be reached by one of two potential routes for public vehicle access. The first route to be considered would involve access to the national park via the Baca National Wildlife Refuge; this option would be studied by the USFWS. (This option would require no new road construction or improvements within the national park.) If the USFWS determined this option to be incompatible with the purposes of the refuge, a second option of entering the park via a public county road from the Baca Grande subdivision (e.g., Camino Real), would be studied by the National Park Service in cooperation with Saguache County and the Baca Grande Property Owners Association. This second option, if determined feasible, would require construction of a 1.0-mile connector road (two-wheel drive, high clearance, all-weather gravel) within the national park—from the subdivision boundary to Cow Camp Road.

The size of this backcountry zone in the north part of the park would allow maximum flexibility for siting either of the two potential access routes. No new facilities or roads, beyond the primitive campground and trailhead mentioned above, are proposed. A trail or trails to the mountain front from the trailhead/campground area would be provided



Three Public Nodes Alternative

GREAT SAND DUNES NATIONAL PARK AND PRESERVE



within the backcountry adventure zone. Alpine Camp would serve limited visitor purposes such as a ranger station or backcountry permit station.

Additional (subsequent) public vehicle access options could be considered in a separate future joint NPS/USFS public planning and environmental analysis process if USFS planning indicated that such access was needed. Two options for such access have been defined to date: (1) if either of the above-described access routes into the national park were implemented, Cow Camp Road could be extended to the mountain front to connect with Liberty Road, or (2) if neither of the above-described access routes were determined to be feasible, the 0.7 mile segment of Liberty Road within the national park could be converted to a backcountry access zone. Either option would permit public vehicle access to the new USFS lands.

The National Park Service would seek acquisition of Medano Ranch and would use the ranch headquarters as a public day-use area. In the interim, The Nature Conservancy would continue to graze bison on lands they lease or own, and they would continue to use ranch structures. After National Park Service acquisition, Medano Ranch structures would be adaptively used for public purposes (such as an interpretive area, contact station, concessions support, picnicking, and/or an environmental education facility); most historic structures would be maintained. Guided hiking and horseback tours to nearby high interest areas could be provided. Another possibility would be a cooperative situation at Medano Ranch: the National Park Service could use some ranch structures for public purposes while The Nature Conservancy continued management of bison grazing on their leased and owned lands, in conjunction with public use and education.

When the main dunes parking area fills, visitors would be directed to one of the other park nodes. Within the guided learning zone, some existing unpaved roads would be used for administrative purposes and guided visitor use, while others would be closed and use discontinued.

The National Park Service would consider requiring permits for backcountry use in certain areas. It would also encourage the USFS to not expand the capacity of Music Pass trailhead parking or the standard of the four-wheel-drive access road located east of the Sangre de Cristo divide. These measures would help maintain desired visitor and resource conditions for the natural/wild zone in the Upper Sand Creek drainage (see natural/wild management zone description for more information on desired conditions).

Dogs would not be permitted in areas where there is high potential for, or a history of problems with, conflicts with visitors (e.g., the area of concentrated visitor use at Medano Creek near the dunes parking area) or with wildlife (e.g., bighorn sheep); otherwise, leashed dogs would be allowed. Within the dunes play zone, there would be an alternative downstream area where leashed dogs would be allowed. Unleashed dogs would still be allowed for hunting, which is permitted only within the national preserve. To assist visitors with complying with dog regulations, a commercial service to provide dog boarding in the vicinity of the main dunes area would be sought.

Necessary and appropriate commercial services would continue to include providing firewood and incidental camper supplies in the vicinity of the campground through a concessions contract. Pending a study of financial feasibility, a determination may be made to seek the following new commercial services: (1) dog boarding

within the main dunes area frontcountry zone; and (2) guided tours by horseback, jeep, or hiking from Medano Ranch (with possible stable and other base facilities at the ranch). Horseback riding, pack trips, guided hunting, guided hiking, photography workshops, and four-wheel-drive tours are appropriate activities and would continue to be authorized. The National Park Service would consider other potential commercial activities on a case-by-case basis to determine if they were necessary and appropriate before any new contracts or authorizations would be issued (see “Criteria for Commercial Services in chapter one).

APPLICATION OF MANAGEMENT ZONES

Most of the preserve and about half of the national park would be zoned natural/wild (natural conditions prevail and trails disallowed). Existing trails, zoned backcountry adventure, would remain. The northwest portion of the national park would also be zoned backcountry adventure to provide for future new trails. The frontcountry zone east of the dunes would be fairly small—no new facilities or development are anticipated. The Medano Ranch headquarters would be zoned frontcountry to permit public use. East of Medano Ranch headquarters, a guided learning zone for guided visitor use of sensitive areas would be located. The Medano Pass primitive road would be zoned backcountry access. The dunes play

zone would cover a portion of the dune-field closest to the dunes parking lot. Administrative zones would be located in various places around the park and preserve, primarily for NPS operational access.

WILDERNESS

No new areas would be proposed for wilderness designation.

STAFFING AND COSTS

Full staffing levels under the three public nodes alternative would be 38 FTEs. Volunteers would continue to be a key component of park operations.

The cost estimates provided here are for alternatives comparison purposes only—they are not to be used for budgeting purposes. Capital costs for the three public nodes alternative are estimated at \$15.8 to \$20.6 million. In addition to items mentioned for the no-action alternative, this includes costs for a new trailhead, trails, primitive campground, access road, improvements for public use at Medano Ranch, associated utilities, and bison fence removal. Life-cycle costs over 25 years, which include staff, maintenance, and operations costs (as well as capital costs), are estimated at \$46.7 to \$50.3 million. More information on costs is provided in appendix F.

ACTIONS CONSIDERED BUT ELIMINATED FROM DETAILED CONSIDERATION

During the planning process, some additional actions were considered, but later dismissed from further consideration. These actions and the reasons for dismissing them are described below.

ALLOWING OFF-HIGHWAY VEHICLES ON MEDANO PASS PRIMITIVE ROAD (WITHIN THE NATIONAL PRESERVE ONLY)

The Medano Pass primitive road has a narrow corridor that is bordered by wilderness. Allowing off-highway vehicles on Medano Pass primitive road (within the national preserve only) was originally considered because: (1) the USFS currently allows off-highway vehicle use on the Medano Pass Road east of the pass, and (2) off-highway vehicle use on Medano Pass Road west of the pass was formerly allowed, before the area became part of the national preserve. This action was dropped from detailed consideration for the following reasons: (1) there are concerns about resource damage resulting from illegal use on NPS lands outside the road corridor, (2) allowing off-highway vehicle use on NPS lands would require a special regulation (exception), (3) off-highway vehicle users coming from the pass must turn around at the national park boundary anyway (off-highway vehicles are not allowed in national parks), and (4) many other areas outside the national preserve are available for off-highway vehicle use.

REINTRODUCTION OF A NATIVE, NPS-MANAGED BISON HERD WITHIN THE PARK AND

ADJACENT LANDS UNDER FEDERAL MANAGEMENT

This action was considered because bison are native to the San Luis Valley, and because NPS policy supports the reintroduction of native species if: (1) adequate habitat exists to support the species, (2) the species may be managed so as to not pose a serious threat to the public, (3) the species' genetic make-up closely matches that of the original, and (4) the species disappeared as a direct result of human-induced change. Such restorations are supported only when they can be done in a way that promotes the restoration of natural resources and processes.

From the available literature, it is difficult to ascertain whether or not the modern species of bison (*Bison bison*) had continuous presence in the San Luis Valley. We must rely on documentation from oral histories, field notes and journals, and ethnographic and archeological studies. Documentation for the presence of bison in the Valley is scant at best. Bean (1975) asserts that bison herds never consisted of large numbers of animals, and that those reportedly in the San Luis Valley were "strays" that had come over the passes of the Sangre de Cristo mountain range during the summer. It is more likely that people living in the San Luis Valley made forays during the fall to the eastern Plains to secure meat, which was dried or jerked before it was brought back to the Valley for the winter. Wilson (1975) reports that a western route out of the San Luis Valley, one favored by the Utes to reach their winter homes, was named "Cochetopa" or "Buffalo Pass"; she emphasizes that although there were never extensive herds in the San Luis Valley, they must have used

this migration route, based on the Utes' name for the pass.

Jodry (1999) discusses historic and recent land use in the San Luis Valley by native people. In her interview with the Southern Ute tribal leader, Everett Burch, it was understood that “since buffalo were abundant in many areas of southern Colorado and northern New Mexico, Ute people moved primarily to obtain other resources that they needed, meanwhile hunting bison in those areas.” However, the areas of bison abundance did not specifically include the San Luis Valley. She also cites the earliest known written record of bison in the San Luis Valley. The journal of Spanish explorer Don Diego de Vargas in July 1694, relates Spanish efforts to “secure fresh meat from a herd of 500 animals in the southern valley” (de Vargas 1694 *in* Jodry 1999). Likewise, White (2005) cites Zebulon Pike’s reports of bison in the “mountain valleys north of the Great Sand Dunes” in 1807. Although his party killed deer and reported on wild horses and elk in the San Luis Valley, bison were not mentioned (Pike 1810 *in* White 2005). The Great Sand Dunes has four records of bison remains in its curatorial collection database. Of the four records, only one (a skull) has been positively identified as *Bison bison* (modern bison), and this record was deaccessioned (removed from the collection) in 1981, because its provenience is unknown. The other three specimens (one phalange and two horns) have been identified to genus (*Bison* sp.).

The phalange was found within the former monument boundaries in 1958, and identified by Dennis Stanford of the Smithsonian in 1978. The two horns were found on a property east of the dunes (area around Liberty, George White Ranch).

Today, available bison habitat within the park is very limited compared to that needed by a wild (unconfined) bison herd on a year-round and year-to-year basis. Also, the abundance of bison forage is quite variable in this area due to limited precipitation and high elevation. Bison confined to the national park and adjacent Nature Conservancy lands (bison are not an option on the refuge for the foreseeable future) would have to be intensively managed to maintain herd size and mimic natural grazing impacts. Such management would require a significant amount of time and energy that would divert resources from other park needs and projects. For these and other reasons, this option is not realistic for the life of the GMP. If additional bison habitat becomes available at some time in the future, this option may be reconsidered by the National Park Service. In the meantime, The Nature Conservancy may continue its ranching operations within the park (on its private inholdings and on lands it leases from the state and the National Park Service), thus preserving some desirable aspects of bison on the land, creating opportunities for natural systems study, and providing opportunities for visitors to see bison.

MITIGATION MEASURES FOR THE ACTION ALTERNATIVES

In the legislation that created the National Park Service, Congress charged the agency with managing lands under its stewardship “in such manner and by such means as will

leave them unimpaired for the enjoyment of future generations” (National Park Service Organic Act (16 *United States Code* [USC] 1 2 3, and 4). As a result, the National

Park Service routinely considers and implements mitigation measures whenever activities that could adversely affect the resources or systems are anticipated. Mitigation means to take action to avoid, reduce, or compensate for the effects of environmental damage.

A common set of mitigation measures would be applied to the action alternatives in this GMP. The National Park Service would avoid, minimize, and mitigate adverse impacts whenever practicable.

GENERAL

New facilities such as trailheads and trails would be sited in disturbed areas whenever feasible to avoid causing new impacts to resources.

Construction zones would be identified with temporary fencing prior to any construction activity to confine activity to the minimum area required. All protection measures would be clearly stated in construction specifications and workers would be instructed to avoid areas beyond the fencing.

Outdoor lighting for new or rehabilitated facilities would be the minimum amount required to provide for personal safety. Lights would also be shielded and/or directed downward to minimize impacts to the night sky.

NATURAL RESOURCES

New trails would be sited with potential wildlife impacts in mind. Specific measures used to avoid impacts on wildlife would include the following (Trails and Wildlife Task Force et al. 1998):

- Considering not only the narrow width of the trail, but also the wider area it may influence; different species respond differently to the presence of humans (and dogs) along trails.
- Seeking out degraded areas that have the potential to be used or restored when aligning a trail, rather than creating another disturbed area.
- Aligning trails along or near human-created ecological edges rather than bisecting undisturbed areas.
- Keeping trails (and their zones of influence) away from known sensitive species, populations, or communities.
- Locating trails where they can be screened and separated by vegetation or topography from sensitive wildlife.
- Providing trail experiences that are diverse and interesting enough that recreationists are less inclined to create their own trails

Measures to control dust and erosion during construction would be implemented and could include the following: water sprinkling dry soils; using silt fences and sedimentation basins; stabilizing soils during and after construction with specially designed fabrics, certified straw, or other materials; covering haul trucks; employing speed limits on unpaved roads; and revegetating disturbed areas where practicable.

Wetlands and riparian habitats would be delineated by qualified specialists, as appropriate, clearly marked, and avoided during construction. To protect water quality and wetlands/riparian areas, best

management practices would be employed and could include all or some of the following actions, depending on site-specific requirements:

- Work would be scheduled to avoid the wet season.
- Barriers would be provided between stream channels and trails or paved areas to reduce erosion potential.
- Disturbed areas would be kept as small as possible to minimize exposed soil and erosion potential.
- Silt fences, temporary earthen berms and water bars, sediment traps, stone check dams, or other equivalent measures would be installed prior to construction.
- Regular site inspections would be conducted during construction to ensure that erosion control measures were properly installed and functioning effectively.
- Chemicals, fuels, and other toxic materials would be stored, used, and disposed in a proper manner.

Undesirable species would be controlled in high-priority areas. Other undesirable species would be monitored and control strategies initiated if these species occur. To prevent the introduction of and to minimize the spread of nonnative vegetation and noxious weeds, the following measures would be implemented:

- Minimize soil disturbance.
- Pressure wash all construction equipment to ensure that it is clean and weed-free before entering the park.

- Limit vehicle parking to road shoulders, parking areas, or previously disturbed land.
- Obtain fill, rock, or additional topsoil from the project area. If this is not possible, obtaining weed-free sources from NPS-approved sources outside the park would be required.
- Monitor disturbed areas for two to three years following construction to identify noxious weeds or nonnative vegetation. Treatment of nonnative vegetation would be completed in accordance with NPS Director's Order – 77: *Natural Resource Management Reference Manual* (NPS 2004).

Mitigation measures would occur prior to construction to minimize immediate and long-term impacts to rare, threatened, and endangered species. Surveys would be conducted for such species as warranted. Facilities would be sited and designed so as to avoid adverse effects on rare, threatened, and endangered species whenever possible. If avoidance is not feasible, adverse effects would be minimized and compensated for, as appropriate, and in consultation with appropriate resource agencies.

Before surface irrigation of meadows was discontinued on Medano Ranch, a study would be conducted to better understand how this action might affect wetlands, groundwater supplies, federal water rights, the Closed Basin Project, etc.

Standard noise abatement measures would be implemented, as appropriate, during park operations and construction activities. Examples include: scheduling activities so that impacts are minimized, use of the best available noise control technique, use of hydraulically or electrically powered tools,

and situating noise-producing machinery as far as possible from sensitive uses or resources.

be appropriate if the proposed activity may affect these species.

THREATENED AND ENDANGERED SPECIES

Mitigation measures are undertaken to reduce potential impacts to federally listed or candidate species. Mitigation measures include the following:

- Canada lynx habitat in the preserve will follow the guidelines provided in the Lynx Conservation Assessment and Strategy (LCAS).
- Activities in the vicinity of bald eagle habitat will follow the CDOW raptor guidelines for seasonal avoidances and buffer distances.
- Initiation of a NEPA process and additional consultation if oil and gas exploration on lands within the park subject to private mineral rights occurs.
- Prior to the implementation of any activity in or near riparian habitat, surveys will be conducted for the southwestern willow flycatcher, yellow-billed cuckoo, bald eagle nests, and bald eagle winter roosts. Additional section 7 consultation with the USFWS may be appropriate if the proposed activity may affect these species.
- Prior to implementation of any activity in or near dense coniferous forests on steep slopes, surveys will be conducted for the Mexican spotted owl. Additional section 7 consultation with the USFWS may

Additional consultation with the USFWS would be required if any of the following occurred:

- Documentation of use of relevant habitats within the park and preserve by the southwestern willow flycatcher, yellow-billed cuckoo, or Mexican spotted owl.
- Initiation of activities anticipated to impact the single bald eagle winter roost site in the western portion of the park.
- Identification of additional bald eagle winter roost sites or of bald eagle nest sites within the park.
- Establishment of den sites by Canada lynx within the park.

Renewed discussions and consultation with the USFWS, should any of the above events occur, would focus on development of specific conservation measures to reduce potential impacts on these species. Such conservation measures would be based on the recommendations provided by the current USFWS recovery plan or further coordination with the USFWS for the relevant species.

CULTURAL RESOURCES

The identification and evaluation of cultural resources in the park are ongoing. As much of the park has not been surveyed for cultural resources, the planning process for facilities, visitor use areas, trails, and other land and resource management actions and practices would include consultation with NPS cultural resource

professionals and likely would include surveys for cultural resources. Land and resource projects and practices would be planned to avoid effects to cultural resources to the extent possible, using this cultural resources information. In any case, the National Park Service would comply with section 106 of the NHPA in the planning for these actions, including consultation with the Colorado SHPO and other consulting parties, as outlined in 36 CFR 800.

Prior to undertaking ground-disturbing activities, the National Park Service would coordinate with its cultural resource professionals to determine if archeological survey is warranted and/or if such activities should be monitored by a professional archeologist for unanticipated discovery of archeological resources. Workers would be informed of penalties for illegally collecting artifacts or intentionally damaging archeological or historic property and of notification procedures in the event that previously unknown resources were uncovered during construction.

If any archeological resources are discovered, work in the immediate vicinity of the discovery would be halted, the discovery would be secured, NPS cultural resource professionals would document and evaluate the resource, and the National Park Service would take appropriate actions to avoid or mitigate effects to the resource, in consultation with the Colorado SHPO and other consulting parties.

In the event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001), would be followed.

Great Sand Dunes National Park and Preserve would consult with associated American Indian tribes to develop and accomplish the programs in a way that respects the beliefs, traditions, and other cultural values of the American Indian tribes who have ancestral ties to park lands. The park will maintain government-to-government relations with associated tribes to ensure a collaborative working relationship, and will consult regularly with them before taking actions that would affect natural and cultural resources that are of interest and concern to them. The park would accommodate access to, and ceremonial use of, American Indian sacred sites by American Indian religious practitioners in a manner that is consistent with park purposes and applicable law, regulation, and policy.

All proposed documentation, recordation, and mitigation measures for archeological, historical, and ethnographic resources that are included in or eligible for listing in the NRHP would be stipulated in a memorandum of agreement among the National Park Service, Colorado SHPO (and/or, as necessary, the Advisory Council on Historic Preservation [ACHP]) in accordance with 36 CFR 800.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

The environmentally preferred alternative is the alternative that promotes the national environmental policy expressed in the National Environmental Policy Act of 1969 (NEPA) (sec. 101(b)). This includes alternatives that: (1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations; (2) ensure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings; (3) attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences; (4) preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice; (5) achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities; and (6) enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources" (NPS DO - 12: Handbook, section 2.7D).

"Generally this means the alternative that causes the least damage to the biological and physical environment. It also means the alternative that best protects, preserves, and enhances historic, cultural, and natural resources" (Council on Environmental Quality (CEQ), "Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations" [40 CFR 1500-1508], *Federal Register* Vol. 46, No. 55, 18026-18038, March 23, 1981: Question 6a).

The NPS preferred alternative has the most advantages compared to the other alternatives (see appendix E for a detailed

discussion). It also meets the purpose and need for the GMP. By managing the park in a conservative manner, protecting certain sensitive resource areas via the guided learning zone, limiting new facilities, recommending wilderness, and protecting key historic resources and cultural landscapes, the NPS preferred alternative realizes criteria 1 through 5. The alternatives do not differ much with respect to criterion 6.

The no-action alternative is meant to represent how the park was managed soon after ownership and management of the Baca Ranch was transferred to the U.S. government. It was included to provide a baseline against which to compare the effects of the other (action) alternatives. It only minimally meets the six criteria outlined above. Furthermore, it does not address the GMP's purpose and need, nor does it address key planning issues outlined in chapter one.

The dunefield focus—maximize wildness alternative realizes criteria 1 and 2 and some aspects of criterion 4 by managing the park in a conservative manner, limiting new facilities, and recommending wilderness. Because it does not protect sensitive resources or historic structures/cultural landscapes to the same degree as the NPS preferred and three public nodes alternatives, it does not realize criteria 3 and 5 to the same extent as these alternatives.

The three public nodes alternative realizes criteria 3, 4, and 5 by managing the park in a conservative manner, protecting certain sensitive resource areas via the guided learning zone, limiting new facilities, and protecting key historic resources and cultural landscapes. Because it does not

recommend wilderness and has undesired/unintended impacts related to increased visitor access, it does not meet criteria 1 and 2 as well as the NPS preferred and dunefield focus—maximize wildness alternatives.

After a review of the alternatives' environmental consequences, it was determined that the NPS preferred alternative is also the environmentally preferred alternative. This alternative best realizes the full range of national environmental policy goals as stated in section 101 of NEPA.

TABLE 1. SUMMARY OF KEY DIFFERENCES AMONG THE ALTERNATIVES

	No-Action Alternative	NPS Preferred Alternative	Dunefield Focus—Maximize Wildness Alternative	Three Public Nodes Alternative
General Emphasis	<ul style="list-style-type: none"> ▪ Existing management extended to new lands. ▪ Most visitors continue to go to the main dunes area. Some visitors explore the backcountry on horseback and on foot. 	<ul style="list-style-type: none"> ▪ Dunes area remains the main focus of visitor activity. ▪ New access in the north and at Medano Ranch (limited). ▪ New horseback and trail options, including overnight linking or loop options. ▪ Emphasis on cooperative or joint facilities (e.g., access routes, trailheads, ranger stations). 	<ul style="list-style-type: none"> ▪ Most visitors go to the main dunes area. ▪ Most of the rest of the park and preserve remains wild and undeveloped. ▪ Few new trails. 	<ul style="list-style-type: none"> ▪ Most visitors go to the main dunes area. ▪ Additional visitor activities available near the main dunes, Medano Ranch / guided learning zone, and north portion of new lands. ▪ New trail options in certain areas.
Management Zones	<ul style="list-style-type: none"> ▪ Not zoned. 	<ul style="list-style-type: none"> ▪ Moderate amount of backcountry adventure zone. ▪ Moderate amount of natural/wild zone. ▪ Small amount of guided learning zone. 	<ul style="list-style-type: none"> ▪ Most of the park and preserve zoned natural/wild. ▪ Frontcountry zone east of main dunes larger than in other action alternatives. 	<ul style="list-style-type: none"> ▪ Lots of natural/wild zone. ▪ Moderate amounts of backcountry adventure and guided learning zones.
Wilderness	<ul style="list-style-type: none"> ▪ No new wilderness recommended. 	<ul style="list-style-type: none"> ▪ Most undeveloped areas of new park land recommended for wilderness. 	<ul style="list-style-type: none"> ▪ Most undeveloped areas of new park land recommended for wilderness. 	<ul style="list-style-type: none"> ▪ No new wilderness recommended.
Medano Ranch Headquarters	<ul style="list-style-type: none"> ▪ Continued use by The Nature Conservancy as Medano Ranch headquarters. Most historic structures maintained by The Nature Conservancy. 	<ul style="list-style-type: none"> ▪ Adaptively used for NPS administrative purposes and open to the public on a limited basis for scheduled activities. Most historic structures maintained by the National Park Service. 	<ul style="list-style-type: none"> ▪ Use discontinued and area managed as natural/wild zone. Structures not maintained and possibly removed. 	<ul style="list-style-type: none"> ▪ Adaptively used as a public day-use area (e.g., interpretive area, contact station, concessions support). Most historic structures maintained by the National Park Service.

TABLE 1. SUMMARY OF KEY DIFFERENCES AMONG THE ALTERNATIVES

	No-Action Alternative	NPS Preferred Alternative	Dunefield Focus—Maximize Wildness Alternative	Three Public Nodes Alternative
New Trails and Trailheads	<ul style="list-style-type: none"> ▪ Existing trails and trailheads maintained. ▪ Otherwise, no new trails or trailheads, but visitors could enjoy most portions of park and preserve via foot or horseback (select areas remain off-limits to horses). 	<ul style="list-style-type: none"> ▪ New trailhead in northern part of the national park and new trails in backcountry adventure zone areas. ▪ Link park trails to outside trails where possible. ▪ New trails in guided learning zone. ▪ Cooperative trailheads around park if possible (e.g., Oasis, Baca National Wildlife Refuge, San Luis Lakes State Park). 	<ul style="list-style-type: none"> ▪ New multiuse trail from the park boundary (near the Oasis) to the visitor center, dunes parking lot / picnic area, and Pinyon Flats campground. ▪ New trails or trailheads only in frontcountry zone east of main dunes. 	<ul style="list-style-type: none"> ▪ New trailhead in northern part of park and new trails in backcountry adventure zone areas. ▪ Trailhead at Medano Ranch for new trails in guided learning zone. ▪ Possible concession opportunities for guided hiking and horseback tours to high interest areas on or near Medano Ranch.
Public Access to North Part of Park	<ul style="list-style-type: none"> ▪ Foot-only access facilitated; no equestrian gates, trailhead, or campground. 	<ul style="list-style-type: none"> ▪ Small backcountry trailhead (10–15 vehicles) within backcountry access zone improves foot, horseback, and vehicle access. ▪ No campground in this area. ▪ Access route to trailhead to be determined in the future. ▪ Public vehicle access options to new USFS lands, i.e., Liberty Road or extension of the selected route could be considered in a separate future NEPA process. 	<ul style="list-style-type: none"> ▪ Foot and horseback access only facilitated (gate or gates provided at northern boundary); no trailhead or campground in this area. 	<ul style="list-style-type: none"> ▪ Backcountry trailhead (15–20 vehicles) and primitive campground within backcountry access zone improves foot, horseback, and vehicle access. ▪ Access route to trailhead and campground to be determined in the future. ▪ Two public vehicle access options to new USFS lands could be considered in a separate future NEPA process (Liberty Road or extension of Cow Camp Road to Liberty Road).

TABLE 1. SUMMARY OF KEY DIFFERENCES AMONG THE ALTERNATIVES

	No-Action Alternative	NPS Preferred Alternative	Dunefield Focus—Maximize Wilderness Alternative	Three Public Nodes Alternative
Main Dunes Area Carrying Capacity	<ul style="list-style-type: none"> Minor expansion (~5% additional paved surface) and reconfiguration of the dunes parking lot to improve circulation and increase capacity. 	<ul style="list-style-type: none"> Possible modest shuttle system to transport visitors from remote parking into the dunes area during peak summer weekends. 	<ul style="list-style-type: none"> Parking and related support facilities (e.g., restrooms) could be expanded within the frontcountry zone if the parking lot fills too often. 	<ul style="list-style-type: none"> No parking or facility expansion; when the dunes parking area is full, visitors arriving at the main entry would be directed to alternate park nodes (e.g., Medano Ranch).
Backcountry Carrying Capacity	<ul style="list-style-type: none"> Manage according to existing backcountry management plan (addresses former national monument only). 	<ul style="list-style-type: none"> New trails in backcountry adventure zone direct use to areas that can accommodate it. Guided learning zone protects Big Spring and Little Spring. Sensitive areas (Upper and Lower Sand Creek lakes, Deadman Creek, Big Spring and Little Spring) managed closely according to new wilderness management plan. 	<ul style="list-style-type: none"> Few new trails or access points; keep use light and dispersed. Sensitive areas (Upper and Lower Sand Creek lakes, Deadman Creek, Big Spring and Little Spring) managed closely according to new wilderness management plan. 	<ul style="list-style-type: none"> New trails in backcountry adventure zone direct use to areas that can accommodate it. Guided learning zone protects Big Spring and Little Spring. Sensitive areas (Upper and Lower Sand Creek Lakes, Deadman Creek, Big Spring and Little Spring) managed closely according to new wilderness management plan.
Dogs	<ul style="list-style-type: none"> Leashed dogs generally allowed in the national park. Leashed dogs generally allowed in the national preserve. Unleashed dogs allowed for hunting (permitted only within the national preserve). 	<ul style="list-style-type: none"> Within the national park, leashed dogs allowed only within the frontcountry, dunes play, and backcountry access zones, and Liberty Road administrative zone. Leashed dogs generally allowed in the national preserve. Unleashed dogs allowed for hunting (permitted only within the national preserve). 	<ul style="list-style-type: none"> Within the national park, leashed dogs permitted only in parking areas, picnic areas, and car campgrounds. Leashed dogs not allowed in the national preserve. Dogs allowed for hunting (permitted only within the national preserve). 	<ul style="list-style-type: none"> No dogs in areas with high potential for (or a history of problems with) conflicts with visitors or wildlife; otherwise leashed dogs allowed. Within the dunes play zone, leashed dogs allowed in an alternative downstream area. Unleashed dogs allowed for hunting (permitted only within the national preserve).

TABLE 1. SUMMARY OF KEY DIFFERENCES AMONG THE ALTERNATIVES

	No-Action Alternative	NPS Preferred Alternative	Dunefield Focus—Maximize Wildness Alternative	Three Public Nodes Alternative
Bison	<ul style="list-style-type: none"> Continued bison grazing within the park on lands owned or leased by The Nature Conservancy. 	<ul style="list-style-type: none"> A NPS-managed free-roaming bison herd is not feasible for the life of the GMP. If additional bison habitat becomes available at some time in the future, this option can be reconsidered by the National Park Service. 	<ul style="list-style-type: none"> A NPS-managed free-roaming bison herd is not feasible for the life of the GMP. If additional bison habitat becomes available at some time in the future, this option can be reconsidered by the National Park Service. 	<ul style="list-style-type: none"> A NPS-managed free-roaming bison herd is not feasible for the life of the GMP. If additional bison habitat becomes available at some time in the future, this option can be reconsidered by the National Park Service.
Total 25-Year Life Cycle Costs	\$28.1 to \$29.5 million	\$44.6 to \$49.6 million	\$35.6 to \$36.7 million	\$46.7 to \$50.3 million



Chapter Three: Affected Environment

INTRODUCTION

This chapter describes the existing environment of Great Sand Dunes National Park and Preserve. The focus is on key park resources, visitor use and experience, socioeconomic characteristics, and park operations that would be affected by the alternatives should they be implemented. These topics were selected on the basis of federal law, regulations, executive orders, NPS expertise, and concerns expressed by other agencies or

members of the public during project scoping. The conditions described in this chapter establish the baseline for Chapter Four: Environmental Consequences.

The first section in this chapter discusses impact topics that are analyzed in detail in this GMP. The next section describes impact topics that are not analyzed in detail and explains the rationale for this decision.

TABLE 2. IMPACT TOPICS

Impact Topics Considered in this GMP	Impacts Topics Considered But Not Analyzed in Detail
<i>Proposals in this plan have potential to affect these resources/topics</i>	<i>These resources/topics are important, but proposals in this plan would have only positive impacts on these resources, and/or any adverse impacts would be negligible to minor</i>
Archeology	Museum Collections
Historic Structures	Ethnographic Resources
Cultural Landscapes	Floodplains
Vegetation	Prime and Unique Farmlands
Ecologically Critical Areas	Air Quality
Federal Threatened and Endangered Species	Natural Soundscapes
Wildlife, Including Colorado State-Listed Species	Wild and Scenic Rivers
Soils and Geologic Resources	Energy Requirements and Conservation Potential
Wetlands	Indian Trust Resources
Water Resources	Environmental Justice
Visitor Use and Experience	
Scenic Resources and Visual Quality	
Socioeconomics	
Health and Safety	
National Park Service Operations	
Operations of Other Entities and Management Agencies	

IMPACT TOPICS CONSIDERED IN THIS GENERAL MANAGEMENT PLAN

CULTURAL RESOURCES

Historic Property Definitions

Historic properties are defined under 36 CFR 800. They are defined as, “any prehistoric or historic district, site, building, structure, or object included in or eligible for inclusion in, the National Register of Historic Places.” The National Park Service provides the following definitions for buildings, sites, structures, objects, districts, and landscapes:

- **Building:** created principally to shelter any form of human activity such as a barn, house, church, or hotel.
- **Site:** the location of a significant event; a prehistoric or historic occupation or activity; or a building or structure, whether standing or ruined, or vanished, where the location itself possesses historic, cultural, or archeological value, regardless of the value of the existing structure.
- **Structure:** a functional construction usually made for purposes other than creating human shelter such as tunnels, bridges, oil wells, or dams.
- **Object:** primarily artistic in nature or is relatively small in scale and simply constructed. Although an object may be moveable by nature or design, it is associated with a specific setting or environment, including sculptures, boundary markers, or statues.
- **District:** possesses a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development such as a college campus, central business district, fort, or sprawling ranch.
- **Landscape:** associated with events, persons, design styles, or ways of life that are significant in American history, landscape architecture, archeology, engineering, or culture.

Cultural resources associated with the Great Sand Dunes National Park and Preserve include archeological sites, historic buildings and structures, ethnographic resources, and cultural landscapes. Cultural resources and values that are fundamental to the park (that is, key to maintaining the park’s purpose and significance) are archeological sites associated with Folsom Early Man (9,000 years before present), culturally peeled ponderosa pines, the dunes themselves, and contemporary community connections to the park. These resources are described below. Consistent with park policy and federal law, locations of archeological sites are not included in these descriptions.

Archeological Resources

The Great Sand Dunes is rich in prehistoric resources. Over 4,500 acres have been inventoried, although this represents just a small fraction of the park. Surveyed areas in general include most of the frontcountry, Mosca, Medano, Music, and Sand Creek mountain corridors, the lower Sand Creek corridor, and various localities around

springs. Archeological site distribution tends to be high around lakes and streams, near ponderosa tree stands, in the woodlands, and along established trails and passes. Surveys have not been conducted in the majority of the Baca and Medano ranch lands, most of the dunefield, and various wetlands located within the park. Exposure of archeological resources in the dunes and sand sheet is dynamic, as shifting dunes uncover some resources and bury others over time.

Within the authorized boundary of the park, 129 archeological sites have been identified. The National Park Service does not own or manage all of these sites. In addition, there is information about 132 isolated artifact finds and other archeological resource locations (Martorano 2001, 2002, 2004; Martorano and Mrzlack 2003; Anderson 2006). All four stages of prehistory (Paleo-Indian, Archaic, Late Prehistoric/Ceramic, and Protohistoric) are represented within the park. Open campsites, stone tools, hearth features, ceramics, wickiups, and culturally modified trees are some of the prehistoric resources found within the surveyed areas. Many undocumented sites also exist throughout the park (Marilyn Martorano, pers. comm., 2005).

Many of the archeological sites in the park appear to meet the NRHP eligibility criteria, and many more are likely to be identified in the future. Evaluations of NRHP eligibility is an ongoing process and will continue in the future. To date, four sites have been formally evaluated for their NRHP eligibility, in consultation with the Colorado SHPO, resulting in one site being listed in the NRHP, one site being determined to be eligible for listing in the NRHP, and two determined to be ineligible for the NRHP. The one property listed in the NRHP is Indian Grove, an archeological district of culturally peeled trees located in the eastern part of the park. An

additional 73 archeological properties have had NRHP eligibility recommendations, but await formal NRHP eligibility determinations in consultation with the Colorado SHPO—of these, 36 have been recommended as eligible for listing in the NRHP, and 37 have been recommended as ineligible for listing in the NRHP. An additional 52 sites remain unevaluated for NRHP eligibility and, therefore, have no NRHP eligibility recommendations at this time.

An area of approximately 10 miles by 4 miles within the sand sheet contains a dense concentration of documented and undocumented archeological resources, as well as ethnographic resources important to American Indian groups. Many undocumented sites also exist throughout the park (Marilyn Martorano, pers. comm., 2005).

Site distribution in the sand dunes and sand sheet is difficult to document. As dunes migrate and sand blow-outs appear over time, sites may be repeatedly exposed and covered (Marilyn Martorano, pers. comm., 2005). Buried cultural features may be considered significant and sensitive by archeologists and American Indians.

Artifacts from these sites and features have been illegally collected and vandalized (Martorano 2004). Adverse and beneficial impacts related to visitor use are possible from the proposed alternatives within this unstable area. This generalized area will also be addressed and considered for all alternatives.

Additional Buildings and Structures

There are additional buildings and structures within the park, some of which are not owned or managed by the National Park Service. These include several cabins and other structures and a stamp mill that

the National Park Service does not own or manage. Cabins and other buildings and structures are also located in the areas proposed for NPS wilderness management. At this time, the National Park Service has not fully documented or evaluated these buildings and structures for their NRHP eligibility.

Historic Structures and Districts

Although numerous buildings and structures are found throughout the park, only certain buildings qualify as historic properties because they meet the eligibility criteria for inclusion in the NRHP (table 3), have been formally determined to be eligible for the NRHP, or have been listed in the NRHP. Many others exist, but have not been evaluated for eligibility for inclusion in the NRHP, formally or informally.

At the administrative park headquarters, two structures are listed on the NRHP: (1) the Works Progress Administration (WPA) territorial revival style superintendent's residence (includes courtyard walls) that is now used for administrative headquarters offices, and (2) the WPA territorial revival style check-in station. These structures will not be discussed further in this document because no impacts to them would occur from the GMP alternatives. The NPS preferred alternative proposes moving an entrance station, but this is a different, nonhistoric structure.

Other buildings and structures, such as the visitor center and amphitheater, were built during the Mission 66 era but have lost integrity due to extensive renovations and rebuilding. (Mission 66 was a federal program to improve or replace deteriorated facilities during 1956–1966; many structures built during this era have been recognized as historically significant.) The

visitor center has been remodeled and enlarged. The Mission 66 amphitheater burned down in 2000 and was rebuilt.

There are numerous ditches (most are ephemeral) in the park and preserve. They are thought to be the result of historic water management efforts. One unevaluated ditch segment is present between the visitor center and Pinyon Flats campground. Other unevaluated historic buildings or structures include a pipeline segment and the Garden Creek flume, the latter located immediately east of Pinyon Flats campground. Only the ditch segment will be discussed further; no impacts would occur to the remainder from the GMP alternatives.

Canal (ditch) Segment

This canal segment is actually more of a ditch remnant than a canal in that it lacks formal features (Marilyn Martorano, pers. comm., 2005). It is of unknown age, but is likely associated with European American ranching.

Medano Ranch

In the southwest portion of the park, the Medano Ranch complex, which is owned and managed by The Nature Conservancy, is listed on the NRHP as a historic district. It consists of the main ranch house, various outbuildings/structures, a silo, and an extensive corral. The Medano Ranch was established in 1875, when the first homestead was erected. Early log buildings were eventually replaced or incorporated into more substantial log buildings. Contributing buildings include the main ranch house, bunkhouse, harness shed, meat house, cookhouse, privy, draft horse barn, cottonseed cake house, and corral. Noncontributing elements include two machine sheds, a

storage shed, and a metal silo. The ranch complex is architecturally significant for its joining of smaller buildings to create larger ones. The main ranch house, bunkhouse, and cookhouse all represent the

combination of smaller buildings into one larger building. The corral is also significant due to its complexity of design (Simmons and Simmons 2004).

TABLE 3. BUILDINGS, AND STRUCTURES (NRHP LISTED OR ELIGIBLE) AND POTENTIAL IMPACTS

Resource No.	Name	Type	Comments
5AL301	Medano Ranch headquarters	Historic district – 9 contributing buildings/structures, 4 noncontributing buildings/structures	NRHP listed, numerous buildings in district; impacts possible [Note: this property is currently owned and managed by The Nature Conservancy]
5AL414	GRSA superintendent’s residence and courtyard walls	WPA territorial revival – building	NRHP listed, classified structure; no impacts anticipated
5AL414	GRSA check-in station	WPA territorial revival – structure	NRHP listed, classified structure; no impacts anticipated

Cultural Landscapes

The National Park Service identifies a cultural landscape as, “a reflection of human adaptation and use of natural resources and is often expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures that are built. The character of a cultural landscape is defined, both by physical materials such as roads, buildings, walls, and vegetation, and by use reflecting cultural values and traditions.”

Cultural landscapes are the imprint on the natural landscape of physical human activity combined with unconscious schemes of spatial organization and patterns of living and working. This alteration and manipulation of the natural landscape provides a look at the long interaction between humans and their

environment. Technology, politics, land-use management, economic, and environmental factors all influence how humans interact with the landscape and order their world. Upon closer inspection of the interplay between these factors that form a cultural landscape and between the cultural landscapes themselves, an overall understanding of the history of an area begins to emerge. This provides a broad, dynamic look at human history.

No listed or eligible cultural landscapes have been identified within the park. However, two potential cultural landscapes that could be affected by the GMP alternatives have been identified and are described in the following sections. There are other potential cultural landscapes (Duncan and Wellington) that are not evaluated since they will not be affected.

Medano Ranch Landscape

This potential cultural landscape centers around the Medano Ranch complex, but includes other ranches and ranching features in the area such as roads, ditches, fences, and ranch buildings from other ranches. The Medano Ranch was the largest and most important in the San Luis Valley and had enveloped the Zapata, Oliver, and Taylor ranches, as well as the Trujillo homestead and lands (Simmons and Simmons 2004). The Medano Ranch buildings, structures, and objects would all be included in the landscape, in addition to features from the other ranches subsumed by the Medano Ranch. Fencelines reinforce use and management patterns on the landscape. Roads help us understand transportation systems within Medano Ranch and between the ranch and its surroundings. At one time, there were 10 miles of ditches used by the ranch for irrigation. The ditches help us to understand irrigation systems and the arrangement of agricultural field types on the landscape (Simmons and Simmons 2004). The buildings and homesteads provide insight into settlement patterns and land use.

National Park Service Administrative Landscape

This potential cultural landscape is centered around the superintendent's residence (currently park headquarters), its courtyard walls, and the historic check-in station. The superintendent's residence and historic check-in station are representative of a particular era and type of design associated with the WPA and territorial revival style architecture, but they are only two remaining elements of what was once a more intact and larger landscape. As a result, the residence and historic check-in station may not be able to

adequately evoke an image of the landscape as a whole.

VEGETATION

Great Sand Dunes National Park and Preserve includes a diverse cross-section of vegetation representative of the San Luis Valley and the Sangre de Cristo mountain range. From the valley floor on the western boundary of the park to the mountain crest in the national preserve, seven general life zones (habitats) support a dramatic array of distinct plant communities that have been classified into 27 broader ecological systems. Over 620 vascular plant species are known for the park and an additional 400 taxa could reasonably be expected to occur within its boundaries (Spackman et al. 2004). The park supports rare plant taxa that are discussed in the "Ecologically Critical Areas" section. For this GMP, vegetation is described in terms of broad life zones, associated ecological systems (NatureServe 2005), and nonnative plant species. Plant communities at the association and alliance levels of the National Vegetation Classification System are presently being sampled and classified by the Colorado Natural Heritage Program (CNHP) and NatureServe under the National Park Vegetation Mapping Program. This detailed classification and an associated vegetation map should be available during fiscal year (FY) 2007. There are seven plant associations known within the park and reported and described by CNHP that are considered critically imperiled; these are discussed in detail in the "Ecologically Critical Areas" section of this chapter.

Life Zones and Ecological Systems

Great Sand Dunes, best known for impressive sand dunes, also supports other

distinct life zones ranging from sabkha flats to steep alpine tundra. Intervening landscapes support short-shrubs; open pinyon-juniper woodlands; montane woodlands; and forests of fir, pine, and quaking aspen, as well as extensive stands of Engelmann spruce and subalpine fir. From the lowest to highest elevations are seven broad life zones, including sabkha, sand sheet, dunefield, pinyon-juniper woodland, montane woodland and forest, subalpine forest and meadows, and alpine tundra (figure 8). Life zones represent an intuitive, general description of regional vegetation distribution and are defined herein by the more rigorous ecological systems developed by NatureServe (2005) to classify and describe existing vegetation on the landscape. Ecological systems have been mapped for Colorado as part of the Southwest ReGAP program.

NatureServe (2005), a nonprofit conservation organization that provides scientific information and tools to guide conservation, has defined ecological systems to represent biological communities that are found in similar physical environments and are influenced by similar dynamic ecological processes such as fire or flooding. Ecological systems represent classification units that are readily identifiable by conservation and resource managers in the field. Ecological systems that occur in the park are described under the seven life zones below (NatureServe 2005). A brief description of each life zone and its component ecological systems follows:

Sabkha Life Zone

The sabkha encompasses part of the valley floor and is characterized by an alkali-hardened sand crust. Leaching of minerals from the near-to-surface water table has

resulted in high soil alkalinity tolerated only by a small number of plant species including four-wing saltbush (*Atriplex canescens*) and saltgrass (*Distichlis spicata*). The sabkha is one of the park's fundamental resources and values (see chapter one).

Inter-Mountain Basins Playa. Composed of barren and sparsely vegetated playas (generally <10% canopy cover). Salt crusts are common throughout, with small saltgrass beds in depressions and sparse shrubs around the margins. These systems are intermittently flooded. Characteristic species typically include greasewood or chico (*Sarcobatus vermiculatus*), and four-wing saltbush.

Inter-Mountain Basins Greasewood Flats. Occupies basins and occurs near drainages on stream terraces and flats or forms rings around more sparsely vegetated playas. Typically have saline soils, a shallow water table, and flood intermittently, but remain dry for most growing seasons. This system usually occurs as a mosaic of multiple communities, with open to moderately dense shrublands dominated or codominated by greasewood and four-wing saltbush with alkali sacaton (*Sporobolus airoides*), saltgrass, or spike-rush (*Eleocharis palustris*) in the understory.

Sand Sheet Life Zone

The sand sheet occurs on the valley floor at a slightly higher elevation than the sabkha. Soil alkalinity is reduced in this landscape where sandy soils are anchored by deep-rooted shrubs and forbs including rabbit-brush (*Chrysothamnus* spp., *Ericameria* spp.), winterfat (*Krascheninnikovia lanata*), prickly-pear cactus (*Opuntia polyacantha*),

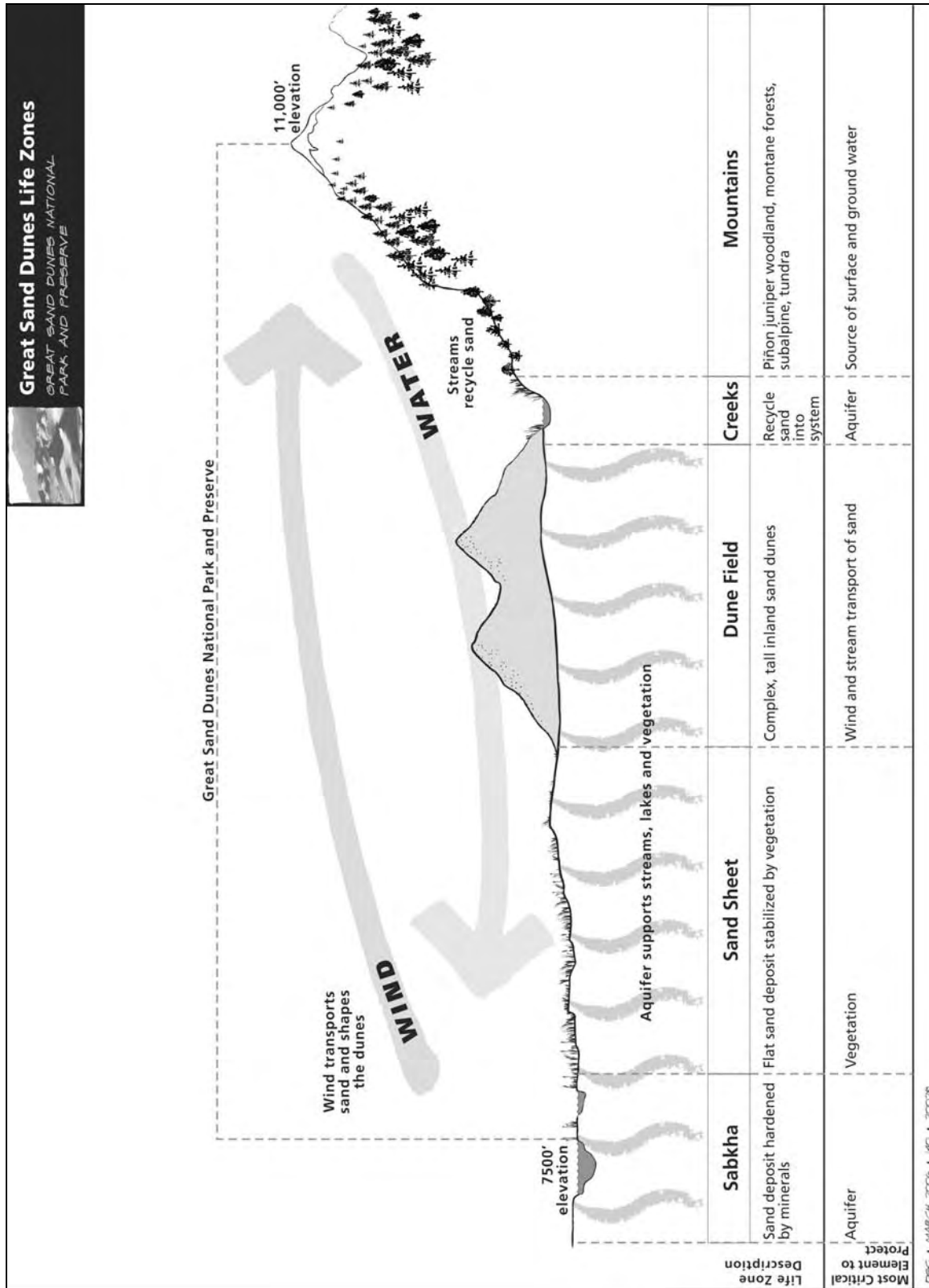


FIGURE 8. CROSS-SECTION SHOWING GREAT SAND DUNES LIFE ZONES

sand verbena (*Tripterocalyx micranthus*), prairie sunflower (*Helianthus petiolaris*), and yucca (*Yucca glauca*). The sand sheet is one of the park's fundamental resources and values (see chapter one).

Inter-Mountain Basins Semi-Desert Shrub-Steppe. Typically occurs on alluvial fans and flats with moderate to deep soils. This semi-arid shrub-steppe is typically dominated by graminoids (>25% canopy cover) with an open shrub layer. Characteristic species include Indian ricegrass (*Achnatherum hymenoides*), blue grama (*Bouteloua gracilis*), needle-and-thread (*Hesperostipa comata*), alkali sacaton, four-wing saltbush, rabbitbrush species, and winterfat.

Inter-Mountain Basins Semi-Desert Grasslands. Occurs on dry plains and mesas between 4,800 to 7,600 feet. These grasslands occupy lowland and upland areas on swales, playas, mesa tops, plateau parks, alluvial flats, and plains, but sites are typically xeric. When they occur near foothills, grasslands are on flatter land at lower elevations and are characterized by Indian ricegrass, blue grama, and needle-and-thread.

North American Arid West Emergent Marsh. Occurs in ponds, as fringes around lakes, and along slow-flowing streams and rivers. Marshes are frequently or continually inundated, with water at depths up to 6.5 feet. Characterized by emergent and aquatic herbaceous plants including bulrush (*Scirpus* spp.), cattail (*Typha latifolia*), rush (*Juncus* spp.), pondweed (*Potamogeton* spp.), and water smartweed (*Persicaria amphibia*). This system may also include areas of relatively deep water with floating-leaved plants such as duckweed (*Lemna* spp.), water smartweed, hornwort (*Ceratophyllum* spp.), and the mostly submerged water milfoil (*Myriophyllum sibiricum*).

Dunefield Life Zone

Highly mobile sand dunes rise from the sand sheets, creating the distinctive dunefield life zone. Although mostly barren, the sand dunes support a range of plants uniquely suited for this habitat, including some rare plants described in the "Ecologically Critical Areas" section of this chapter. Common plant species found on active dunes include blowout grass (*Redfieldia flexuosa*) and scurfpea (*Psoralidium lanceolatum*). The dunefield is also one of the park's fundamental resources and values (see chapter one).

Inter-Mountain Basins Active and Stabilized Dunes. Composed of unvegetated to moderately vegetated (<10%–30% canopy cover), active and stabilized dunes and sand sheets. Species occupying these environments are often adapted to shifting, coarse-textured substrates (usually quartz sand), and form patchy or open grasslands, shrublands, or steppe characterized by Indian ricegrass, four-wing saltbush, rubber rabbitbrush (*Ericameria nauseosa*), and alkali sacaton.

Pinyon-Juniper Woodland Life Zone

Occurs as a distinct band on south- and west-facing slopes at the base of the mountains, directly above the sand sheet and sand dune formations. Regularly spaced pinyon pine and juniper trees characterize this life zone with a mix of understory species including blue grama, Colorado's state grass.

Southern Rocky Mountain Pinyon-Juniper Woodland. Occurs on dry mountains and on warm, dry sites on mountain slopes, mesas, plateaus, and ridges. The woodland is characterized by an open canopy of two-needle pinyon pine (*Pinus edulis*) and Rocky Mountain juniper

(*Juniperus scopulorum*) with understories characterized by mountain mahogany (*Cercocarpus montanus*), currant (*Ribes* spp.), rabbitbrush, or blue grama.

Montane Forests Life Zone

At higher elevations than pinyon-juniper woodlands and grasslands occupying cooler and wetter slopes are more dense woodlands and montane forests. Common trees in this zone include Douglas-fir (*Pseudotsuga menziesii*), white fir (*Abies concolor*), ponderosa pine, and quaking aspen (*Populus tremuloides*). The mesic conditions support a diverse understory, particularly where there are breaks in tree canopies that allow light to penetrate. Club moss (*Selaginella* spp.), penstemon (*Penstemon* spp.), columbine (*Aquilegia* spp.), and wax currant (*Ribes cereum*) are common species.

Rocky Mountain Aspen Forest and Woodland. Found in the montane and subalpine zones where the elevation ranges from 8,300 to 10,000 feet (but occurrences can be found at lower elevations). Characteristic upland forest and woodland species include quaking aspen without a significant conifer component (<25% relative tree cover). The understory structure may be complex with multiple shrub and herbaceous layers, or simple with herbaceous ground cover characterized by snowberry (*Symphoricarpos* spp.), raspberry (*Rubus* spp.), serviceberry (*Amelanchier* spp.), and kinnikinnick (*Arctostaphylos uva-ursi*). Occurrences originate and are maintained by stand-replacing disturbances such as avalanches, crown fire, insect outbreak, disease, and windthrow, or clearcutting by beaver, within the matrix of conifer forests.

Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest and Woodland. Highly variable ecological system of the

montane zone, occurring on all aspects at elevations ranging from 8,300 to 10,800 feet. Douglas-fir forests occupy drier sites where ponderosa pine is a common codominant. White fir stands occupy cooler sites such as upper slopes at higher elevations, canyon side slopes, ridgetops, and north- and east-facing slopes that burn somewhat infrequently. Blue spruce (*Picea pungens*) is found in cool, moist locations, often occurring as smaller patches within a matrix of other associations. As many as seven conifer species can be found growing in the same occurrence, and there are a number of common cold-deciduous shrub and grass species, including kinnikinnick, Oregon-grape (*Mahonia repens*), mountain lover (*Paxistima myrsinites*), snowberry, and fescue (*Festuca* sp.).

Rocky Mountain Mesic Montane Mixed Conifer Forest and Woodlands. Occur in cool ravines and on north-facing slopes at elevations ranging from 9,000 to 10,800 feet. Common canopy trees include Douglas-fir, white fir, and Englemann spruce (*Picea engelmannii*); blue spruce or ponderosa pine may be present. This system includes mixed conifer/quaking aspen stands and is characterized in the understory by Rocky Mountain maple (*Acer glabrum*), thinleaf alder (*Alnus incana*), western birch (*Betula occidentalis*), red-osier dogwood (*Cornus sericea*), fleabane (*Erigeron* spp.), strawberry (*Fragaria* spp.), and meadow rue (*Thalictrum* spp.).

Inter-Mountain Basins Aspen-Mixed Conifer Forest and Woodland. Occurs on montane slopes and plateaus from 9,000 to 9,800 feet in elevation. The tree canopy is composed of a mix of deciduous and coniferous species characterized by quaking aspen, Douglas-fir, white fir, subalpine fir (*Abies lasiocarpa*), blue spruce, and limber pine (*Pinus flexilis*). As the stands age, quaking aspen is slowly

reduced in cover until the conifers dominate. Commonly associated shrubs and herbs include serviceberry, chokecherry (*Prunus virginiana*), western snowberry (*Symphoricarpos occidentalis*), common juniper (*Juniperus communis*), rose (*Rosa* spp.), Oregon-grape, yarrow (*Achillea millefolium*), bedstraw (*Galium* spp.), meadow-rue, and/or false Solomon's-seal (*Maianthemum stellatum*).

Southern Rocky Mountain Ponderosa Pine Woodland. Occurs in small stands or patches at the lower tree line/ecotone between grassland or shrubland and more mesic coniferous forests typically in warm, dry, exposed sites. Elevations range from 8,200 to 9,100 feet and stands occupy all slopes and aspects with moderately steep to very steep slopes or ridgetops the most common habitat. Stands are characterized by ponderosa pine, in addition to Douglas-fir, two-needle pinyon pine, and Rocky Mountain juniper. Understories are usually shrubby, with species of rabbitbrush common. Common grasses include needle-and-thread, ricegrass (*Achnatherum* spp.), fescue (*Festuca* spp.), muhly (*Muhlenbergia* spp.), and grama (*Bouteloua* spp.).

Rocky Mountain Lower Montane-Foothill Shrubland. Occurs between 9,000 to 9,500 feet elevation and are usually associated with exposed sites, rocky substrates, and dry conditions that limit tree growth. Scattered trees or inclusions of grassland patches or steppe may be present, but the vegetation is typically characterized by a variety of shrubs including serviceberry (*Amelanchier* spp.), mountain mahogany, western snowberry, or yucca. Characteristic grasses include muhlys, grammas, and needle-and-thread.

Southern Rocky Mountain Montane-Subalpine Grasslands. Typically occur between 9,000 to 9,800 feet on flat to rolling plains or on lower side slopes that

are dry, but may extend up to 11,000 feet on warm aspects. A stand usually consists of a mosaic of two or three plant associations characterized by oatgrass (*Danthonia* spp.) and fescue. These large-patch grasslands are intermixed with matrix stands of spruce, fir, lodgepole pine, ponderosa pine, and quaking aspen forests.

Rocky Mountain Lower Montane Riparian Woodland and Shrubland.

Occurs up to 9,200 feet in elevation as a mosaic of multiple communities that are tree dominated with a diverse shrub component. This system is dependent on a natural hydrologic regime, especially annual to episodic flooding. Stands are found within the flood zone of rivers, on islands, sand or cobble bars, and immediate streambanks. Characterized by box-elder (*Acer negundo*), narrowleaf cottonwood (*Populus angustifolia*), Douglas-fir, blue spruce, Rocky Mountain juniper, thinleaf alder, western birch, red-osier dogwood, hawthorn (*Crataegus* spp.), chokecherry, and willows, e.g., mountain, Drummond, and coyote (*Salix monticola*, *S. drummondiana*, *S. exigua*).

Wet Meadow Vegetation. Typically forb-rich, with forbs contributing more to overall herbaceous cover than graminoids. Important characteristic species include fleabane, bluebell (*Mertensia* spp.), lupine (*Lupinus* spp.), goldenrod (*Solidago* spp.), lovage (*Ligusticum* spp.), tufted hairgrass (*Deschampsia caespitosa*), Junegrass (*Koeleria micrantha*), and shrubby cinquefoil (*Dasiphora floribunda*).

Subalpine Life Zone

The subalpine life zone is located higher in elevation, above the montane forest stands and below the treeless tundra. Harsh conditions result from the cold temperatures and heavier snow accumulation that

occur at high elevations. Engelmann spruce, blue spruce, subalpine fir, and quaking aspen are the common tree species.

Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland. Support Engelmann spruce and subalpine fir forests that comprise the matrix forests of the subalpine zone, occur up to 11,000 feet elevation, and are usually the highest elevation forests. Sites are cold year-round and precipitation is predominantly snow, which may persist until late summer. Tree canopy characteristics are remarkably similar across its distribution, with Engelmann spruce and subalpine fir characterizing mixed stands or occurring individually as stands. Douglas-fir may persist for long periods without regeneration. Stands of mixed conifer and quaking aspen also regularly occur. Understory species common to stands on dry sites include common juniper and Oregon-grape. Disturbance includes occasional blow-down, insect outbreaks, and stand-replacing fire.

Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland. Occurs at high elevations and is characterized by Engelmann spruce and subalpine fir. It typically occurs in locations with cold air drainage or ponding, or where snow pack lingers into late summer such as north-facing slopes and high-elevation ravines. Typical mesic understory shrubs include serviceberry and species of willows, and herbaceous plants include baneberry (*Actaea rubra*), false Solomon's-seal, flowering dogwood, fleabane, lupine, and bluejoint reedgrass (*Calamagrostis canadensis*). Disturbances include occasional blow-down, insect outbreaks, and stand-replacing fire.

Rocky Mountain Subalpine-Montane Limber-Bristlecone Pine Woodlands.

These zones occur on dry, rocky ridges and slopes near upper tree line above the matrix spruce-fir forest. These stands are characterized by limber pine and bristlecone pine (*Pinus aristata*), Rocky Mountain juniper, and/or Douglas-fir. Understory species can include kinnikinnick, common juniper, Oregon-grape, currant, reedgrass (*Calamagrostis* spp.), and fescue.

Rocky Mountain Subalpine Mesic Meadows. Restricted to sites in the subalpine zone where finely textured soils, snow deposition, or wind-swept dry conditions limit tree establishment, typically above 9,800 feet in elevation. These upland communities occur on gentle to moderate gradient slopes. These sites are not as wet as those found in the Rocky Mountain alpine-montane ecological system.

Rocky Mountain Subalpine-Montane Riparian Shrublands. Montane to subalpine riparian shrublands occurring as narrow bands lining streambanks and alluvial terraces in narrow to wide, low-gradient valley bottoms and floodplains with sinuous stream channels. Generally, it is found at higher elevations, but can be found anywhere from 8,000 to 11,400 feet. Can also be found around seeps, fens, and isolated springs on hill slopes away from valley bottoms. Characteristic shrubs include thinleaf alder, birch, red-osier dogwood, and a number of willow species, e.g., Bebb, plane-leaf, Drummond, and mountain (*Salix bebbiana*, *S. brachycarpa*, *S. drummondiana*, *S. monticola*), among others. Generally, the vegetation surrounding these riparian systems is either conifer or quaking aspen forests.

Rocky Mountain Subalpine-Montane Riparian Woodlands. Comprised of seasonally flooded forests and woodlands found at montane to subalpine elevations and containing the conifer and quaking

aspen woodlands that line montane streams. Tolerant of periodic flooding and high water tables. Typically occur at elevations between 9,800 and 10,800 feet and are confined to specific riparian environments on floodplains or terraces of rivers and streams, in V-shaped narrow valleys, and canyons (where there is cold-air drainage). Characteristic trees include subalpine fir, Engelmann spruce, Douglas-fir, blue spruce, quaking aspen, narrowleaf cottonwood, and/or Rocky Mountain juniper.

Rocky Mountain Alpine-Montane Wet Meadows. High-elevation communities characterized by herbaceous species found on saturated sites with very low-velocity surface and subsurface flows. They range in elevation from montane to alpine (9,000–11,000 feet) and occur as large meadows in montane or subalpine valleys, as narrow strips bordering ponds, lakes, and streams, and along toeslope seeps. Often occurs as a mosaic of several plant associations characterized by graminoids and forbs, including species of sedge (*Carex* spp.), tufted hairgrass, spike-rush, rush, and marsh marigold (*Caltha leptosepala*). Often alpine dwarf-shrublands, especially those supporting willows, are immediately adjacent to the wet meadows.

Rocky Mountain Alpine Bedrock and Scree. Composed of barren and sparsely vegetated alpine substrates, typically including both bedrock outcrop and scree slopes with nonvascular-dominated (lichen) communities. Desiccating winds, rocky and sometimes unstable substrates, and a short growing season limit plant growth. These exposed sites support sparse cover of forbs, grasses, lichens, and low-growing shrubs.

Rocky Mountain Cliffs and Canyons. Consist of barren and sparsely vegetated landscapes (generally <10% plant cover)

and are found from foothill to subalpine elevations on steep cliff faces, narrow canyons, and smaller rock outcrops. Also included are unstable scree and talus slopes that typically occur below cliff faces. There may be small patches of dense vegetation, but they typically include scattered trees and/or shrubs. Characteristic trees and shrubs include Douglas-fir, ponderosa pine, limber pine, quaking aspen, white fir, subalpine fir, two-needle pinyon pine, juniper, rock-spiraea (*Holodiscus dumosus*), currant, rose, and serviceberry.

Tundra Life Zone

Tundra in the Sangre de Cristo Mountains occurs on thin soils interspersed among bare rock outcrops and rock-strewn talus slopes. Devoid of trees, this zone supports low-growing, mat-forming cushion plants and stunted shrubs. Moss campion (*Silene acaulis*) and purplefringe (*Phacelia* spp.) are common tundra cushion plants. The tundra is one of the park's fundamental resources and values (see chapter one).

Rocky Mountain Alpine Fell-Fields. Wind-scoured, rock-strewn sites that are free of snow in the winter, such as ridgetops and exposed saddles, expose the plants to severe environmental stress. Most fell-field plants are cushioned or matted, frequently succulent, flat to the ground in rosettes and often densely haired and thickly cutinized. Usually found within or adjacent to alpine tundra dry meadows and are characterized by species of cushion plants and graminoids including sedge, alpine avens (*Geum* spp.), phlox (*Phlox* spp.), and moss campion.

Rocky Mountain Dry Tundra. Occurs above upper tree line on gentle to moderate slopes, flat ridges, valleys, and basins. Vegetation is controlled by snow retention, wind desiccation, permafrost, and a short

growing season, and is characterized by a dense cover of low-growing, perennial graminoids and forbs. Although alpine tundra dry meadow is the matrix of the alpine zone, it typically intermingles with alpine bedrock and scree, ice field, fell-field, alpine dwarf-shrubland, and alpine/subalpine wet meadow systems. Rhizomatous, sod-forming sedges are the dominant graminoids, and prostrate- and mat-forming plants with thick root stocks or taproots characterize the forbs, including tufted hairgrass, fescue, and alpine avens.

Nonnative Invasive Plant Species

During vascular plant inventories, the CNHP documented 47 nonnative plant species within the park (Spackman et al. 2004, Whitson et al. 2000). The most important invasive weeds, due to their difficulty to control, were determined to be Canada thistle (*Cirsium arvense*), field bindweed (*Convolvulus arvensis*), leafy spurge (*Euphorbia esula*), whitetop (*Cardaria pubescens*), yellow and white sweetclovers (*Melilotus officinalis* and *M. alba*), smooth brome (*Bromus inermis*), crested wheatgrass (*Agropyron cristatum*), and cheatgrass (*Bromus tectorum*). Of particular concern is leafy spurge, which is listed on the Colorado list of noxious weeds (Colorado Department of Agriculture 2003). Other perennial, nonnative species that have become established in and along wetlands include Russian-knapweed (*Acroptilon repens*), spike bentgrass and redtop (*Agrostis exarata* and *A. stolonifera*), meadow foxtail (*Alopecurus pratensis*), timothy (*Phleum pratense*), Kentucky bluegrass (*Poa pratensis*), orchardgrass (*Dactylis glomerata*), watercress (*Nasturtium officinale*), and red clover, and white Dutch clover (*Trifolium pratense* and *T. repens*) (Spackman et al. 2004).

Canada thistle, leafy spurge, and whitetop are perennial species with extensive underground rhizomes that become established on moist sites and wetlands, often forming patches or stands to the exclusion of native species. They are commonly observed in the borrow areas and ditches of roads, along canals and natural drainages, around ponds, in sloughs, in irrigated hayfields, and in emergent wetlands. Smooth brome and yellow and white sweetclovers occupy mesic to dry sites and wetlands margins, usually at slightly higher elevations than the preceding species. Introduced as a pasture and erosion-control grass, smooth brome forms extensive patches and stands via underground rhizomes. Yellow and white sweetclovers, introduced primarily for erosion control on highway cut-and-fill slopes, are biennials that form a rosette the first year and flower the second, are often scattered in distribution, but can also form extensive stands. They occupy dry to mesic sites, including the margins of wetlands.

Field bindweed is a vining forb that becomes established in and persists on disturbed land, particularly roadsides, homesteads, and agricultural fields (both active and abandoned). Crested wheatgrass is a perennial bunchgrass that was introduced to enhance forage production on rangeland and also for erosion control along highways. It more commonly occurs on lands that were disturbed mechanically and re-seeded. Cheatgrass is an annual that was introduced primarily to enhance forage production for livestock. It has spread abundantly on both disturbed and undisturbed landscapes and can occur as pure stands on sites that have burned or sites that have experienced intensive use such as homesteads, corrals, agricultural fields, etc.

Methods commonly used to control these nonnative species include mechanical (mowing, disking, flooding, etc.), chemical (herbicide application), and biological (introduction of host-specific insects, etc.). These methods are also used in combination to increase their efficacy and to maximize stress on the nonnative plant populations. Control is expensive and requires perseverance because stands are not or are very rarely eliminated by using only one treatment or by treating for only one season. Control is important as part of a good neighbor policy because seeds generated in or plants spreading by rhizomes from the park can blow to or grow onto adjacent private or nonpark public lands. Of course, the reverse is also true, further establishing the need for communication and cooperation among landowners.

ECOLOGICALLY CRITICAL AREAS

When evaluating the intensity of environmental impacts according to NEPA, certain unique characteristics of the geographic area must be considered, including ecologically critical areas (40 CFR 1508.27). Ecologically critical areas can be defined as “special ecosystems that serve unique functions and are small in area or are unusually fragile relative to others” (Conservation Foundation 1984). To identify ecologically critical areas for the purposes of this GMP, the National Park Service used a CNHP designation called “potential conservation sites.” The CNHP delineates potential conservation sites to identify areas and ecological processes that are necessary to support elements of natural heritage significance in Colorado. The potential conservation sites, once identified, are given a rank (score) between 1 and 5 that reflects their overall biodiversity significance. For the purposes of this GMP, the planning team defined ecologi-

cally critical areas as CNHP potential conservation sites ranked as B1 (outstanding significance) or B2 (very high significance). They are shown on the “Selected Potential Conservation Sites” map and are discussed briefly below. More detailed information about the CNHP potential conservation site program (definitions, ranks, etc.) is provided in appendix B.

Great Sand Dunes Potential Conservation Site

The Great Sand Dunes potential conservation site, estimated at 103,640 acres, encompasses the massive active sand dunes, the sand sheet with its grass and shrub communities, interdunal wetlands, and Sand and Medano creeks (“Selected Potential Conservation Sites” map). It has been assigned a biodiversity rank of B1—outstanding significance (CNHP 1998). This site contains many species that are restricted in range and endemic (native to a certain limited area) to the Great Sand Dunes system or to the San Luis Valley (CNHP 1999).

Seven rare plant associations occupy the nearly barren active dunes, the associated sand sheet, and creek banks. These include *Redfieldia flexuosa* – (*Psoralidium lanceolatum*) (blowout grass – (dune scurfpea)) Herbaceous Vegetation, *Achnatherum hymenoides* – *Psoralidium lanceolatum* (Indian ricegrass – dune scurfpea) Herbaceous Vegetation, and *Hesperostipa comata* – *Achnatherum hymenoides* (needle-and-thread – Indian ricegrass) Herbaceous Vegetation (CNHP 1998). The *Schoenoplectus pungens* (three-square bulrush) Herbaceous Vegetation association is an emergent wetlands that is rare in the park. Two riparian shrubland associations occupy creek bank habitat: *Alnus incana* – *Salix (monticola, lucida, ligulifolia)*

(thinleaf alder – (mountain willow, whip-lash willow, strapleaf willow)) Shrubland, and *Salix exigua* (coyote willow) Barren Shrubland (CNHP 1998). One montane riparian woodland type is also present: *Populus angustifolia* / *Alnus incana* (narrowleaf cottonwood / thinleaf alder) Woodland. The narrowleaf cottonwood trees growing on the banks of Medano Creek and Sand Creek are thought to represent a pure strain that has not hybridized with other stands; these are some of the oldest narrowleaf cottonwood trees known in the western U.S. and have been identified as among the fundamental resources and values of the park (see chapter one).

Rare plant species include *Cleome multicaulis* (slender spider-flower), associated with emergent wetlands and wetlands margins, and *Cryptantha cinerea* var. *pustulosa* (James' catseye), found on sand sheet and rocky slope habitats (CNHP 1998). The active dunes and surrounding sand sheet represent important habitat for arthropods, including six endemic insect species (Pineda 2002, CNHP 1998). As many as 2,000 insect species may be present (CNHP 1998). Endemic species include: Great Sand Dunes tiger beetle (*Cicindela theatina*), circus beetle (*Eleodes hirtipennis*), anthycid beetle (*Amblyderus triplehorni* and *A. wernerii*), a noctuid moth (*Copablepheron* undescribed), and a robber fly (*Proctacanthus* n.sp.) (Pineda, 2002). A local subspecies of the rare silky pocket mouse (*Perognathus flavus sanluisi*) and the Rio Grande cutthroat (*Oncorhynchus*

clus clarki virginalis) are also associated with this potential conservation site.

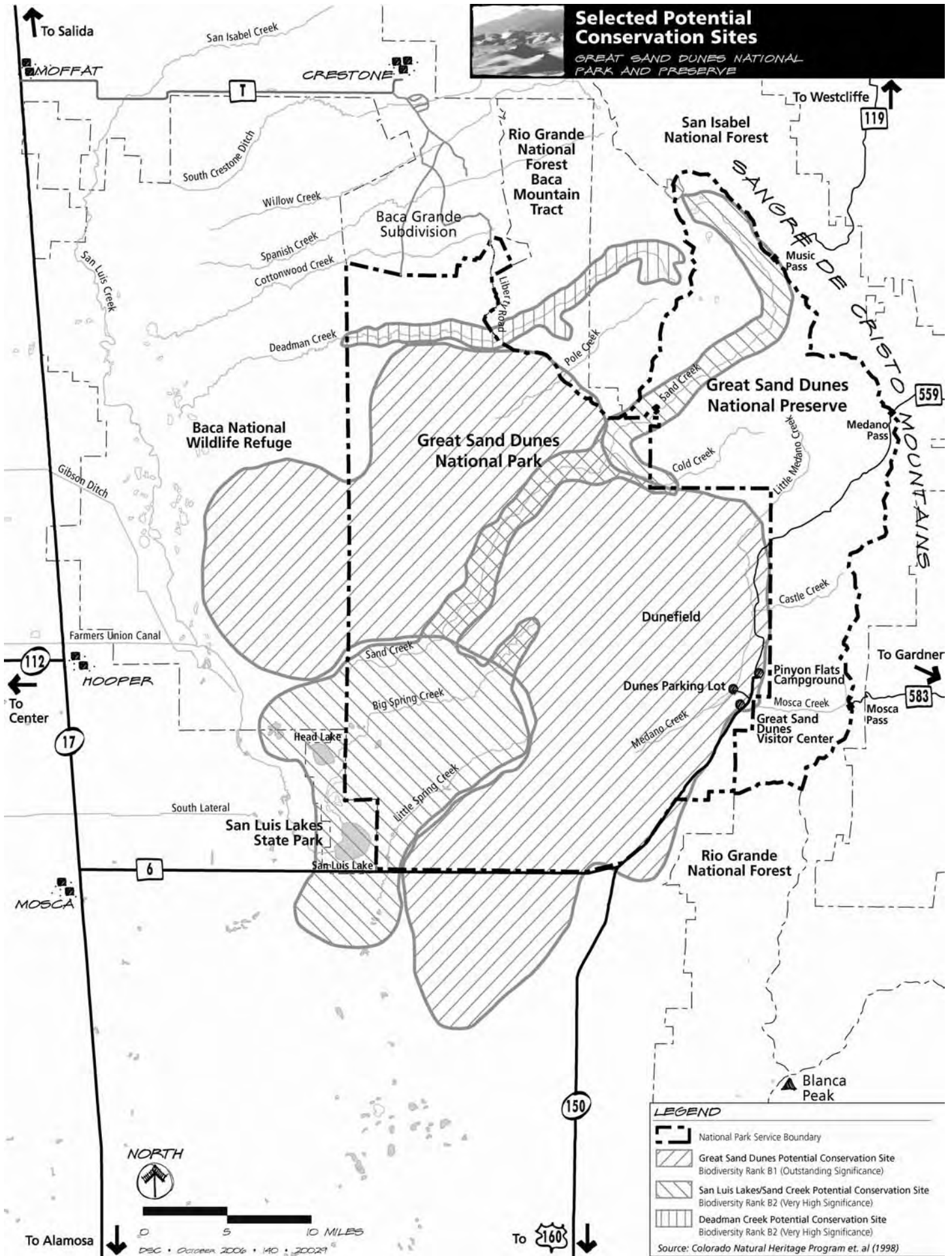
Deadman Creek Potential Conservation Site

The Deadman Creek potential conservation site, estimated at 3,500 acres, encompasses nearly the entire Deadman Creek watershed from the Sangre de Cristo Range (12,300 feet) to the floor of the San Luis Valley (7,600 feet). It has been assigned a biodiversity rank of B2—very high significance (CNHP 1998). Rare plant associations include *Populus tremuloides* / *Acer glabrum* (Quaking aspen / Rocky Mountain maple), *Populus angustifolia* – *Juniperus scopulorum* / *Sporobolus cryptandrus* (Narrowleaf cottonwood – Rocky Mountain juniper / Sand dropseed) Woodland, and *Populus angustifolia* / *Salix* (*monticola*, *drummondiana*, *lucida*) (Narrowleaf cottonwood / (Mountain willow, Drummond's willow, Whiplash willow)) Woodland (CNHP 1998, Nature-Serve 2005). Rare plant species include the canyon bog orchid (*Platanthera sparsiflora* var. *ensiflora*) and Smith whitlow-grass (*Draba smithii*) (CNHP 1998). The former occupies emergent wetlands and the latter occupies steep mountain slopes with mountain mahogany and mountain muhly (*Muhlenbergia montana*). Rare wildlife observations in the Deadman Creek corridor include a nursery for Townsend's big-eared bat (*Corynorhinus townsendii pallescens*) in an abandoned mine adit and Rio Grande cutthroat trout (*Oncorhynchus clarki virginalis*) (CNHP 1998).



Selected Potential Conservation Sites

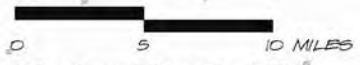
GREAT SAND DUNES NATIONAL PARK AND PRESERVE



LEGEND

- National Park Service Boundary
- Great Sand Dunes Potential Conservation Site
Biodiversity Rank B1 (Outstanding Significance)
- San Luis Lakes/Sand Creek Potential Conservation Site
Biodiversity Rank B2 (Very High Significance)
- Deadman Creek Potential Conservation Site
Biodiversity Rank B2 (Very High Significance)

Source: Colorado Natural Heritage Program et. al (1998)



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San Luis Lakes / Sand Creek Potential Conservation Site

The San Luis Lakes / Sand Creek potential conservation site, estimated at 35,000 acres, includes the Big Spring area, which has been designated a Colorado Natural Area (named Indian Spring Natural Area) by the Colorado Natural Areas Program (CNAP 2005). It includes San Luis Lakes State Park and the watershed of Sand Creek and Big Spring Creek, which flow into San Luis Lake. The site ranges in elevation from 7,500 to 12,050 feet, extending to the summit of the Sangre de Cristo range within the Sand Creek watershed. It has been assigned a biodiversity rank of B2—very high significance (CNHP 1998).

Emergent wetlands associations on the potential conservation site include *Eleocharis palustris* (creeping spikerush) Herbaceous Vegetation, *Carex simulata* (analogue sedge) Herbaceous Vegetation, *Hippuris vulgaris* (mare's-tail) Herbaceous Vegetation, and *Polygonum amphibium* (water smartweed) Permanently Flooded Herbaceous Vegetation (CNHP 1998), and brookgrass – monkeyflower (*Catabrosa aquatica* – *Mimulus glabratus*); for the latter there is no corresponding plant association within NatureServe Explorer (2005). A riparian forest type occupies sand dune habitats: *Populus angustifolia* (narrowleaf cottonwood) / Sand Dune Forest. Two riparian forest and woodland types are present in the montane floodplain of Sand Creek: *Abies concolor*–*Picea pungens*–*Populus angustifolia* / *Acer glabrum* (white fir–blue spruce–narrowleaf cottonwood / Rocky Mountain maple) Forest and *Populus angustifolia* / *Salix drummondiana*–*Acer glabrum* (narrowleaf cottonwood / Drummond's willow–Rocky Mountain maple) Woodland. Rare plant species observed within this potential conservation site include *Cleome*

multicaulis (slender spiderflower) and *Platanthera sparsiflora* var. *ensiflora* (canyon bog orchid); both occupy emergent wetlands.

A rare insect species, the San Luis sandhill skipper (*Polites sabuleti ministigma*), and two rare small mammal subspecies (the plains pocket mouse (*Perognathus flavescens relictus*), and the silky pocket mouse) have been recorded on sand sheet habitats (CNHP 1998). Pineda (2002) reported 1,034 arthropod species, mostly insects, from the Indian Spring locale. Six of these species were considered endemic. Migrant bird species, mostly aquatic birds and shorebirds, are supported by this potential conservation site. Rare bird species include the short-eared owl (*Asio flammeus*) of montane habitats, western snowy plover (*Charadrius alexandrinus nivosus*), long-billed curlew (*Numenius americanus*), black-crowned night-heron (*Nycticorax nycticorax*), white-faced ibis (*Plegadis chihhi*), eared grebe (*Podiceps nigricollis*), and Forster's tern (*Sterna forsteri*) (CNHP 1998).

FEDERAL THREATENED AND ENDANGERED SPECIES

The Endangered Species Act of 1973, as amended, requires that federal agencies consult with the USFWS before taking any action that could jeopardize the continued existence of any federally listed threatened or endangered plant or animal species, or critical habitat. Agencies must consider potential effects the proposed action could have on listed species and critical habitats. NPS policy also requires the examination of impacts on federal candidate species.

Consultation was initiated on January 5, 2005, with a letter to the USFWS. In a facsimile dated February 15, 2005, the USFWS provided an inventory list of

threatened or endangered species and candidate species that are potentially present in Alamosa and Saguache counties (appendix I). There was no designated critical habitat listed in the inventory. Table 4 identifies the federally listed threatened or endangered species and candidate species potentially found in Alamosa and Saguache counties and the park. The table indicates for each species whether it was retained for or dismissed from detailed analysis in this GMP / EIS (and why).

The listed fish species identified by the USFWS as occurring in these two counties (bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker) are actually located in the Colorado River system. Based on the complete geographic separation of these species from the Rio Grande River basin and Great Sand Dunes, these species are dismissed as impact topics. On September 29, 2005, the USFWS announced its finding that the southern Rocky Mountain population of the boreal toad (*Bufo boreas*) population did not meet the criteria for listing as a distinct population and is no longer a candidate for federal listing. Therefore, the boreal toad is dismissed as an impact topic. Similarly, on April 12, 2006, the USFWS announced its finding that the Gunnison sage-grouse (*Centrocercus minimus*) did not warrant designation as threatened or endangered under the Endangered Species Act, and is no longer a candidate for federal listing. Therefore, Gunnison sage-grouse is dismissed as an impact topic. Similarly, on April 12, 2006, the USFWS announced its finding that the Gunnison sage-grouse (*Centrocercus minimus*) did not warrant designation as threatened or endangered under the Endangered Species Act, and is no longer a candidate for federal listing. Therefore, Gunnison sage-grouse is dismissed as an impact topic.

Wildlife species listed as threatened, endangered, or of special concern by CDOW are also presented in table 4, and discussed below after the federally listed species. The state of Colorado does not list or protect plant species. However, the CNHP has identified several plants that occur within the park that are deserving of special attention and protection (CNHP 1998). These plants are also included in table 4 and are discussed in an ecosystem context in the “Ecologically Critical Areas” sections of this document (chapters three and four).

Yellow-billed Cuckoo

The yellow-billed cuckoo (*Coccyzus americanus*) is currently a candidate for listing under the Endangered Species Act. This species is a rare spring and fall migrant and summer resident on the eastern plains of Colorado. It is an uncommon local summer resident in western valleys, primarily from Mesa County southwest (NDIS 2005c). The western subspecies (*Coccyzus americanus occidentalis*) nests in tall cottonwood and willow riparian woodlands, and appears to require patches of at least 25 acres of dense riparian forest with a canopy cover of at least 50% in both the understory and overstory (Biosystems Analysis 1989). The USFWS considers any such riparian habitat patches larger than 10 acres as potentially suitable habitat for this species (USFWS 2006). In Colorado, this species prefers old-growth riparian woodlands with dense understories (Colorado Breeding Bird Atlas, Kingery 1998). These woodlands are typically large; the bottomland riparian woodland along the Conejos River in the southern portion of the San Luis Valley, which does support yellow-billed cuckoos, is more than a mile in width (Giroir 2005a). Rawinski (2004) indicated that a yellow-billed cuckoo was reported at Great Sand Dunes in 1984;

however, no subsequent records in the park are known. CDOW has no confirmed records of this species from Saguache or Alamosa counties. A recent avian inventory for the park and preserve (Giroir 2005b) did not detect the presence of yellow-billed cuckoos at Great Sand Dunes. However, it is possible that the narrow old-growth cottonwood stringers, with their dense understory, along various creeks in the park could not provide large enough stands for suitable habitat. Therefore, the yellow-billed cuckoo is retained as an impact topic and will be discussed under “Federal Threatened and Endangered Species” in chapter four.

Southwestern Willow Flycatcher

The southwestern willow flycatcher (*Empidonax traillii extimus*) is listed as endangered by both the USFWS and the state of Colorado. This species occupies thickets, scrubby and brushy areas, open second growth, swamps, and open woodland (AOU 1983). In Arizona, it is restricted to riparian habitat (Brown 1988). These birds nest primarily in swampy thickets, especially of willow, but sometimes of buttonbush (Phillips, Marshall, and Monson 1964; AOU 1983), tamarisk (Brown 1988), vines, or other plants where vegetation is 12 to 21 feet or more in height. The USFWS generally considers a patch size of 0.25 acre or greater that contains dense riparian vegetation that is more than 5 feet in height to be suitable habitat. Small stringers of riparian vegetation can be suitable if connected to a larger block or if a number of small stringers are in close proximity to each other (USFWS 2006). This species has been reported at Alamosa National Wildlife Refuge, which is approximately 25 miles south of the park (Hawks Aloft 2002, Rawinski 2004). No records are known for the park. However, the same strands of riparian vegetation that

may support yellow-billed cuckoos could also potentially provide suitable habitat for southwestern willow flycatchers. Based on this information, the southwestern willow flycatcher is retained as an impact topic and will be discussed under “Federal Threatened and Endangered Species” in chapter four.

Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) was first listed under the Endangered Species Act on March 11, 1967. It is federally listed as threatened within the contiguous United States, and as threatened by the state of Colorado. The primary habitat for this species includes lakes, reservoirs, and rivers—large, open bodies of water. In winter, bald eagles may occur locally in semi-deserts and grasslands, especially in the vicinity of prairie dog towns (NDIS 2005d). Bald eagles wintering in the San Luis Valley range in number between 100 and 200 individuals across the years for which data are available (Rawinski 2004). Most individuals migrate north from the area by late spring of each year (Rawinski 2004). A number of bald eagles were observed at San Luis Lakes State Park in late March 2005, and Giroir (2005b) reported the presence of bald eagles over the park during an avian inventory. While there are no known nesting sites for this species within the park, a winter roost site has been identified along Sand Creek in the southwestern portion of the park. Given the number of bald eagles that use adjacent San Luis Lakes State Park (the presence of a known winter roost site in the southwestern portion of the park, and the presence of potential roosting habitat in the same portion of the park), the bald eagle is retained as an impact topic and will be discussed under “Federal Threatened and Endangered Species” in chapter four.

Mexican Spotted Owl

The Mexican spotted owl (*Strix occidentalis lucida*), first listed under the Endangered Species Act on March 13, 1993, is listed as threatened at both the federal and state (Colorado) levels. This species is most common in unlogged, closed canopy forests situated in steep canyons. Uneven-aged stands with high basal area and many snags and downed logs are most favorable (NatureServe 2005). In Utah and Colorado, most nests are in caves or on cliff edges in steep-walled canyons (USFWS 1995, Seamans and Gutierrez 1995). CDOW maps (NDIS 2005h) indicate no records for this species from either Saguache or Alamosa counties, although potential habitat reportedly occurs in the western-most portion of Saguache County. Although a single unconfirmed report of a Mexican spotted owl in the Conejos District of the Rio Grande National Forest in 1989 or 1990 was discussed by Rawinski (2004); avifaunal surveys for nocturnal species at Great Sand Dunes did not detect the presence of this species in the park (Giroir 2005b). Nonetheless, potential habitat for this species does occur along the western slope of the Sangre de Cristos in the national preserve. Additionally, substantial numbers of this species are established outside the park in the Wet Mountains to the east of the Sangre de Cristos. Based on the presence of potential habitat for this species in the park, and the proximity of known populations from which individuals might disperse into this habitat, the Mexican spotted owl is retained as an impact topic and will be discussed under “Federal Threatened and Endangered Species” in chapter four.

Canada Lynx

The Canada lynx (*Lynx canadensis*), listed as threatened under the Endangered

Species Act on March 24, 2000, and as endangered by the state of Colorado, is a species of the northern coniferous forest. The preferred habitat of the Canada lynx is uneven-aged stands with relatively closed canopies and well-developed understories. Elevational ranges have been reported as 9,000 to 14,500 feet (Quinn and Parker 1987, NDIS 2005e), and 8,000 to 12,000 feet (USFWS 2006). While the snowshoe hare comprises 80% of the lynx diet (Brand et al. 1976), this carnivore will also take squirrels, beavers, muskrats, and large ungulates such as deer (NDIS 2005e). Before recent reintroductions of Canada lynx to Colorado, the lynx appeared to be restricted to extremely isolated areas of the mountains of the central portion of the state (NDIS 2005e). Beginning in 1999, 166 lynx were released in southwestern Colorado, the vast majority in the Rio Grande National Forest. Released animals were tracked by satellite or VHF transmitters. Cumulative data from 1999 through January 2005 indicate three position records occurred—two in the southwestern portion of the national park, and one on the extreme northern part of the preserve. The two records in the southwestern portion of the park likely represent one or two individuals dispersing from the release sites on the western side of the San Luis Valley to suitable habitat at higher elevations on the eastern side. Canada lynx habitat in the preserve will be managed as the Great Sand Dunes Lynx Analysis Unit (LAU) and will follow the guidelines provided in the LCAS (Reudiger et al. 2000). The National Park Service is responsible for tracking any changes that would alter Canada lynx habitat and for annually updating the LAU map and acreages. In light of these records, continued reintroduction efforts, and the presence of potential lynx habitat in the upper reaches of the national preserve (not in the national park), the Canada lynx is retained as an impact topic and will be

discussed under “Federal Threatened and Endangered Species” in chapter four.

Summary and Determination— Federal Threatened and Endangered Species

The federally listed threatened and endangered species and federal candidate species that have the potential to occur within the park have been analyzed relative to the anticipated impacts of the four GMP alternatives. The analysis indicates that the alternatives are anticipated to have no to negligible adverse impacts on the following species:

- Uncompahgre fritillary
- humpback chub
- bonytail chub
- Colorado pikeminnow
- razorback sucker
- Gunnison sage grouse
- black-footed ferret

Based on this analysis, the species listed above have been dismissed as impact topics.

The following species are federally listed or candidate species to which impacts may be anticipated:

- southwestern willow flycatcher
- yellow-billed cuckoo
- bald eagle
- Mexican spotted owl
- Canada lynx

COLORADO STATE-LISTED WILDLIFE SPECIES

Rio Grande Sucker

The Rio Grande sucker (*Catostomus plebeius*) listed as endangered in Colorado,

is found in the Upper Rio Grande basins of New Mexico and Colorado, along with some disjunct areas in Mexico (CSU 2004). It resides in riffles, runs, and pools in small- to medium-sized clear streams and eats plant and animal material scraped from rocks. Most of the populations in Colorado have been eliminated through habitat degradation and hybridization or competition with the white sucker (*Catostomus commersonii*). During 1996, a multiagency team introduced the Rio Grande sucker into Medano Creek (CDNR 1996). Medano Creek had appropriate barriers (disappears into the sand dunes) and could serve as a refuge for 200 Rio Grande suckers obtained for transplant from the Rio Tusos in New Mexico. Medano Creek parallels Medano Pass Road and is in the portion of the park already designated as wilderness. Because the action alternatives differ in the management zoning of the Medano Creek corridor, and this may result in differential impacts on the Rio Grande sucker, this species is considered as an impact topic under “Colorado State-Listed Species and Wildlife” in chapter four.

Rio Grande Chub

The Rio Grande chub (*Gila pandora*) is a state species of special concern. This species is found in pools of small to moderate streams near areas of current. It is found in association with undercut banks, overhanging bank vegetation, and aquatic plants. This native fish is generally restricted to the Rio Grande basin in Colorado, but has also been collected in small impoundments in the San Luis Valley (NDIS 2005g). This species historically occurred in the park and is a candidate for reintroduction. All three action alternatives would seek to return hydrologic regimes

TABLE 4. SPECIAL-STATUS PLANT AND ANIMAL SPECIES

MAJOR GROUP	SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS ¹	COLORADO STATUS ²	HABITAT COMMENTS AND OTHER NOTES	REASONS FOR DISMISSING FROM DETAILED ANALYSIS, IF DISMISSED
Insects						
d	<i>Boloria improba acrocneuma</i>	Uncompahgre fritillary	E	—	Occurs around moist alpine slopes above 12,000 feet with extensive snow willow (<i>Salix nivalis</i>).	Not found in the park; snow willow habitat in the park differs markedly from that known to support this species; no differences among the GMP alternatives that would differentially affect this species.
Fish						
✓	<i>Catostomus plebeius</i>	Rio Grande sucker	—	E	Present in the park (introduced to Medano Creek). Occurs in areas near rapidly flowing water. Backwaters or banks adjacent to fast waters provide holding areas during the day.	—
d	<i>Gila cypha</i>	Humpback chub	E	T	A “big river” fish. Found in Colorado in the Yampa, Gunnison, Green, and Colorado rivers.	Historical and current occurrence limited to the Colorado River system; does not occur in the park or the Rio Grande River system. The park is not a suitable area for potential reintroduction.
d	<i>Gila elegans</i>	Bonytail chub	E	E	Found historically throughout the Colorado River drainage—in recent years bonytail have only been taken from the Green River in Utah and lakes Havasu and Mohave.	Historical and current occurrence limited to the Colorado River system; does not occur in the park or the Rio Grande River system. The park is not a suitable area for potential reintroduction.

TABLE 4. SPECIAL-STATUS PLANT AND ANIMAL SPECIES

MAJOR GROUP	SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS ¹	COLORADO STATUS ²	HABITAT COMMENTS AND OTHER NOTES	REASONS FOR DISMISSING FROM DETAILED ANALYSIS, IF DISMISSED
✓	<i>Gila pandora</i>	Rio Grande chub	—	SC	Extirpated from the park, but under consideration for reintroduction. Found in pools of small to moderate streams near areas of current, in association with undercut banks, overhanging bank vegetation, and aquatic plants. Has been collected in small impoundments in the San Luis Valley.	—
✓	<i>Oncorhynchus clarki virginalis</i>	Rio Grande cutthroat trout	—	SC	Present in the park (introduced to Medano Creek). Found in small headwater streams; spawns in clean gravel; nursery habitat along stream margins in slower water; winter habitat includes deep pools (may be limiting in headwaters).	—
d	<i>Ptychocheilus lucius</i>	Colorado pikeminnow	E	T	Occurs in medium to large rivers.	Historical and current occurrence limited to the Colorado River system; does not occur in the park or the Rio Grande River system. The park is not a suitable area for potential reintroduction.
d	<i>Xyrauchen texanus</i>	Razorback sucker	E	E	Large river species not found in smaller tributaries and headwater streams.	Historical and current occurrence limited to the Colorado River system; does not occur in the park or the Rio Grande River system. The park is not a suitable area for potential reintroduction.

TABLE 4. SPECIAL-STATUS PLANT AND ANIMAL SPECIES

MAJOR GROUP	SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS ¹	COLORADO STATUS ²	HABITAT COMMENTS AND OTHER NOTES	REASONS FOR DISMISSING FROM DETAILED ANALYSIS, IF DISMISSED
Amphibians						
d	<i>Bufo boreas pop.</i>	Boreal toad	—	E	Southern Rocky Mountain population. Elevational range of 7,000–12,000 ft. Found in wetlands and riparian areas in montane forest, subalpine, and alpine life zones.	Historic and current observations of this species are well north and west of the park; the park may provide suitable habitat for reintroduction if historic occurrence within the park is established; GMP alternatives would not differentially or adversely affect such efforts.
d	<i>Rana pipiens</i>	Northern leopard frog	—	SC	Elevational range of 3,500–11,000 ft. Found in wet meadows and banks and shallows of just about any type of water body.	A single individual has been found in the park in recent decades; potential for reintroduction to the park would not be affected by the GMP alternatives.
Birds						
d	<i>Buteo regalis</i>	Ferruginous hawk	—	SC	Occurs in grassland and shrubland habitats; rare in pinyon-juniper woodlands. Rare occurrence in San Luis Valley.	Occurs only rarely and very locally in the San Luis Valley and has not been observed in the park; would not be differentially affected by the GMP alternatives.
d	<i>Centrocercus minimus</i>	Gunnison sage grouse	C	SC	Sagebrush shrublands and proximal grasslands; riparian areas within these habitat types.	Historic range did not include the park; not currently found in or near the park; the park would not be a suitable area for potential reintroduction.

TABLE 4. SPECIAL-STATUS PLANT AND ANIMAL SPECIES

MAJOR GROUP	SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS ¹	COLORADO STATUS ²	HABITAT COMMENTS AND OTHER NOTES	REASONS FOR DISMISSING FROM DETAILED ANALYSIS, IF DISMISSED
d	<i>Charadrius alexandrinus nivosus</i>	Western snowy plover	—	SC	Found in open beaches, salt flats, or dry mud flats where vegetation is sparse or absent.	Not found in or near the park; a future separate study will analyze potential impacts to this species from alterations in hydrologic regime; no other impacts from GMP alternatives are anticipated.
d	<i>Charadrius montanus</i>	Mountain plover	—	SC	Occurs primarily in grazed grasslands or fallow fields.	Not found in or near the park; no impacts anticipated from implementation of GMP alternatives.
✓	<i>Coccyzus americanus</i>	Yellow-billed cuckoo	C	—	Found in lowland riparian forests and urban areas with tall trees.	—
✓	<i>Empidonax traillii extimus</i>	Southwestern willow flycatcher	LE	E	Nests primarily in swampy thickets, especially of willow, sometimes buttonbush, tamarisk, vines, or other plants where vegetation is 4–7 meters or more in height.	—
✓	<i>Grus canadensis tabida</i>	Greater sandhill crane	—	SC	Present in the park. Migrants occur on mudflats around reservoirs, in moist meadows, and in agricultural areas. Breeding birds are found in parks with grassy hummocks and water courses, beaver ponds, and natural ponds lined with willows or aspens.	—
✓	<i>Haliaeetus leucocephalus</i>	Bald eagle	T	T	Habitat includes reservoirs and rivers. In winter, they may also occur locally in semideserts and grasslands, especially near prairie dog towns.	—

TABLE 4. SPECIAL-STATUS PLANT AND ANIMAL SPECIES

MAJOR GROUP	SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS ¹	COLORADO STATUS ²	HABITAT COMMENTS AND OTHER NOTES	REASONS FOR DISMISSING FROM DETAILED ANALYSIS, IF DISMISSED
d	<i>Numenius americanus</i>	Long-billed curlew	—	SC	Short-grass grasslands and sometimes in wheat fields or fallow fields. Most nests are close to standing water, so that many otherwise suitable areas may be unoccupied.	One single transient individual recorded for the park and vicinity; future and separate study will analyze potential impacts to this species due to alteration in hydrologic regime; no other impacts from the GMP alternatives anticipated.
✓	<i>Strix occidentalis lucida</i>	Mexican spotted owl	T	T	Occurs in unlogged, closed canopy forests in steep canyons. Nests in caves and on cliff ledges in steep-walled canyons.	—
Mammals						
✓	<i>Lynx canadensis</i>	Canada lynx	T	E	Present in the park. Northern coniferous forests are preferred habitat, especially uneven-aged stands with relatively closed canopies and well-developed understories.	—
d	<i>Mustela nigripes</i>	Black-footed ferret	E, XN	E	Historically occupied areas ranging from the shortgrass and midgrass prairie to semidesert shrublands.	Neither this species nor its prey (prairie dogs) currently exist in the park, nor are there known historical records for either.
✓	<i>Corynorhinus townsendii pallescens</i>	Townsend's big-eared bat subsp.	—	SC	Present in the park (documented along Deadman Creek). Found in caves and riparian areas.	—
d	<i>Thomomys talpoides agrestis</i>	Northern pocket gopher subsp.	—	SC	Found in many different habitat types including agricultural and pasture lands, semidesert shrublands, and grasslands at lower elevations upwards into alpine tundra. Very resilient to transient human disturbance (e.g., hikers and horseback riders).	<i>Thomomys talpoides</i> documented in park, but subspecific status unknown; regardless of subspecific status, these populations would not be affected by the GMP alternatives.

TABLE 4. SPECIAL-STATUS PLANT AND ANIMAL SPECIES

MAJOR GROUP	SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS ¹	COLORADO STATUS ²	HABITAT COMMENTS AND OTHER NOTES	REASONS FOR DISMISSING FROM DETAILED ANALYSIS, IF DISMISSED
<i>Plants</i>						
✓	<i>Cleome multicaulis</i>	Slender spiderflower	G2,G3	S2,S3	Present in the park. Occurs around ponds, meadows, or old lake beds. Elevation 7500–8000 ft.	—
✓	<i>Cryptantha cinerea var. pustulosa</i>	James' catseye	G5	SNR	Present in the park. Found on the sand sheet and rocky slopes.	—
✓	<i>Draba smithii</i>	Smith's draba	G2	S2	Present in the park. Occurs on talus slopes, in crevices, and between rocks in shaded protected sites. Elevation 8000–11,000 ft.	—
✓	<i>Platanthera sparsiflora var. ensifolia</i>	Canyon bog orchid	G4	S3	Present in the park. Found in riparian habitats and wetlands (elevation unknown).	—

✓ = impacts to this species discussed in this EIS
 d = impacts to this species dismissed from detailed analysis in this EIS

¹ C=Candidate, LE = Listed as Endangered; T=Listed as Threatened, XN=Experimental, Nonessential
² E=Endangered, T=Threatened, SC=Species of Concern
³ G2=Globally imperiled, G3=Globally vulnerable to extirpation or extinction, G4=Apparently Secure, G5=Secure
⁴ S2=State imperiled, S3=State vulnerable to extirpation or extinction, SNR=State not ranked

Table modified from CNHP Web site ftp://ftp.cnhp.colostate.edu/WEBDL/cnhp_tracking_list_080904.zip, and augmented with data from CNHP (1999) and Spackman et al. (2004)

within the park to more natural conditions, resulting in the potential for more water reaching downstream users. Based on this information, the Rio Grande chub is retained for analysis in chapter four.

Rio Grande Cutthroat Trout

The Rio Grande cutthroat trout (*Oncorhynchus clarkii virginalis*), listed as a species of concern in Colorado, resides in rapidly flowing water with eddies in small headwater streams of the Rio Grande River drainage (CNHP 1999). It was estimated by Alves (1996) that this species occupied less than 1% of its original habitat in Colorado. Medano Creek has been reclaimed by CDOW to support the Rio Grande cutthroat trout. The creek was selected because it has no outlet and could serve as a refuge for this rare trout species. Little Medano Creek also provides good habitat for the Rio Grande cutthroat trout, and although it does not connect to Medano Creek year-round, there is a viable population present in the drainage. Because the action alternatives differ in the management zoning of the Medano and Little Medano Creek corridors, and this may result in differential impacts on the Rio Grande cutthroat trout, this species is retained for analysis under “Colorado State-Listed Species and Wildlife” in chapter four.

Greater Sandhill Crane

The greater sandhill crane (*Grus canadensis tabida*), a state species of special concern, is an abundant fall and spring migrant in the San Luis Valley (NDIS 2005k). Migrants occur on mudflats around reservoirs, in moist meadows, and in agricultural areas. Breeding birds are found in open areas with grassy hummocks and watercourses, beaver ponds, and natural

ponds lined with willows or aspens (Ellis and Haskins 1985, Renner et al. 1990). No records of breeding sandhill cranes are known for the San Luis Valley (Rawinski 2004), although this species still nests in some parts of northern Colorado (Nature-Serve 2005). No records of sandhill cranes utilizing the national park were provided by CNHP (1999), Rawinski (2004), or Giroir (2005). Suitable habitat in the San Luis Valley, including San Luis Lakes State Park, the various national wildlife refuges, and possibly the southwestern and currently irrigated portion of the national park, all contribute important stop-over habitat for these birds during their spring and fall migrations. The three action alternatives propose to return the hydrologic regime of the national park to a more natural state, which may have some impact on potential stop-over habitat for sandhill cranes. Therefore, this species is carried forward as an impact topic under “Colorado State-Listed Species and Wildlife” in chapter four.

Townsend’s Big-Eared Bat

Townsend’s big-eared bat (*Corynorhinus townsendii*), a state species of special concern, occupies a variety of habitats across its range, including desert scrub, pinyon-juniper woodlands, and deciduous and coniferous forests (Schmidt 2003). This species commonly utilizes riparian corridors within these habitats (Jones 1965, Seidman and Zabel 2001, Fellers and Pierson 2002, others). In Colorado, these bats are primarily associated with abandoned mines, saxicoline brush, sagebrush, semidesert scrub, pinyon-juniper woodlands, ponderosa pine woodlands (Adams 1990, Armstrong et al. 1994), and montane forests (Adams 2003). This species is vulnerable to human disturbance at the roost, particularly at maternity roosts during the period immediately prior to

parturition (giving birth). Maternity roosts often are at lower elevations to take advantage of warmer temperatures, which increase neonatal development. This species has been documented in the Deadman Creek corridor within the park (NPS 2004), and is carried forward as an impact topic under “Colorado State-Listed Species and Wildlife” in chapter four.

Summary: Colorado State-Listed Species

Species listed by the state of Colorado as threatened, endangered, or as species of special concern that have the potential to occur within the park, have been analyzed relative to the anticipated impacts and differences of those impacts among the four alternatives. The analysis indicates that the alternatives may have the potential to affect riparian species (the Rio Grande sucker, Rio Grande chub, Rio Grande cutthroat trout, and Townsend’s big-eared bat) and wetlands species (the greater sandhill crane). These taxa are evaluated, along with other members of their communities (species associated with riparian corridors and wetlands-associated species) identified below under “Wildlife,” as impact topics in chapter four. Due to the lack of anticipated impacts on the ferruginous hawk, western snowy plover, mountain plover, long-billed curlew, and northern pocket gopher, these species are dismissed from further analysis in chapter four.

WILDLIFE

The elevational range encompassed by the Great Sand Dunes National Park and Preserve incorporates a diversity of plant communities, which in turn provide habitat for a remarkable array of wildlife species. Recent faunal inventories of the park

indicate the presence of at least 29 species of mammals (Valdez 2003), 110 species of birds (Giroir 2005), 6 species of reptiles, and 4 amphibian species (Muths and Street 2002). As such, the following description of wildlife species in the park is not all-inclusive, but provides a context for consideration of those wildlife species that may be differentially affected by the various action alternatives. Wildlife characterization of the park is presented by life zones, although many taxa, particularly larger species, move among the life zones.

Wildlife of the Sabkha Life Zone

This low-lying, salt-encrusted plain is sparsely vegetated by saltbush and saltgrass. The playa lakes and wetlands within the sabkha provide important habitat for a variety of migratory bird species such as sandhill crane (*Grus canadensis*) and American white pelican (*Pelecanus erythrorhynchos*). A diverse complex of shorebirds, including American avocet (*Recurvirostra americana*), spotted sandpiper (*Actitis macularia*), and lesser yellowlegs (*Tringa flavipes*), occupy shorelines around playa lakes and other water bodies within the sabkha.

Wildlife of the Sand Sheet Grasslands and Shrublands Life Zone

The vast sand sheet surrounding the dunes is stabilized by a mixture of grassland and shrubland habitats. While both of these habitats are used by wide-ranging species such as mule deer and elk, the diverse assemblage of wildlife species that typify these habitats includes pronghorn (*Antilocapra americana*), white-tailed jackrabbit (*Lepus townsendii*), silky pocket mouse (*Perognathus flavus*), and plains pocket mouse (*P. flavescens*). The sage sparrow (*Amphispiza belli*) nest in

sagebrush shrublands, but uses adjacent grasslands and other types of shrublands during migration. The red-tailed hawk (*Buteo jamaicensis*) and American kestrel (*Falco sparverius*) frequent this life zone.

Wildlife of the Dunefield Life Zone

While a number of wildlife species such as coyotes, mountain lions, and elk will traverse parts of the dunefield, the only mammal to actually establish home ranges within the dunefield is Ord's kangaroo rat (*Dipodomys ordii*). A number of endemic invertebrate species are found only at the Great Sand Dunes; at least seven insect species including five beetles, a robber fly, and a moth appear to be limited to the sand dune habitat (CNHP 1999, Pineda 2002, NPS 2004). The insects that are endemic to the Great Sand Dunes include two species of ant-like flower beetles (*Amblyderus wernerii* and *A. triplehorni*), Great Sand Dunes tiger beetle (*Cicindela theatina*), histerid beetle (*Hypocaccus* species undescribed), circus beetle (*Eleodes hirtipennis*), a robber fly (*Proctacanthus* species new), and an as yet undescribed noctuid moth (*Copablepharon* sp.). Additional rare species of insects observed within the dunefield life zone include the giant sand treater camel cricket (*Daihini-baenetes giganteus*) that was once thought to be endemic, but is now known from other localities, the San Luis Valley sand hills skipper (*Polites sabuleti ministigma*), and the golden-edged gem (*Schinia avemensis*).

Wildlife of the Pinyon-Juniper Woodlands and Montane Forest Life Zone

These two life zones intercalate (join or combine) within an elevational band ranging from about 8,000 to 9,500 feet,

occurring in different positions on the landscape. Montane forest species such as Douglas-fir, aspen, and narrowleaf cottonwood, prefer wet drainages. Pinyon pines and junipers occur on sunny hillsides that are drier. This diversity of habitat types provides for great species diversity within this life zone. Bobcats (*Lynx rufus*) commonly hunt these forests and woodlands for rabbits (*Sylvilagus nuttallii*), voles (*Microtus longicaudus* and *M. pennsylvanicus*), mice (*Peromyscus maniculatus* and *Neotoma cinerea*), and squirrels, including Abert's squirrel (*Sciurus aberti*) and red squirrels (*Tamiasciurus hudsonicus*). Species of birds that use these habitats include western tanager (*Piranga ludoviciana*), chipping sparrow (*Spizella passerina*), and green-tailed towhee (*Pipilo chlorurus*), as well as northern goshawk (*Accipiter gentiles*). Canyons, caves, and riparian areas in this life zone are often used by Townsend's big-eared bats (*Corynorhinus townsendii*), and a number of bat species such as long-eared and long-legged myotis (*Myotis evotis* and *M. volans*, respectively) forage among the trees in woodlands and along forest edges.

Wildlife of the Subalpine Forest Life Zone

Subalpine forests, extending from about 9,500 feet up to tree line (~11,000 feet) are characterized by hardy, stout trees such as Englemann and blue spruce, which can withstand the heavy winter snowfalls experienced in this life zone. The heavy winter snows contribute to year-round cold, damp conditions in the subalpine forest. This life zone is typically utilized by bighorn sheep (particularly on steep terrain), elk, mule deer, and black bear, beaver, and mountain lion. Warbling vireo (*Vireo gilvus*), Steller's jay (*Cyanocitta stelleri*), and gray jays (*Perisoreus*

canadensis) may be observed in the subalpine life zone.

Wildlife of the Alpine Tundra Life Zone

This life zone occurs above about 11,000 feet and is characterized by a short growing season resulting in low-growing plant life. Animals that use this zone include American pika (*Ochotona princeps*), yellow-bellied marmot (*Marmota flaviventris*), and bighorn sheep. Elk and mule deer may be seen along the forested periphery of this zone. During summer months, the golden eagle (*Aquila chrysaetos*), a variety of hawks, and the white-throated swift (*Aeronautes saxatalis*) may be observed flying over, while the horned lark (*Eremophila alpestris*) and white-tailed ptarmigan (*Lagopus leucurus*) may be observed nesting and foraging on the alpine tundra.

Summary: Wildlife

Wildlife that may be differentially affected by the proposed alternatives and include migratory birds and ungulates (mule deer, elk, and bighorn sheep). Migratory bird species associated with wetlands habitats are collectively considered as wetlands-associated species under “Colorado State-Listed Species and Wildlife” in chapter four because alterations of current hydrologic regimes may impact these species. Management of elk numbers may vary under the different alternatives, having different consequences for mule deer and bighorn sheep numbers and herd health; therefore, these species are considered jointly as an impact topic in chapter four. Finally, the action alternatives differ with regard to the presence of leashed dogs within the preserve. As these differences may have varying impacts on bighorn

sheep, bighorn sheep will be considered as an impact topic in chapter four.

SOILS AND GEOLOGIC RESOURCES

Soils

The lower elevations of the park include the sabkha, sand sheet, and dunefield life zones (see “Vegetation” section for a detailed description). These three zones lie on relatively gentle to moderately sloping topography and the overlying soils are predominantly Cotopaxi sand (2%–15% slopes), Space City loamy sand, saline (0%–3% slopes), and Dune land.

Soils were mapped by the Natural Resources Conservation Service (NRCS) for Alamosa County in 1973, and Saguache County in 1984, and were mapped in the lower elevations of the counties where there is a greater potential for agricultural use or development. The mapping performed by NRCS for these areas combined the above three soil types into two general map units that are described as follows: (1) the Dune land (NRCS 1984) or Cotopaxi-Dune land association (NRCS 1973), which encompasses approximately 40% of park soils, is comprised of deep, gently rolling to hilly, excessively drained sandy (coarse) soils; and (2) the Space City-Cotopaxi (NRCS 1984) or Hooper-Corlett (NRCS 1973) association, which occupies nearly level topography, makes up the remaining 60% of park soils, and is characterized by deep, nearly level to hummocky, well-drained to excessively drained, moderately fine- to coarse-textured soils that are strongly affected by alkali. Both of these general soil types are formed from eolian sand and sandy alluvium and are distributed across the park, with the Space City-Cotopaxi (Hooper-Corlett) association covering the western half of the park and

the Dune land (Cotopaxi-Dune land) association covering the eastern half.

In the preserve (foothill, montane, sub-alpine, and alpine) life zones, the soils have not been mapped as extensively as in the lower elevations within the park. However, general mapping shows them to be primarily covered by Comodore very stony loam, Comodore-Rock outcrop complex, and Mount Home-Saguache cobbly sandy loam. These soil types represent shallow to deep, well-drained soil of ridges, mountain slopes, or alluvial fans formed from igneous and metamorphic rocks.

More specific mapping of the area by NRCS identified 24 different soil types across the park and immediate vicinity. The general descriptions of these soil types are provided in table 5. There is some difference in soil taxonomy between the Alamosa and Saguache counties surveys; however, the types are combined, when possible, in table 5 (NRCS 1973, 1984).

Evaluation of the engineering characteristics for the listed soil types found in the vicinity of the park indicate the soils are generally poor for development of structures, including roads. The primary characteristics for this unsuitability include: susceptibility to soil blowing or erosion, caving soils, high permeability, high salinity or alkalinity, shallow soils, large stones, steep slopes, high shrink-swell ratio, shallow groundwater, flooding or wetness, and high potential for pollution of shallow groundwater.

Geologic Resources

Great Sand Dunes Geologic Processes

The Great Sand Dunes are the result of and an element in a fragile, dynamic system that both influences and sustains dune formation (“Great Sand Dunes System” map). The dune mass is a huge deposit of eolian sand nestled against the Sangre de Cristo Mountain range. An extensive vegetated sand sheet consisting mostly of flat bedded sand deposits with scattered groups of parabolic dunes surrounds the dune mass and is stabilized by species of grasses and shrubs. “Blowouts” are concave pockets of sand that are exposed when vegetation is disturbed. They are promoted by wind erosion and are a source of sand to the dune system. The sabkha is an alkaline plain located west of and adjoining the sand sheet. It is cemented together in many places by minerals deposited by seasonal wetlands. In a comparative study of 1936 and 1990 aerial photography, the dune mass and associated sand sheet did not show any obvious shifts; rather they displayed remarkable stability over the 54-year time period (McArthur and Sanderson 1990). The national preserve protects the watershed of creeks that play a role in dunes sand recycling.

The origin of the dunes was controlled by a combination of geographic, geologic, and climatic factors (Taylor 1999). Most sand grains (quartz and rhyolite) that make up the dunes result from weathering of Tertiary volcanic rocks of the San Juan Mountains. A smaller amount of quartz sand originates from weathering of Precambrian granites, granodiorites, and gneisses from the Sangre de Cristo Mountains. As sand grains are transported to the Valley by streams, strong winds from

TABLE 5. SPECIFIC SOIL TYPES PRESENT ON OR IN THE VICINITY OF THE GREAT SAND DUNES

Map Unit – Name	Description
12 – Comodore very stony loam, 25%–65% slopes	Shallow, well-drained soil of ridges and mountainside slopes that formed in colluvium from igneous and metamorphic rocks.
13 – Comodore-Rock outcrop complex, 40%–65% slopes	Shallow, well-drained soil of mountainsides that formed in thin colluvium from igneous and metamorphic rocks. The rock outcrop consists of rhyolite, closely associated volcanic material, and conglomerate materials.
14, CpB – Corlett-Hooper complex, 0%–15% slopes	Moderately well-drained, alkali soils of terraces and fans adjacent to old creek channels and in old lake basins on alluvial valley floors that formed in alkaline eolian sands, alluvium derived from basalt, and have a wind-deposited sandy surface layer.
16, CtE – Cotopaxi sand, 2%–15% slopes	Deep, somewhat excessively drained soil of dune-like hills and ridges on alluvial valley floors that formed in eolian sand.
22, Du - Duneland	Deep, gently rolling to steep, excessively drained sandy soils of dunes.
30, Gn – Gunbarrel loamy sand	Deep, somewhat poorly drained, alkaline and saline soil of terraces and low fans on alluvial valley floors that formed in alluvium.
31, Gs – Gunbarrel loamy sand, saline	Deep, poorly drained soil, severely affected by salts and alkali, of terraces and low fans on alluvial valley floors that formed in alluvium.
35, Ho – Hooper loamy sand	Deep, moderately well-drained soil of floodplains and fans on alluvial valley floors that formed in alluvium derived from basalt and with a wind-deposited surface layer.
36, Hp – Hooper clay loam	Deep, moderately drained soil of floodplains and fans on alluvial valley floors that formed in alluvium derived from basalt.
42, Le – Laney loam, 0%–3% slopes	Deep, well-drained, saline and alkali-affected soil of floodplains and fans on alluvial valley floors that formed in calcareous alluvium.
45, Mc – McGinty sandy loam, 0%–3% slopes	Deep, moderately well-drained soil of fans on alluvial valley floors that formed in calcareous alluvium derived from igneous rock.
46, Mn – Medano fine sandy loam	Deep, poorly drained soil of floodplains on alluvial valley floors that formed in alluvium.
51, MtD – Mount Home-Saguache cobbly sandy loams, 4%–12% slopes	Deep, somewhat excessively drained soils of fans at the foot of the Sangre de Cristo range that formed in alluvium.
53 – Ouray-Sabe dry complex, 9%–25% slopes	Deep, excessively drained soil of alluvium from sand.
67 – Seitz very stony loam, warm, 15%–65% slopes	Deep, well-drained soil of mountainsides and ridges that formed in colluvium derived from igneous rock.
71, SrB – Space City loamy sand, saline, 0%–3% slopes	Deep, well-drained soil along the margins of intermountain valleys and basins on alluvial valley floors with undulating topography that formed in eolian sand.
72, StE, Space City-Hooper complex, 0%–15% slopes	Deep, somewhat excessively drained and moderately well-drained soils of low dunes on alluvial valley floors that formed in eolian sand on low dunes and alluvium derived from basalt and have a wind-deposited surface layer.
78, UrF – Uracca very cobbly loam, 15%–35% slopes	Deep, somewhat excessively drained soil of fans covered by cobble at the foot of the Sangre de Cristo range that formed in alluvium.
Am – Alamosa loam, 0%–1% slopes	Deep, somewhat poorly drained soil on floodplains on alluvial valley floors that formed in alluvium.
CmF – Comodore extremely rocky loam, 40%–50% slopes	Shallow, well-drained soil of mountainsides that formed in colluvium and is covered by angular stones and rounded cobblestones.

TABLE 5. SPECIFIC SOIL TYPES PRESENT ON OR IN THE VICINITY OF THE GREAT SAND DUNES

Map Unit – Name	Description
CoE – Corlett sand, hilly	Deep, somewhat excessively drained, alkali soils of low dunes and ridges on the valley floor that formed in eolian sand.
CsA – Costilla loamy sand, 0%–2% slopes	Deep, somewhat excessively drained soil of alluvial floodplains that formed in alluvium.
Hs – Hooper soils, occasionally flooded, 0%–1% slopes	Deep, somewhat poorly drained soil of old lake beds that formed in alluvium.
ZnB – Zinzer loam, 1%–3% slopes	Deep, well-drained soil of floodplains on the valley floor that formed in calcareous mixed alluvium.

Source: NRCS 1973, 1984

the southwest erode the grains from valley sediments and move them over the sand dunes. As the winds rise over the Sangre de Cristo Mountains they are funneled to the area of Medano Pass. The Great Sand Dunes and the deposition system contributing to them cover an area of approximately 497 square miles (800 square kilometers) (CNHP 1999).

Streams that drain the Sangre de Cristo mountain range return wind-blown sand (and some feldspathic sands and gravels and carbonate fragments derived from the mountain bedrock) back to and west of the active dune system in a form of “recycling.” The sand carried downstream by Medano and Sand creeks, in particular, is re-deposited on the sand dune mass by southwesterly winds. Over time, sand, wind, and water function to shape and re-shape the dunefield in a near closed loop system. At the foot of the dunes, the surging water in Medano Creek seasonally provides an interesting and delightful contrast to the near-barren sand surfaces. During the spring, pressure differentials associated with storms generate strong southwesterly winds that can blow for several days and transport millions of sand grains abrasive enough to scour the landscape prior to deposition on the

sabkha, sand sheet, dunefield, or mountains.

The sand dunes are immense, some exceeding 700 feet above the adjacent landscape. The dune mass covers approximately 30 square miles, with an average sand thickness of 136 feet (41.42 meters). The thickest dunes lie parallel to Medano Creek and are in line with San Luis Lake (Bunch 1997). Most dunes are oriented in a south to north direction in the main dune mass.

Several dune types are present and their formation is controlled by wind velocity, sand supply, and vegetation. These dune types include reversing dunes, star dunes, transverse dunes, barchan dunes, parabolic dunes, and climbing dunes. Some very mobile dunes, known as escape dunes, are located east of Medano Creek, and form when the creek disappears during dry years or seasons (Bunch 1997). Between 1936 and 1990, escape dunes smothered a stand of ponderosa pine trees in an area now known as the Ghost Forest (Bunch 1997). Escape dunes move constantly to the northeast.

The dominant movement of the dune mass is to the northeast; however, winds frequently blow from the northeast, stabilizing

the dunefield to some extent (Taylor 1999). Medano and other creeks flowing westerly from the Sangre de Cristo Mountains erode advancing dunes on the east side of the formation, returning the sand to the southwest side where winds blow it back onto the dunes. This represents a natural sand recycling system that is relatively unique. Migration of the dunes is inhibited by the two wind directions and by the presence of wet sand grains a few inches below the dune surface. Erosion of the dunes is effectively halted when wet sand is exposed. Dune mapping and the form of reversing dunes indicate that dunes within the dunefield migrate slightly.

Local Mineral Resources

Within the national park, subsurface mineral rights associated with the former Baca Ranch are owned by a private company. This company and others who have owned the mineral interests underlying the former ranch, have conducted extensive exploratory activities for oil and gas, including drilling two exploratory wells. National Park Service and U.S. Geological Survey (USGS) geologists generally agree that oil deposits within the geologic structure underlying Baca Ranch present little or no prospect for developable quantities of oil or gas. No production activities for oil or gas have been requested or undertaken to date. The National Park Service would pursue acquisition of these mineral rights from willing sellers. Oil and gas exploration activities within national parks must be managed pursuant to NPS regulations designed to protect park resources and values (see 36 CFR 9B: *Non-federal Oil and Gas Rights Regulations*).

WETLANDS

Wetlands Definition and Classification

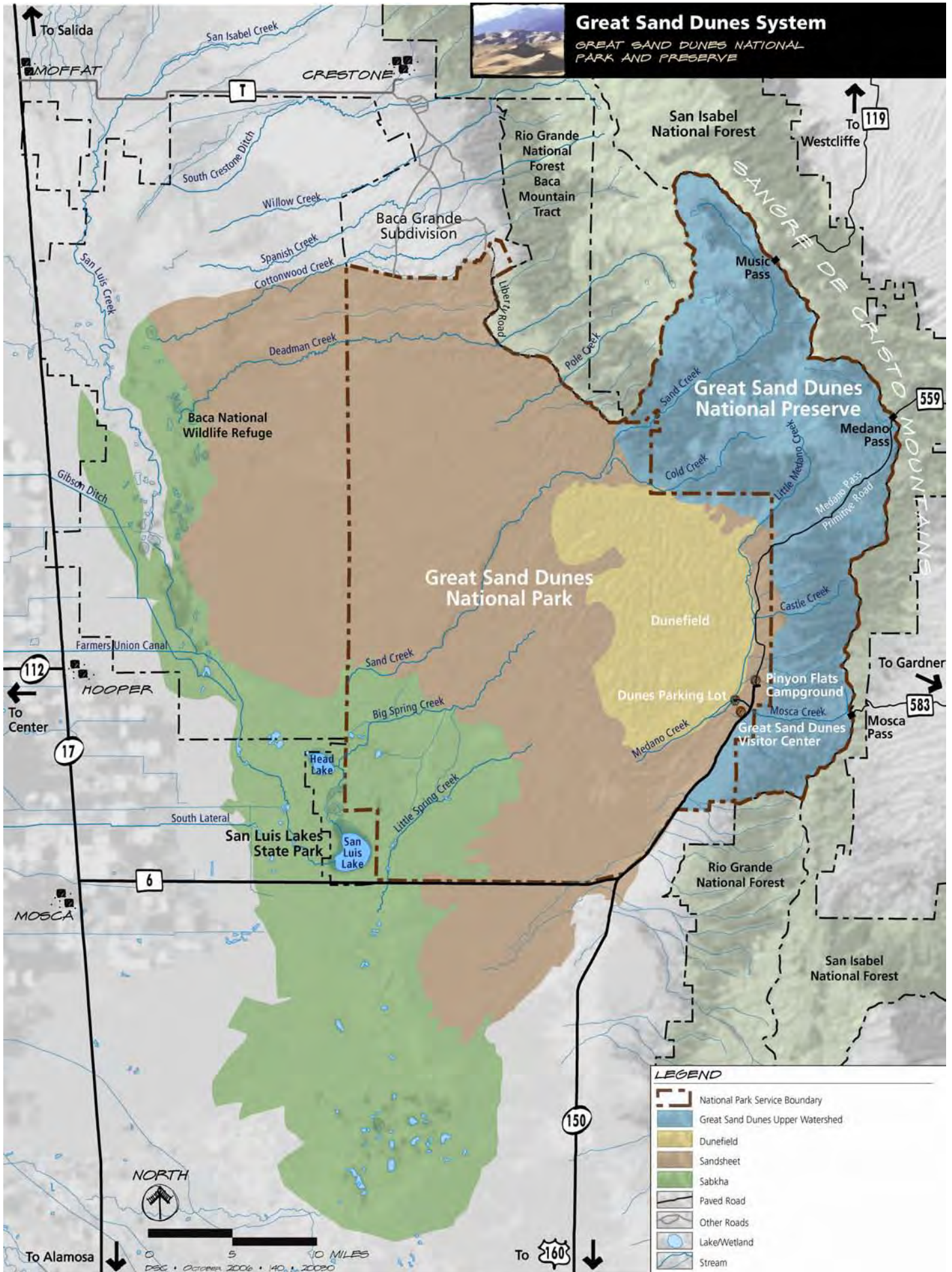
Wetlands have been defined both by academicians and agencies responsible for their management. The term “wetlands,” used herein is defined to both the National Park Service’s and U.S. Army Corps of Engineers conventions.

The U.S. Army Corps of Engineers has jurisdiction for protecting wetlands under section 404 of the Clean Water Act. This agency defines wetlands as “*areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (33 CFR 328.3[b]). Wetlands generally include swamps, marshes, bogs, and similar areas.*” Wetlands have three diagnostic characteristics: (1) over 50% of the dominant species present must be classified as obligate facultative wetlands, or facultative wetlands, (2) the soils must be classified as hydric, and (3) the area is saturated or inundated long enough during the growing season to create anaerobic soil conditions (Environmental Laboratory 1987).

The National Park Service classifies, delineates, and maps wetlands using the USFWS Cowardin classification system (USFWS 1979). This system is based on the more inclusive definition: “*lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water.*” Under this classification, wetlands must have one or more of the

Great Sand Dunes System

GREAT SAND DUNES NATIONAL PARK AND PRESERVE



LEGEND

- National Park Service Boundary
- Great Sand Dunes Upper Watershed
- Dunefield
- Sandsheet
- Sabkha
- Paved Road
- Other Roads
- Lake/Wetland
- Stream



0 5 10 MILES

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following characteristics: (1) the land supports, at least periodically, predominantly hydrophytes (i.e., plants adapted to growing in water or in saturated soils that are oxygen deficient), (2) the substrate is comprised of predominantly undrained hydric (anaerobic) soils, and (3) the substrate is saturated with water or covered by shallow water at some time during the growing season of each year (USFWS 1979).

Both of these wetlands definition and classification systems recognize three parameters (hydrophytic vegetation, hydric soil, and wetlands hydrology), but the Cowardin system defines more habitat types as wetlands. The Cowardin system also recognizes many unvegetated sites or areas without soil (e.g., mudflats, rocky or sandy banks, beaches, stream shallows, saline lakeshores, and playas) as wetlands habitats with important wildlife habitat values.

Regional Context

In general, wetlands information presented in this section is descriptive and programmatic in nature. Based on the available *National Wetlands Inventory* maps for the park, it seems that wetlands mapping efforts within the expanded park to date have focused on particular areas (e.g., the southwest portion of the national park, Sand Creek, and Medano Creek). As a result, wetlands in other park areas (for example, those along Deadman Creek, Cold Creek, and Pole Creek) are not shown on the *National Wetlands Inventory* maps. Additional wetlands distribution and area information can be obtained from the Southwest Regional Gap Analysis Project mapping effort. Details concerning present extent and jurisdictional determination are not included herein and are left for more specific planning and implementation

documents. Other sections of this chapter (vegetation, wildlife, ecological critical areas, water resources) provide additional information related to wetlands.

The park contains 12 primary streams that flow westward from the Sangre de Cristo Mountains and provide wetlands hydrology. They include Mosca, Medano, Castle, Sawmill, Buck, Little Medano, Cold, Sand, Pole, Deadman, Big Spring, and Little Spring creeks. Of these, the major streams are Medano and Sand creeks. They originate high in the mountains, filling numerous alpine lakes before flowing into the sand dunes and across the valley floor. Medano Creek flows around the dunefield along the eastern and southeastern borders and then into the southern portion of the sand sheet. Sand Creek flows around the dunefield on its northeastern, northwestern, and western edges and then into the northern portion of the sand sheet. Sand Creek becomes a braided, sand-bottomed creek in the vicinity of the dunefield and on the sand sheet life zones.

Since there is no surface outlet for groundwater in the northern San Luis Valley, this hydrological system is considered a closed basin. The water infiltrates quickly through the sand, adding to the already high permanent groundwater levels, which typically lie only 5 feet to 15 feet from the ground surface in the shallow aquifer under the park (Cooper 1992). The high water table of San Luis Valley creates an array of wetlands and wildlife habitats. The many types include permanent ponds and lakes, playa lakes, seasonal ponds and marshes, seeps, wet meadows on pond edges, and salt flats. Groundwater flows primarily west and southwest (Rupert and Plummer 2004) across the park. It emerges in the southwestern portion of the park as a line of springs. The water flowing from these springs creates large areas of lush, productive wetlands around Big Spring

Creek and ultimately flows into San Luis Lake. In addition to these wetlands formations, wind erosion has removed sand to the elevation of the water table in places, allowing the establishment of interdune wetlands within the sand sheet life zone (CNHP 1999).

Wetlands and associated riparian habitats within the park support nearly one-third of the known plant species listed by Spackman et al. (2004). Cooper (1992) described 24 emergent wetlands associations on only the sand sheet and sabkha life zones of the park. Several rare plant species grow in wetlands habitat and most of the plant communities that are considered rare are associated with wetlands or riparian areas (see the “Ecologically Critical Areas” section).

Wetlands Functions and Values

Wetlands provide keystone habitat for a wide array of animal and plant species. Vegetation production and diversity are usually very high in and around wetlands, with many plant species adapted only to this unique environment. Wetlands destruction, filling, and draining are occurring throughout North America and pose a major threat to wildlife diversity, carrying capacity, and hydrologic regimes. Changes to and destruction of wetlands can have effects that are proportionally greater than elsewhere in an ecosystem (Graber 1996).

Wetlands in general, and those of the San Luis Valley area in particular, perform many beneficial functions (biological and physical processes) in addition to providing habitat for animals and plants (Adamus et al. 1991). These functions and values pertain to water quality, water quantity, landscape health, and human recreation:

- groundwater recharge
- groundwater discharge
- flood flow alteration
- sediment stabilization and shoreline anchoring
- sediment and toxicant retention
- production export
- aquatic diversity and abundance
- wildlife diversity and abundance
- recreation
- uniqueness or heritage value

Wetlands Distribution and Management

The largest acreages are distributed along Deadman, Medano, Sand, Big Spring, and Little Spring creeks and their tributaries. They range from sparsely vegetated playas and seasonal mudflats, to aquatic and emergent stands in shallow water and irrigated hay meadows, to streamside shrublands, woodlands, and forests, to high elevation ponds, seeps, and snow glades (see the “Vegetation” section). Introduced wetlands have become established due to irrigation of natural meadows (which has occurred for over a century) on Medano Ranch and on banks of excavated ponds, ditches, and canals, which are located mostly at lower elevations on gentle slopes and flats. A particularly high concentration of irrigated wetlands occurs in the lower reaches of Sand, Big Spring, and Little Spring creeks on Medano Ranch. In general, restoration of a natural runoff and drainage regime in these areas, which is proposed in the action alternatives, is expected to reduce the area extent of some wetlands types (e.g., wet meadow, emergent wetlands, aquatic, etc.) and expand or re-establish the extent of other types (e.g., ephemeral ponds, playas, mudflats, etc.).

Wetlands Types by Life Zone

Wetlands occur throughout the park life zones (see map, appendix J), are diverse, and can broadly be characterized in the Cowardin system as either riverine (rivers, creeks, and streams), palustrine (shallow ponds, marshes, swamps, sloughs), and lacustrine (lakes and deep ponds).

On the lowest elevations, the sabkha life zone supports limited wetlands vegetation due to high soil salinity and alkalinity. In general, aquatic, emergent, and wet meadow plant communities are intolerant of saline soils and lack of fresh water. Wetlands that have become established here are primarily palustrine emergent, consisting of grasses and other graminoids that can tolerate increased alkaline and saline conditions such as saltgrass, alkali cordgrass, and alkali sacaton. The sabkha wetlands transition to those typically found on the sand sheet life zone in areas where the soil has been flushed by runoff.

The sand sheet and dunefield life zones contain riverine, palustrine, and lacustrine wetlands. Riverine perennial wetlands vegetation is found primarily along the margins of permanent streams (e.g., Medano, Sand, and Big Spring creeks). Palustrine emergent wetlands occur in the form of marshes and wet meadow habitat found along San Luis Creek and on the west side of the dunefield. Palustrine scrub/shrub vegetation characterized by willow species and similar hydrophilic shrubs is found along the primary drainages and margins of the larger bodies of water. Other sites in the San Luis Valley, including drained agricultural fields, barren mudflats, and unvegetated stream and pond shores may also support wetlands.

The palustrine emergent wetlands of the sabkha and sand sheet life zones were

classified into seven general wetlands plant classes and more finely into 27 wetlands and adjacent upland plant associations by Cooper (1992). The seven classes were composed of one or a few common plant species associated with the moisture gradient and include (in order from low open water to higher upland): (1) aquatics (open water), (2) hardstem bulrush (*Schoenoplectus lacustris* ssp. *acutus*), (3) spikerush, (4) three-square bulrush (*Schoenoplectus pungens*), (5) Baltic rush, (6) saltgrass, (7) cordgrass (*Spartina gracilis*), and (8) blue grama grass (upland). Depending on the presence and duration of standing water and the influx of fresh water, some of these classes may be absent or may vary locally in species composition.

The pinyon-juniper woodland, montane woodland, and forest life zones contain primarily riverine and palustrine wetlands associated with streams, ponds, and wet meadows. Riverine wetlands and riparian habitat is found within and adjacent to the flowing water of the permanently flooded rock, cobble, or sand-bottomed stream channels. The vegetation is primarily a lush mix of herbaceous, shrub, and tree species. Palustrine emergent wetlands located in these life zones include beaver ponds, montane meadows, and seeps that typically support stands of sedges and grasses. The palustrine forest and woodland types have become established along streams and include quaking aspen, blue spruce, and narrowleaf cottonwood, among other tree species. Palustrine scrub/shrub wetlands occupy streambanks and saturated soils where they often mix with meadow (palustrine emergent) and riparian (palustrine forest and woodland) species. Several willow species and thinleaf alder shrubs are common shrub/scrub species.

The subalpine life zone supports similar creek bank and palustrine wetlands as those found in the montane zone. This

zone also supports lacustrine wetlands associated with subalpine lakes and ponds. Palustrine emergent wetlands characterize subalpine meadows and seeps that occupy peat beds that are permanently or seasonally saturated. Subalpine vegetation is characterized by herbaceous species of grasses, sedges, rushes, and perennial herbs. Palustrine scrub/shrub wetlands in this life zone include stands of willow species and occasionally alder and birch. Palustrine forests and woodlands have become established along streams and on mesic sites that support open to thick stands of conifers, usually blue spruce or Douglas-fir, and deciduous trees, including narrowleaf cottonwood and quaking aspen. Lacustrine limnetic sites include naturally occurring glacial ponds and constructed beaver ponds. In-lake vegetation is typically limited to rooted aquatic grasses, sedges, floating vascular plants, and algae. Meadow (palustrine emergent) and riparian (palustrine forest and palustrine scrub/shrub) communities generally border lake margins.

Wetlands in the tundra zone are restricted to alpine streams, seeps, ponds, and snow glades. The vegetation is primarily classified as palustrine and includes low-growing species of sedges, grasses, and willows.

WATER RESOURCES

The San Luis Valley is an arid environment with average annual precipitation of 7.1 inches recorded in Alamosa, Colorado, and 8.4 inches recorded in Saguache, Colorado, over a 56-year time period (WRCC 2005). Annual snowfall averages 31.7 inches and 26.4 inches at these two locations, respectively. The Great Sand Dunes has more precipitation, averaging 10.5 inches (NPS 1995a). Direct precipitation for the San Luis Valley represents a very minor portion

of the water supply. The most important source of water to the Valley is surface water inflow, which directly or indirectly provides most water used for irrigation, and recharges the aquifers. Surface water inflow largely results from variable snow-melt and runoff from the surrounding mountains and has ranged from a high of 2,783,000 acre-feet in 1941, to a low of 743,000 acre-feet in 1951. The total watershed of the San Luis Valley covers about 5 million acres. Approximately 2,800,000 acre-feet of water enter and leave the San Luis Valley annually (Emery 1997).

The northern portion of the San Luis Valley, north of the Rio Grande, encompasses approximately 2,500 square miles, includes the area of Great Sand Dunes, and is referred to as the “Closed Basin” (CSP 1996). Due to a topographic rise in the valley floor, streams that drain the northern portion of the Valley and its surrounding hills and mountains (Cochetopa Hills, northern San Juan Mountains, northern Sangre de Cristo Mountains) do not flow into the Rio Grande; rather the water is retained underground within the Closed Basin.

Water Rights

The National Park Service holds several water rights for Great Sand Dunes, including rights for domestic and operational uses, instream flow, and wildlife purposes. The National Park Service has instream flow water rights (decreed June 20, 1989; priority date March 17, 1932 or June 17, 1956) for Medano, Little Medano, Horse Canyon, Castle, Sawmill Canyon, Buck, Garden, an unnamed creek, Mosca, Morris Gulch, Sand, and Cold creeks. It also inherited instream flow water rights from the USFS when lands within what is now the national preserve were transferred to the National Park Service (decreed

March 30, 2000; priority date October 25, 1999): Medano, Little Medano, Horse Canyon, Castle, Sawmill Canyon, Buck, Garden, an unnamed tributary of Medano, Medano, Mosca, Morris Gulch, Sand, and Cold creeks.

The National Park Service also has federal reserved groundwater rights for domestic and operational uses, and an appropriative water right for Denton Spring for wildlife purposes.

The National Park Service filed a claim for an absolute in-place groundwater right for the Great Sand Dunes on December 30, 2004 (NPS 2004). The claim was filed pursuant to the Great Sand Dunes Act of 2000, which specifically recognized that surface and groundwater systems on and underlying the park and adjacent lands are necessary for preserving the park's natural and cultural resource values, including pulse flow in Sand and Medano creeks. There is a history of proposals to withdraw groundwater for export from the San Luis Valley to Colorado's eastern slope. The Great Sand Dunes Act of 2000 directed the Secretary of the Interior to obtain and exercise water rights required to fulfill the purposes of the park by maintaining groundwater levels, surface water levels, and stream flow on, across, and under the park. The Great Sand Dunes Act of 2000 requires the United States to follow state procedural law in obtaining the water right and to establish the purposes and other substantive characteristics of the water right pursuant to state and federal law. The Great Sand Dunes Act of 2000 protects uses existing on November 22, 2000, and prohibits the federal reservation of water.

Two irrigation ditches in the headwaters of Medano Creek are associated with water rights senior to those of the park. The Hudson Ditch was constructed in 1886, and the Medano Ditch in 1892. Since no

easement was issued for these ditches by the USFS prior to passage of the Great Sand Dunes Act of 2000, the legislative authority for issuing easements and establishing terms and conditions for such easements on these ditches now falls to the National Park Service. However, since the USFS was in the process of issuing easements for these ditches prior to the passage of the Great Sand Dunes Act of 2000, the National Park Service may be required to issue an easement pursuant to the Colorado Ditch Bill (Public Law 99-545, October 27, 1986) despite the fact that this legislation would not normally pertain to an NPS area.

The Closed Basin Division, San Luis Valley Project (Closed Basin Project) is located in the topographic depression (the Closed Basin) of the Valley. The purpose of the project is to pump and deliver unconfined groundwater and available surface flows in the Closed Basin to the Rio Grande River via a 42-mile conveyance channel. The project assists Colorado in meeting its water delivery commitment to New Mexico and Texas under the Rio Grande Compact of 1939, and assists the United States in meeting its water delivery commitment to Mexico under a treaty dated May 21, 1906. The project also delivers water to the Alamosa National Wildlife Refuge under jurisdiction of the USFWS. Management responsibility for the Closed Basin Project features within the national park remains with the U.S. Bureau of Reclamation (Great Sand Dunes Act of 2000). The water level of San Luis Lake is also maintained for fishing and boating recreation using water from the Closed Basin Project (CNHP 1999). A portion of the Closed Basin Project is located within the southwest corner of the national park.

Surface Water

Surface Water Resources

Surface water is a key resource at the Great Sand Dunes, transporting sediments for redistribution to the dunefields by wind, thus shaping the landscape and affecting distribution of plants, animals, and visitor use. The surface water resources are in a nearly natural condition and consist of perennial, intermittent, and ephemeral streams. Natural playa lakes, springs, seeps, and wetlands, i.e., interdunal ponds and wet meadows, are also present within the landscape. Stream flows are often heavy following snowmelt and during flood events following storms. Spring runoff from the Sangre de Cristo Mountains, most visibly characterized by Sand and Medano creeks, is the most obvious and plentiful source of surface water and groundwater recharge in the northern San Luis Valley (CNHP 1999); however, for the most part, the park lies in a closed basin with a high water table, alkaline soils, and little external drainage pattern (NRCS 1973).

Medano Creek, fed by its numerous tributaries, flows from the Sangre de Cristo Mountains and around the dunefield along its eastern and southeastern borders and then disappears beneath the sand in the southern portion of the sand sheet where it deposits or recycles its load of sediment. Sand Creek flows from the mountains, then around the northern, northwestern, and western edges of the dunefield before entering the northern portion of the sand sheet, across which it runs to eventually flow into the San Luis Lakes southwest of the dunefield. Sand and Medano creeks become braided, sand-bottomed creeks in the vicinity of the dunefield and on the sand sheet habitats. Medano and Sand creeks are among the park's "fundamental

resources and values" (see chapter one for the full list).

Surge or pulsating flows in Medano and Sand creeks represent the mechanism for returning vast quantities of wind-blown sand onto the valley floor. Sand Creek, although it is the largest creek in the park, does not display surge flows as consistently as Medano Creek. The waterborne transport of sand by these creeks is a key part of the eolian/hydrologic process that created and sustains the Great Sand Dunes. Sand is blown or eroded into the creek via landslides. Landslides occur as Medano Creek flows against the base of the dunes and undercuts the toe of the dune slopes. The creeks surge because the sand builds up in the creek bottom, creating a minor damming effect, and when the water reaches sufficient volume and pressure it surges downstream with the load of sand. USGS hydrologists consider the Medano Creek surge flow to be one of the best examples of this phenomenon in the world. Castle Creek also displays outstanding surge flow at times and was the site at which the explanation for the surge flow phenomenon was developed.

Water percolates from the streams and recharges the shallow aquifer or emerges as a line of springs in what is believed to be an ancient channel of the Medano Creek drainage that was buried by sand deposits (Fryberger et al. 1990). Big Spring Creek originates at Indian Spring, one of the primary examples of an emergent spring on the sand sheet, west of the dunefield, and flows southwest to San Luis Lakes. Based on a study performed by the USGS (2004), it takes over 60 years for groundwater to migrate from Medano and Sand creeks to Big Spring Creek. Because it is fed by groundwater from seeps and springs, Big Spring Creek is the only gaining system in an area where most other drainages are losing systems. Because of its constant

source, Big Spring Creek is a nonflooding creek with regular flow.

In the sand sheet habitat, the wind scours sand down to the elevation of the water table, allowing the establishment of interdunal wetlands (CNHP 1999); however, the ponds associated with the interdunal wetlands have been disappearing over the last 60 years. Hammond (1997) studied aerial photographs acquired from the 1930s through 1990s and determined 69 small ponds were present along the western part of the national park in the 1930s, and only five remained in the 1990s. The cause of the disappearance of the ponds has not been fully investigated. However, the existence of the ponds is directly related to the level of the shallow or unconfined aquifer of the northern San Luis Valley (USGS 2003).

Sand sheet wetlands (interdunal ponds, Big Spring Creek, and Little Spring Creek) have been identified as fundamental resources and values for the park (see chapter one for the full list).

Surface Water Quality

Preliminary hydrologic research has shown that not only are surface water dynamics in the San Luis Valley complex, but that different sources vary widely in water quality (Cooper and Severn 1992). Most creeks within the park are thought to reflect near-natural water quality conditions and have been determined to maintain the highest water quality in the upper Rio Grande drainage. A USGS study (USGS 2003) found that several Great Sand Dunes perennial streams (Sand, Medano, and Mosca creeks) and ephemeral streams (Cold, Little Medano, Castle, Sawmill Canyon, and Garden creeks) are so pure that they meet the standards for the outstanding waters designation. This designation offers the highest level of

water-quality protection available under the Clean Water Act and Colorado regulations, and is designed to prevent any degradation from existing conditions. The National Park Service closely monitors surface water quality within the park and preserve to ensure that high water quality is maintained. Medano Creek, with its outstanding water quality and closed system, has been identified as a fundamental resource of the park.

Potential sources of contamination to surface and groundwater at the park that are pertinent to the GMP alternatives include humans and animals (e.g., horses and dogs), and sedimentation/erosion (NPS 1995a). Oil and gas exploration activities on former Baca Ranch lands would likely not have any impacts on water quality within or near the park; such activities must be conducted according to an NPS-approved plan of operations designed to ensure protection of park resources, in accordance with 36 CFR 9B.

Great Sand Dunes personnel sampled 10 sites along Medano Creek for the presence of fecal coliform during 1995 (Sundermeyer 1997). Samples analyzed for June (flow of 70 cubic feet per second [cfs]) detected nearly no coliform bacteria in the water. Up to 50 organisms per 100 ml of water were detected during an August (flow of 10 cfs) analysis. During the October (flow of 2.5 cfs) sample analysis, coliform bacteria were detected at a rate of 80 organisms per 100 millimeter (ml) of water. Creeks in the park, particularly Medano Creek, continue to be monitored for total coliform and *e. coli*. Results indicate that occurrences of these bacteria are within the range of <16 and <2.2 organisms per 100 ml of water, respectively. These densities are considered in the safe range for water quality; Medano Creek is classified under the Recreational Body of Water, Division I (full body contact) by the

Colorado Department of Health and Environment (CDPHE), Water Quality Division.

Groundwater

Groundwater Resources

The San Luis Valley has two major groundwater aquifers—the shallow or upper unconfined (Alamosa formation) and the deep or lower confined (Santa Fe formation) (USFWS 2003). Groundwater is regionally separated in the Alamosa and Santa Fe aquifers due to a thick layer of impermeable clay, known locally as the blue clay layer, and also lava flows. Both aquifers consist of unconsolidated clay, silt, sand, and gravel. Estimates in 1971 speculated that there are over 2 billion acre-feet of groundwater stored above 6,000 feet elevation within the San Luis Valley (NPS 1995). These groundwater aquifers are considered to be the “fundamental resources and values” of the park (see chapter one).

The age of the groundwater retained in the Santa Fe aquifer has been dated by the USGS (2004) at approximately 30,000 years before present; plus or minus 3,000 years. However, Magee and Mueller (1991) determined that there is mixing of the unconfined and deep aquifers along the east side of the San Luis Valley because the confining clay layer was absent in monitoring wells drilled and sampled for their study. Many flowing wells from the confined aquifer range in depths from 1,000 feet to over 2,000 feet and some flow at volumes of over 3,000 gallons-per-minute.

The Alamosa aquifer is restricted by the Closed Basin, resulting in very shallow (12 feet or less) groundwater conditions for

about 50% of the San Luis Valley. The southern portion of the San Luis Valley, generally south of the Rio Grande, is well drained in terms of surface and groundwater and depth to groundwater can exceed 300 feet.

Seasonal runoff from the local mountains is the predominant recharge source for the Alamosa aquifer. Other sources include infiltration from applied irrigation water, canal leakage, and precipitation (Emery 1997). Studies performed by the USGS (2004) show there is a direct relation between the shallow aquifer and local surface water bodies, i.e., streams, creeks, and ponds. Thus, lowering of the shallow aquifer level would reduce the size and number of interdunal ponds and minimize the ability of creeks to transport or recycle upwind sand downstream to the sand sheet at the park. Historical and current groundwater pumping and water development have been employed to lower the water table to expand agriculture and build roads in the interior of the San Luis Valley.

Because the depth of the Alamosa aquifer affects the ability of local creeks to recycle sand within the park and the occurrence of the interdunal ponds and wetlands, Great Sand Dunes staff installed 19 shallow groundwater wells between 1990 and 1993 to monitor water levels at the base of the dunefield (NPS 1995a). Eleven wells were placed near Medano Creek, five near Sand Creek, two near Mosca Creek, and one in the sand sheet on the national park boundary. Recently, 10 additional wells were installed near Big Spring and Little Spring creeks. As of 2005, Great Sand Dunes staff were monitoring 27 wells in the area to better understand fluctuations in the Alamosa aquifer and their causes.

Groundwater Quality

The groundwater of the shallow (Alamosa) aquifer of the San Luis Valley is highly mineralized and gaseous, while the deep (Santa Fe) aquifer is less mineralized and often under enough pressure to maintain artesian flows at well heads (CSP 1996). Concentrations of total dissolved solids from active salvage wells placed in the Alamosa aquifer have increased and sometimes exceed water quality levels for the water to be conveyed to the Rio Grande (CSP 1996).

At San Luis Lakes State Park, salvage well 66 requires extensive treatment for removal of heavy metals, minerals, alkalinity, and dissolved solids. Additionally, iron-feeding bacteria have been found in measurable concentrations within this well (CSP 1996). Evaluation of nitrate data from Alamosa aquifer groundwater samples identified mineral fertilizers as the primary source of nitrate in the shallow aquifer system of upper San Luis Valley (Stogner 1997). As indicated by high mineralization and nitrification of the shallow aquifer (from fertilizer use), it is evident that this aquifer's water quality is highly reliant on surface water quality in the northern San Luis Valley. That is, elements in the surface water become concentrated in the groundwater. As such, adverse impacts to surface water quality may also directly affect the quality of the Alamosa groundwater aquifer.

VISITOR USE AND EXPERIENCE

The national parks were created to “conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.” One of the specific

purposes of Great Sand Dunes National Park and Preserve is to “provide opportunities for visitors to experience, understand, enjoy, and gain a sense of stewardship for the park’s natural and cultural resources.” It is therefore important to consider visitor experiences, opportunities, and visitor use when analyzing the impacts of GMP alternatives.

The term “visitor experience” refers to everything that happens to visitors while visiting the Great Sand Dunes—what they do, learn, feel, and perceive. Insights about visitor activities and experiences come primarily from two visitor surveys. A Visitor Services Project Visitor Survey was conducted at the park June 23–29, 2002 (Le and Littlejohn 2003). This survey received 364 responses, which is hereafter referred to as the 2002 Visitor Survey. The previous visitor survey (with 284 respondents) was conducted between July and December 1997, and is hereafter referred to as the “1997 Visitor Survey.” These studies were conducted during short time frames and included a relatively small sample of visitors, so results may not be representative of all visitors.

The term “visitor use” refers to details about how many people visit the park, when and where they come from, how long they stay, etc. The Great Sand Dunes is presently experiencing a transition period related to the change from a smaller national monument to a larger park and preserve, opening of new lands to the public, etc. Visitor use also appears to be changing; therefore, it may be too soon to draw conclusions about new patterns of use.

Visitor Experience

Fundamental Resources and Values

Several aspects of the visitor experience at the Great Sand Dunes have been identified as “fundamental opportunities” (see chapter one, “Fundamental Resources and Values” section). The National Park Service believes that the park should be

managed to maintain these important opportunities. They are fundamental because they are tied closely to park purpose and significance—what is particularly special about the park. Fundamental visitor opportunities include the following:

- climbing and descending the high dunes, which are fairly resilient to recreational use
- experiencing surge flow, playing in Medano Creek near the foot of the dunes
- seeing the heavens (stars, planets, Milky Way, comets, etc.) at night
- viewing the dune mass with the backdrop of the high peaks and from the mountains
- seeing wildlife in its natural setting (e.g., elk, pronghorn, deer)
- learning about the dunes system—its components and dynamic nature
- experiencing quiet and solitude in a wilderness environment
- driving in sand on the Medano Pass primitive road (high clearance four-wheel drive required)

Range of Visitor Activities

The Great Sand Dunes' spectacular scenery and unusual changing landforms attract people throughout the year. The park offers a variety of recreational activities and opportunities, particularly now that it includes the lands within the national preserve. According to the 2002 Visitor Survey, the most common visitor activities are climbing the dunes (80%), visiting the

visitor center (74%), and scenic driving or photography (56%). The next most common activities include wildlife viewing (32%), dune sliding (31%), hiking (29%), picnicking (29%), and attending ranger programs (22%).

Opportunities for scenic driving are available primarily on the main park road and turnouts, plus the Medano Pass primitive road. The latter requires a four-wheel-drive, high clearance vehicle due to deep sand sections (lower elevations), stream crossings, and rocky sections (upper elevations). The Medano Pass primitive road, which leaves the national preserve at the crest of the mountain range and continues on into the western portion of the San Isabel National Forest, is closed when wet, icy, or snow conditions result in resource, public safety, or maintenance concerns. Public vehicle use is not permitted on roads in park expansion lands (e.g., former Baca Ranch) until the GMP defines such use.

Although most visitors do not participate in backcountry camping, backpacking, mountaineering, or horseback riding, some visitors come to the Great Sand Dunes specifically for these activities. These types of activities are popular within both the national preserve and the national park. Opportunities range from simple nature walks to strenuous multiday backpack trips. (See the “National Park Service Operations—Facilities” section of this chapter for a list of designated trails.) Horses and pack animals (e.g., burros and llamas) are allowed in most areas of the park, but there is an exclusion zone around the main dune use / visitor center area.

Camping is available at the Pinyon Flats campground and at designated sites along Medano Pass primitive road. Camping along Sand Ramp Trail is allowed only at designated backcountry campsites. Visitors can also camp in other undesignated areas

in wilderness or nonwilderness portions of the park (permit required and certain conditions apply). However, there is a no-camping zone on the eastern edge of the dunefield. Camping opportunities are also available just outside the park at the Oasis, in San Luis Lakes State Park, and campgrounds in Crestone on the north side of the park and the North Crestone Creek Campground (a USFS campground located north of Crestone).

Bicycling is restricted to the same park roads where public vehicles are allowed. Bicycles are not permitted on hiking trails or within designated wilderness areas.

The main picnic area is located adjacent to the dunes parking lot, but picnic tables are also available at several turnouts along Medano Pass primitive road.

Hunting and fishing are also popular. Hunting is allowed in the national preserve (Great Sand Dunes Act of 2000), but not in the national park. Fishing is allowed throughout the park. Both activities are conducted in accordance with applicable state and federal laws.

As of 2005, commercially guided visitor activities included guided hiking and horseback rides, photographic workshops, overnight trips with packstock, four-wheel-drive tours in open air jeeps (designated route), and guided hunting (preserve only).

Leashed dogs have been allowed in the park (formerly the monument) for years, and are currently allowed throughout the park and preserve. This is atypical in the national park system—most national parks allow dogs only in parking areas and campgrounds. Dogs that are being used for hunting are allowed off-leash within the national preserve (see the “Health and Safety—Dogs” section for details).

Interpretation, Information, and Education

Basic information about the park, including details about visitor opportunities, facilities, programs, and safety, is available from the park’s Web site, visitor center information desk, and from the interpretive newspaper. The newspaper and the park map and guide are distributed at the entrance station or visitor center. About 500 copies of the newspaper are mailed out annually in response to inquiries for trip planning information.

Outdoor and indoor exhibits at the visitor center and various roadside interpretive signs provide orientation information and/or interpret natural resources/systems and cultural resources in keeping with the park’s interpretive themes. The visitor center also offers visitors a central meeting place and point of orientation.

The visitor center includes an auditorium that is used for several different purposes throughout the year. During the spring and fall, the auditorium is used for school groups and contains a series of movable, hands-on exhibits to help teachers and students connect the park with their curriculum. In summer, the park’s interpretive movie is regularly shown in the auditorium.

The visitor center also provides a small space for changing exhibits, which hosts seasonal art exhibits, children’s exhibits, or temporary displays. The Western National Parks Association maintains a year-round bookstore in the visitor center, and entrance fees are collected at the building October through April.

Scheduled interpretive programs are offered at the park most days from late May through September, and are designed to

help visitors make emotional and/or intellectual connections with park resources. Interpretive programs are also offered October to April on a limited basis, or by request (for groups). Programs include short talks at the visitor center, guided interpretive walks or hikes on the dunes or in the foothills, and evening ranger talks and other programs in the campground amphitheater. Sample topics include geology, hydrology and geography, ecology and ecological systems, natural processes (wind, water, etc.), human connections with the dunes over time, the high country of the national preserve, and programs tailored for children.

Curriculum-based education programs for kindergarten through college students are available throughout the year. Hands-on discovery activities in the dunes, foothills, or wetlands are available seasonally, and in the local classrooms in winter months. Park staff work with instructors to ensure that presentations are tailored to meet the needs of the class, as well as the park's interpretive themes. Programs are designed to increase student understanding of how their lives are connected with the natural world. The programs provide an outlet for creativity, exploration, and student-driven inquiry. Park staff are generally available for classroom programs in San Luis Valley schools from September through early April.

An online curriculum resource for primary and secondary teachers and students is also available. It includes lesson plans for elementary teachers, research-based online activities for middle schoolers, and special activities for high school students.

Free interpretive publications are available at the visitor center and from park staff; these provide orientation information and more in-depth interpretation on selected topics relative to park resources. Introduc-

tory printed information is available in German, French, Spanish, and Japanese for international travelers.

Workshops at The Nature Conservancy's Medano-Zapata Ranch are available spring through fall on a variety of topics. Bison and ranch tours are also available on selected dates.

Visitor Perceptions, Opinions, and Motivations

Respondents to the 2002 Visitor Survey were asked what they liked most about their visit to the Great Sand Dunes. The top 10 most frequently mentioned features or characteristics, in descending order, were: (1) the natural beauty of the area; (2) the dunes themselves; (3) climbing the dunes; (4) hiking; (5) uniqueness of the dunes; (6) quiet, solitude, peaceful environment; (7) walking; (8) camping; (9) playing in the sand; and (10) the helpful and friendly staff. When visitors were asked what they liked *least* about their visit, the top five were: (1) hot weather/heat; (2) smoke/haze from forest fires; (3) drought—no water in the creek; (4) not enough time to enjoy it all; and (5) long, tiring walk to dunes; all are factors that are essentially outside the control of NPS managers.

According to the 1997 Visitor Survey (conducted prior to park expansion), the most common reasons for visiting the park were photography, education, recreating on the dunes, finding solitude or quiet, watching wildlife, and hiking on developed trails.

Visitors in 2002 were also asked how particular aspects (noise, horses, dogs, nighttime light pollution, lack of solitude, and "other") affected their park experience. Among those elements, dogs (4%) were mentioned most often as contributing

positively to visitors' experience. Lack of solitude (15%), dogs (7%), and noise (6%) were the specific aspects mentioned most as detracting from visitors' experience.

Dogs. As the statistics above indicate, there are wide-ranging visitor perspectives regarding allowing dogs in the park. Some people appreciate (or at least don't mind) dogs being allowed in all areas of the park. There are valid concerns about the safety of dogs left in or tied to vehicles, and many dog owners simply like to take their dogs along while hiking, etc. Other people would prefer that dogs not be allowed, or that they be restricted to certain areas such as parking areas and campgrounds. Concerns about dogs include aggressive dogs, dog waste, effects on wildlife, health of dogs on the hot sand, and noise. The park occasionally receives letters on both sides of the dog issue.

Crowding. Visitors in 2002 (an unusually low visitation year) were asked how crowded they felt during their visit to the park. In 2002, 56% indicated they did not feel at all crowded, and 35% said they felt somewhat crowded. A total of 9% of respondents said they felt crowded, very crowded, or extremely crowded. When these visitors were asked where they felt crowded, the commonly mentioned locations were the campground (mentioned 17 times), visitor center (since enlarged and remodeled—mentioned 9 times), four-wheel-drive roads (4 times), dunes (3 times), and parking area (3 times). When visitors were asked what they liked least about their visit, 12 respondents (3%) said the park was too crowded or had poor visitation control—the seventh-most frequently mentioned item (of 26 items). Perceptions of crowding may be elevated during years of increased visitation.

Wilderness Values, Including Solitude

As of 2005, the park contained 75,641 acres of designated wilderness. Of this, 35,955 acres were added when the park was enlarged in 2000 (Sangre de Cristo wilderness portion). According to NPS *Management Policies 2001*, recreational uses in NPS wilderness areas should enable “the areas to retain their primeval character and influence; protect and preserve natural conditions; leave the imprint of man's work substantially unnoticeable; provide outstanding opportunities for solitude or primitive and unconfined types of recreation; and preserve wilderness in an unimpaired condition.” This means that mechanized and motorized activities are typically not allowed (see appendix G for more information). Most of the designated wilderness areas in the Great Sand Dunes provide outstanding opportunities for solitude and primitive recreation. The dark night sky and natural quiet are wilderness qualities that are highly valued by visitors to the Great Sand Dunes.

The opportunities and experiences provided by the Great Sand Dunes Wilderness and the Sangre de Cristo Wilderness are rather different due to their natural landscapes. The Great Sand Dunes Wilderness, which includes the dunefield and is located in the national park, is mostly sandy, open country. It's easy to see people, wildlife, and scenic vistas over long distances, provided the terrain allows. The portion of the Great Sand Dunes Wilderness between the dunes parking area and the tall dune, including Lower Medano Creek, is extremely popular for free play. While opportunities for solitude are intermittent here, visitors enjoy great freedom in pursuing “primitive and unconfined recreation” as they play on the dunes. People seeking solitude during busy periods can come early or late in the day, or

hike over nearby dune ridges to find it. The Sangre de Cristo Wilderness, located in the national preserve, is mostly rugged, forested, and mountainous. Below timberline, rugged topography and dense vegetation make it easier to experience solitude.

Park visitors in 2002 were asked to rate the importance of solitude to their visits in the designated wilderness area—30% indicated that they did not visit designated wilderness areas. Of those who did, 70% rated solitude as “very important” or “important.” Eighteen percent said it was “somewhat important,” and 12% said it was not important or had no opinion (2002 Visitor Survey). Of those who said recreating in the park was an important reason for their visit in 1997, more than half were seeking little or no contact with other people (1997 Visitor Survey).

Visitor Use

Parkwide Visitation

The National Park Service defines a “visit” as the entry of any person for recreational purposes onto lands or waters administered by the National Park Service. Total annual visitation to Great Sand Dunes National Park since 1932 (the beginning of historical visitation records) steadily increased through the 1970s. Significant declines in visitation occurred in the early 1980s. Visitation rebounded in the late 1980s through the 1990s, then declined significantly again in 2002, before rebounding again in 2003 and 2004 (figure 9)

Several factors are thought to have contributed to the declines in visitation from 1997 through 2002. First, the park converted from pneumatic rubber-hose (above road) vehicle counters to more

reliable electrical “loop” counters (wires embedded in the road) in 1998. Park staff estimate the rubber-hose counters inflated visitation statistics by as much as 9%. In 2000, a wildfire closed the park for a time, affecting visitation. There was also a general decline in travel and tourism since 2001 and 2002 associated with drought, regional wildfires, and lagging investments in statewide tourism campaigns.

Total visits to Great Sand Dunes in recent years include the all-time peak visitation of 312,795 in 1994, after which it declined to a low of 235,305 visits in 2002. Average visitation for the 13-year period between 1992 and 2005 is 285,540 visits (figure 10).

Visitation at Great Sand Dunes follows a seasonal pattern typical of many national parks. Visitor use peaks during the summer (July), with relatively low visitation during the winter, and moderate spring and fall use.

Medano Creek, which runs seasonally at the base of the dunes, may correlate to fluctuations in visitation. In average to wet years, Medano Creek begins as a trickle in early April, increases to a wide, shallow stream at its peak in May, and diminishes throughout the summer. By August, the creek is typically a trickle near the dunes parking area.

Despite fluctuation in total annual visitation, the patterns of visitation during the year are roughly the same. During years with low visitation, the biggest drop is evident during the summer months. Figures 11 and 12 portray cumulative visitation over the year for selected years and the 13-year average.

Visitation is relatively stable during the first and last four months of the year. However, visitation from May through August has substantial year-to-year variation (figure

12). Visitation in July is particularly volatile, with monthly visitation in 1995 nearly double that recorded in 2002, the latter a year in which drought conditions and extensive wildfires in Colorado adversely affected travel and tourism across much of the state.

If history is any indicator of future public visitation patterns to Great Sand Dunes, future management should take into account the typical visitation pattern of peak summer and low winter visitation, with moderate visitation in spring and fall. National crises such as terrorist threats and attacks, economic factors such as gasoline prices, and natural phenomena (including

climatic variability, drought, and wildfire) will continue to affect future visitation.

Expansion of the park's boundaries and change in administrative management of the preserve resulted in an increase in recreation use. In part, the increase was a simple accounting change as use previously attributable to the national forest now occurs at the Great Sand Dunes. Another source of increase was use that either did not occur previously because the lands involved were privately owned, occurred elsewhere on private or public lands, or represents new use prompted by the establishment of the park.

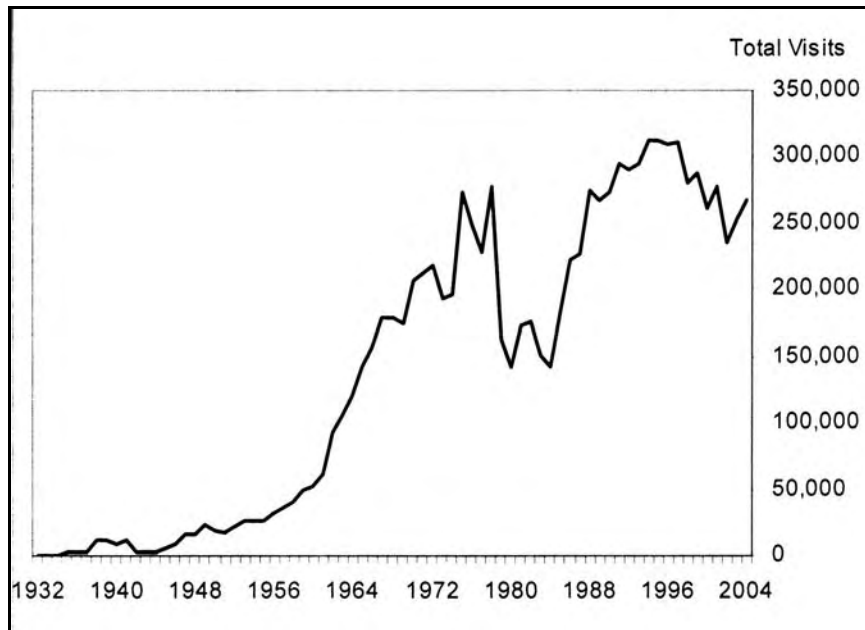


FIGURE 9. TOTAL ANNUAL VISITS TO THE GREAT SAND DUNES, 1932 TO 2004

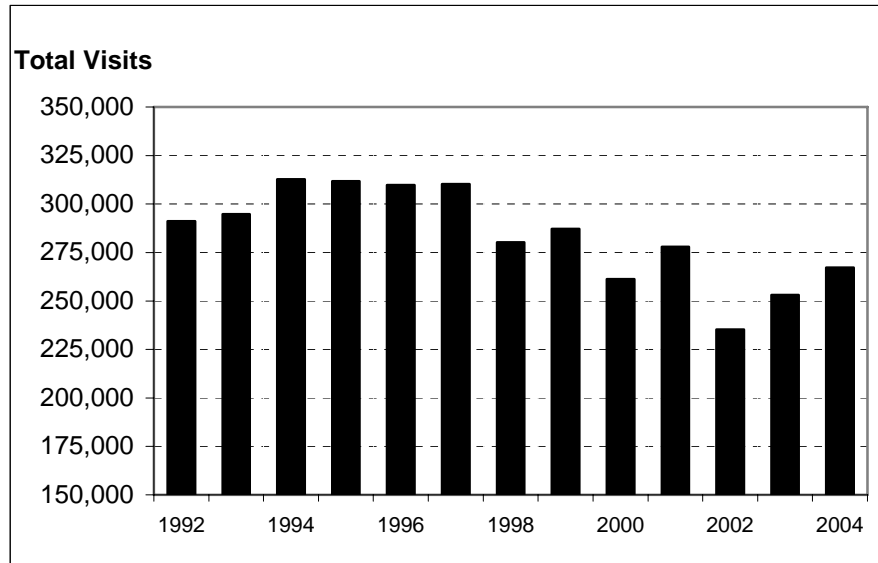


FIGURE 10. TOTAL ANNUAL VISITS TO GREAT SAND DUNES, 1992 TO 2004

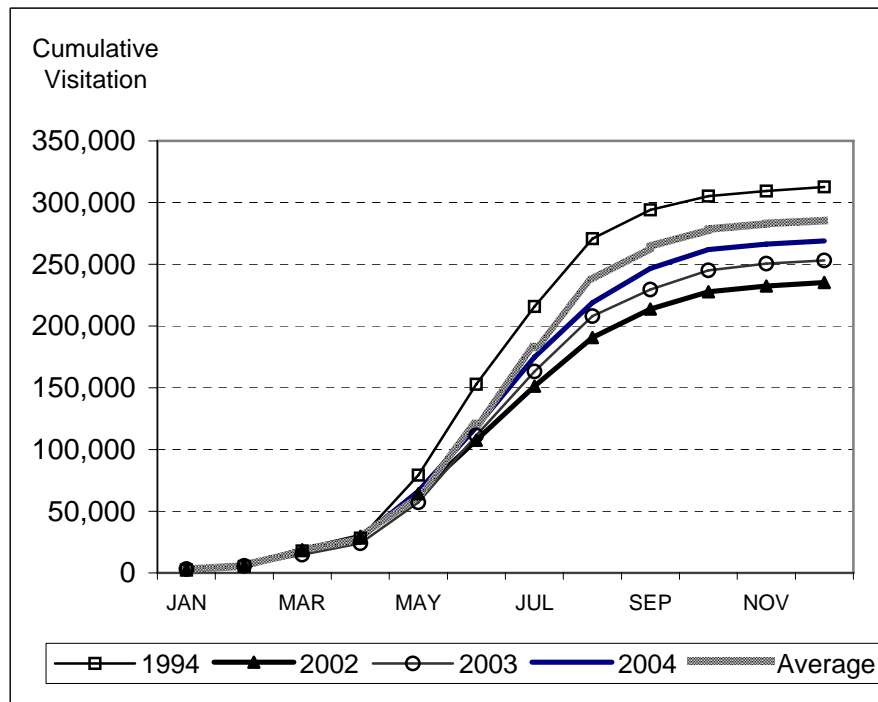


FIGURE 11. CUMULATIVE VISITATION AT GREAT SAND DUNES, SELECTED YEARS AND AVERAGE 1992 TO 2004

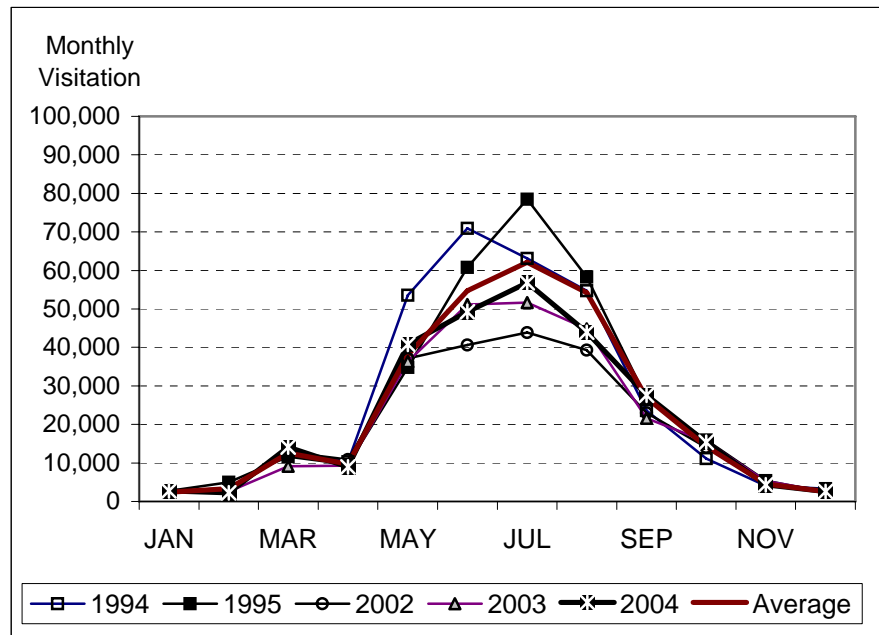


FIGURE 12. MONTHLY VISITATION AT GREAT SAND DUNES, SELECTED YEARS

Accurate tallies of the increase in use are hampered by the large geographic area affected, dispersed nature of use, and remoteness of many points of entry into the park from central administrative facilities. Estimates of such use were consequently developed by park staff, based on information obtained from the USFS, from observed backcountry use, and use at informal parking areas, and from professional judgment. These estimates suggest an increase of about 22,600 annual visitors over and above the counts recorded by the park's existing counters (table 6). The adjusted total of 291,000

visitors in 2004 provides a basis for comparing future visitation for the GMP alternatives. Annual visitation to the Great Sand Dunes is anticipated to increase over time under the no-action and all action alternatives.

Use of Different Park Areas

The dunefield, Medano Creek, and the developed area east of the dunes (visitor center, campground, dunes parking lot, picnic area) receive the majority of visitor use at the Great Sand Dunes. Of park sites accessed by hiking or horseback in 2002, the most frequently visited were the high dunes (67% of visitors surveyed), visitor center loop trail (29%), Medano creekbed (23%), and the campground trail to the dunes (18%). Of sites accessed by automobile, the most frequently visited were the dunes parking area (91% of visitors),

TABLE 6. ESTIMATED CURRENT ANNUAL USE

2004 (recorded)	2004 (adjusted baseline)
268,400	291,000

visitor center (84%), and dunes picnic area (28%). Of visitors surveyed, 12% accessed Medano Pass primitive road (2002 Visitor Survey). It is important to note that this information was gathered before the former Baca Ranch lands were opened to public use in December 2004.

Unless the weather is poor or Medano Creek is not flowing, the dunes parking lot typically fills to capacity at least once daily each weekend day from Memorial Day weekend (late May) through the July 4th holiday weekend. The lot also typically fills over the Labor Day weekend in September. Thus, the parking lot typically fills for at least some part of the weekend six to eight weekends during the summer months. It's not unusual for the parking areas to remain filled for 4 to 6 hours during the middle of the day on the busiest weekends. According to park records, the dunes lot fills on days when about 500 cars enter the park.

Pinyon Flats campground typically reaches capacity on Thursday, Friday, and Saturday nights from mid-May through mid-August, plus a few days around the summer holidays. At least two parking area turnouts located on Medano Pass primitive road (Point of No Return and Castle Creek) fill up on the holiday weekends and usually during the first two weekends in June. Castle Creek may fill more often. The primitive campsites along Medano Pass primitive road typically fill during the Memorial Day weekend. Depending on the year, they may also fill on early June weekends and during the July 4th holiday. Medano Pass primitive road experiences enough vehicle use on busy summer weekends (especially holiday weekends) that park rangers or volunteers alternate traffic traveling in opposite directions. This reduces the need for vehicles to pass one another and helps protect roadside resources.

Length of Stay

Seventy-seven percent of 2002 visitors spent less than 24 hours at the park. Of these, 40% spent less than 2 hours, 37% spent between 2 and 4 hours, and 22% spent more than 4 hours. Of the 23% who spent one day or more in the park, 35% spent one day, 38% spent two days, and 27% spent three days or more. Most overnight visitors (86%) stayed in the Pinyon Flats campground, 7% stayed in a backcountry campsite, and another 7% said they used "other" lodging. There are no motel-type accommodations within the park, but the Oasis, a private enterprise located outside the park boundary on the main entrance road, includes a motel, among other amenities.

Visitor Origin and Other Details

The following statistics come from the 2002 Visitor Survey. They were gathered over one week in June 2002, and may not be typical of year-round visitation. American visitors were mostly from Colorado (38%), Texas (13%), or California (5%). Of Colorado visitors, nearly 80% came from the more urbanized and densely populated Front Range counties that include Denver, Fort Collins, Colorado Springs, and Pueblo. Residents of the San Luis Valley accounted for about 8% of Colorado visitors, although the share is likely more on an annual basis. International visitors (most from Germany, Holland, or England) represented only 4% of total visitation. English was the primary language of 97% of respondents. Additional details can be found in the 2002 Visitor Survey.

SCENIC RESOURCES AND VISUAL QUALITY

Great Sand Dunes National Monument was established for “the preservation of the great sand dunes and additional features of scenic, scientific, and educational interest.” The park’s scenery is one reason the park is popular. The park’s fundamental resources and values (see chapter one) include viewing the dune mass with the backdrop of the high peaks and viewing wildlife in its natural setting. For viewing the dune mass with the backdrop of the high peaks, key elements include: views approaching from the west and south, views from the mountains, changing light conditions, shadows and contrasts on the dunes in early morning and evening, good air quality, and undeveloped mountain slopes.

The scenic resources of the Great Sand Dunes have a high degree of cultural significance. Many of the views into and from the park are iconic and are reflected in the works of artists. The park is a favorite subject for professional and amateur artists, photographers, and writers whose work communicates the striking scenery of the park to visitors and others.

Scenic vistas from many vantage points in and around the park are distinctive and memorable. The spectacular windswept dunes, the high snowcapped peaks of the Sangre de Cristo range, clean air, changing skies and shadows, the rural agricultural valley, and panoramic views combine to offer a wealth of visual resources. As people move through the park’s various life zones, whether on foot, horseback, or by passenger vehicle, they experience a sequence or pattern of visual resources that provide a cumulative visual experience. This cumulative experience involves the interaction of multiple elements in relation to each other: the juxtaposition of individual features in

the foreground and background, the interface of different surfaces, and the interplay of light reflecting off different colors and textures. Protecting this suite of visual resources is as important as protecting any one element.

Scenery is one of the main reasons visitors come to the park. The 2002 Visitor Survey found that 56% of visitors participated in scenic driving or photography. This was the third-highest rated activity, after climbing the dunes and visiting the visitor center. Today, although buildings and structures intrude on some scenic vistas, the surroundings are mostly natural. Human-made features do not dominate, even in the landscapes where they are visible. To date, scenic resources have not been formally studied or analyzed in the park or preserve.

The preserve stretches from the eastern boundary of the old national monument to the crest of the Sangre de Cristos, from just west of Carbonate Mountain on the south side to Milwaukee Peak on the north, then south through Music Mountain, Tijeras Peak, and Cleveland Peak. The preserve is part of the Sangre de Cristo Wilderness and offers opportunities for backcountry hiking and camping. Views within the preserve include those of the high mountain peaks, tundra, small mountain lakes, clear blue skies, and clear, starry night skies. There are very few human-made features (e.g., Medano Pass primitive road, hiking trails, and signs) to intrude upon views, and these do not dominate the natural landscape from any perspective. The preserve also offers expansive panoramic views and glimpses of the Sangre de Cristo range, 14,000-foot-plus peaks, the eastern plains, the San Luis Valley, and the dunes, as visitors move through the landscape.

For many visitors, the ever-changing play of light and shadow on the near-barren,

massive dunefield, backed by alpine peaks, provokes strong emotional responses. The dunefield can be viewed from almost anywhere in the park, including the main road and turnouts, the visitor center and loop trail, the dunes parking area and campground, the valley floor, and from the mountains in the preserve. From the dunes, visitors see a seemingly endless dunefield from some vantage points, and the mountains and rural valley from others. The dunefield is designated wilderness and contains virtually no human-made features. Human-made structures (visitor center, roads, parking areas, campground, amphitheater, and administrative facilities) are not prominent, but they are visible on the eastern edge of the dunes, and can be a visual distraction, although for some they may provide a sense of reassurance.

The new park lands to the west of the dunes contain the grass- and shrub-covered sand sheet, salt-crusted sabkha and creeks, riparian corridors, and wetlands. These lands include features associated with ranching, including fences, two-track roads, cabins, corrals, houses, and outbuildings. Views within the new park lands include grasslands and shrublands with tree stands along some creeks, and distant views of the dunes and mountains, plus typically clear skies during day and night. Views beyond the park boundary to the west, north, and south include the rural agricultural landscape and low-density residential development. Due to the wide-open spaces, these elements do not dominate the landscape, but are merely an element in the mix.

Visual Quality and Night Sky

Great Sand Dunes National Park and Preserve is a class I air quality area. Class I areas deserve the highest level of air quality protection. The Clean Air Act of 1970, as

amended, requires federal officials responsible for managing class I areas to protect the air quality-related values of these areas, including visibility, and to consult with permitting authorities regarding possible adverse impacts from new or modified emitting facilities. The Wilderness Act of 1964 also provides direction for management of air quality; it gives the National Park Service responsibility to manage designated wilderness to preserve and protect its unspoiled character, which can be affected by human-caused air pollution.

Great Sand Dunes National Park and Preserve has consistently attained state and federal ambient air quality standards (Fire Management Plan Environmental Assessment 2005). However, visual quality is often affected by particulates in the air. On most days, visibility is 60 to 80 miles for 180 degrees (NPS Fire Management Environmental Assessment 2005). Air quality was monitored at the then national monument from 1988 to 1995, and a 1997 report summarizing this monitoring program concluded that visibility is best in winter and worst in spring (Binkley 1997). Sulfates, soot, and coarse particulate material contribute most to decreased visibility. Smoke from natural and prescribed fires, wood burning stoves, and campfires is one problem. Effects of agricultural operations (burning stubble, harrowing, planting, etc.) are another. Windy weather increases airborne particulates and decreases visibility, especially in the windier spring months. In 2005, 16 industrial facilities, including refineries, cement plants, a steel mill, a pharmaceutical manufacturer, and 10 power plants were tentatively identified by the Colorado State Department of Public Health and Environment as sources of haze clouding the region's national parks, including the Great Sand Dunes. Automobiles, wildfires, and dust from feedlots also

contribute to the mix of haze-forming pollutants in the region (Denver Post 2005).

Another component of visual quality is ambient light and its effect on the night sky. In accordance with NPS *Management Policies 2001*, the National Park Service strives to preserve natural ambient light-scapes, which are natural resources and values that exist in the absence of human-caused light. Commercial, residential, and agricultural development in the San Luis Valley can introduce light into otherwise naturally dark areas. Within the park, the administrative areas, campgrounds, Medano Ranch, and the visitor center are sources of artificial light. These areas are directly visible from vantage and viewing points within the park and preserve. The National Park Service minimizes extraneous light sources and protects the dark night sky by using shielded lighting, downward directed lighting, and strategically located light sources. The Baca Grande community, located to the north of the national park, has guidelines designed to minimize extraneous light. These include use of motion-activated lights, and shielded or hooded exterior lighting that is limited to entry walks, porches, and exterior patios (Baca Grande 2002). Due to such efforts and the largely rural and undeveloped landscape surrounding the park, there are outstanding opportunities to see the stars, moon, and planets on clear nights. Attempts to measure night darkness at the park have been unsuccessful thus far.

SOCIOECONOMICS

The influence area for economic and social considerations associated with the Great Sand Dunes GMP encompasses Alamosa and Saguache counties in south-central Colorado. The region is predominately rural. The largest community in the region, the city of Alamosa, is located about 25

miles southwest of the park, with several smaller communities in the surrounding area.

Population

Alamosa and Saguache counties experienced modest population growth during the 1980s and 1990s. After 1990, population growth slowed in Alamosa County. Population growth in Saguache County was substantially more, with a net increase of 2,410 residents, or 52% compared to 1990 (table 7). The latter growth was concentrated around the community of Center, about 25 miles west of the park, and in the Baca Grande subdivision. Statewide population growth was 40% during the same period, exceeding 4.6 million in 2004.

In Alamosa County, the city of Alamosa population was estimated at 8,545 in 2004. Another 126 residents resided in Hooper, and the remaining 6,417 residents (42%) lived in unincorporated Alamosa County. The majority of Saguache County residents (3,676 est.) lived in unincorporated areas, including the Baca Grande subdivision. Center and Saguache are the county's two largest communities, with 2,500 and 620 residents, respectively, in 2004. Other communities in the region include Bonanza City, Crestone, and Moffat (U.S. Census Bureau 2005).

Population trends in the two counties are driven by different influences. In Alamosa County, new births are offset in large part by out-migration. Growth in Saguache County has occurred primarily from lifestyle migration into the Baca Grande and Crestone communities, and the settlement in Center of agricultural households employed across the San Luis Valley.

Economic Overview

Total full- and part-time employment in Alamosa County was 10,521 in 2003, compared to 7,191 in 1990; a gain of 3,330 jobs or 46%. Employment in Saguache County increased to 2,750 jobs in 2003 from 2,131 jobs in 1990; a gain of 619 jobs or 29%. Employment data for 2003 highlight structural differences in the economies of the two counties (table 8).

The federal government has a substantial presence and plays an important role in the regional economy. Federal agencies, including the National Park Service, USFWS, USFS, U.S. Postal Service, NRCS (agriculture), and others reported a total of 237 civilian employees in the two counties in 2004, about 1.8% of all jobs. The economic significance of the number of jobs is amplified by their above-average earnings and associated operating, maintenance, and capital expenditures in the local economies.

Agriculture plays a major role in the Saguache County economy, both in terms of direct farm employment, and indirectly through support for agricultural services, transportation, trade, and related private and government services. Agriculture is also important in Alamosa County; however, trade and services are more dominant, reflecting the city of Alamosa's role as a regional trade and service center.

In 2002, 570 individual farms and ranches, encompassing more than 681,000 acres, were operating in the two counties (table 9). Of those, 318 were in Alamosa County, collectively covering nearly 44% of the county's total land area. Agricultural operations in Saguache County involved about 24% of the county's total acreage. In 2002, sales of local crops and livestock generated more than \$176 million in the two-county region. Potatoes, barley and wheat grains, and forage for livestock feed were the predominant crops in terms of acres harvested.

TABLE 7. POPULATION GROWTH TRENDS, 1990 TO 2004

	1990	2000	2004	Change 1990-2004	% Change 1990-2004
Alamosa	13,617	17,966	15,088	1,471	11%
Saguache	4,619	5,917	7,029	2,410	52%
Colorado	3,294,473	4,301,261	4,601,403	1,306,930	40%

Source: U.S. Census Bureau, 2002 and 2005

TABLE 8. EMPLOYMENT BY MAJOR CATEGORY, 2003 (PERCENT OF TOTAL)

County	Farming	Industrial *	Trade and Services **	Government ***
Alamosa	8%	15%	56%	21%
Saguache (est.)	20%	26%	31%	23%
* Industrial includes forestry, mining, utilities, construction, manufacturing, transportation and warehousing, management of companies, and administration and waste services.				
** Trade and services includes wholesale and retail trade, information services, finance and insurance, real estate, professional and technical services, education and health care, arts and recreation, accommodation and food services, and other services.				
*** Includes federal, state, and local government.				

Source: U.S. Bureau of Economic Analysis, 2005

Among the local ranch operations is the 103,000-acre Medano-Zapata Ranch owned by The Nature Conservancy. Comprised of two historic ranches, the Medano-Zapata now operates as a working cattle and bison ranch, environmental education center, and landscape-scale

conservation area. Eleven full- or part-time positions are associated with Medano-Zapata. Annual economic contributions of the Medano-Zapata Ranch include approximately \$500,000 in sales of livestock and hay, which support ranch operations, a comparably sized operating

TABLE 9. OVERVIEW OF AGRICULTURAL OPERATIONS IN THE REGION, 2002

County	Number of Farms	Total Farm Employment	Acres in Farms	Average Size (Acres)	Market Value of Sales (Millions)
Alamosa	318	752	204,640	644	\$ 94.5
Saguache	252	542	477,003	1,893	\$ 81.9

Sources: USDA, 2004 and Bureau of Economic Analysis 2005

budget for The Nature Conservancy’s environmental education and conservation programs, and expenditures in the local community by guests and visitors to the Medano-Zapata Ranch (Robertson 2005).

Recreation and tourism also have a substantial role in the regional economy. In addition to the park, other recreation and tourism attractions in the San Luis Valley include:

- portions of the Rio Grande National Forest
- the Cumbres and Toltec Scenic Railway (a steam-powered excursion railroad)
- Monte Vista, Alamosa, and Baca National Wildlife Refuge

- San Luis Lakes State Park and multiple-state wildlife management areas
- Los Caminos Antiguos Scenic Byway
- Fort Garland Historic Fort and Museum
- multiple spiritual, new age, and retreat centers in Crestone and the Baca Grande subdivision
- Shrine of the Stations of the Cross in San Luis
- numerous local museums and historical sites
- annual sandhill crane migration and festival

In addition, U.S. highways 160, 17, and 285 carry many tourists through the region to Mesa Verde National Park, Santa Fe, Taos, and a myriad of other cultural, recreational, and historical destinations. Visitors and travelers support numerous jobs in the region's retail trade, accommodations and dining, and entertainment and other affiliated industries.

Commercial Services Provided for Great Sand Dunes National Park and Preserve

As of 2005, one concessioner operated within the park to provide firewood and incidental camper supplies such as sunscreen, insect spray, ice, and vended soft drinks. Ten incidental business permit holders provided services for horseback riding and pack trips, guided hunting, guided hiking, photography workshops, and four-wheel-drive tours (NPS records 2005).

Income, Poverty, and Unemployment

Total personal income in Alamosa County was \$350.1 million in 2003, nearly three times the \$120.4 million in Saguache County.² More than 11% of all earnings paid to workers in Alamosa County was to workers commuting from outside the county. Saguache County benefited from a net inflow of \$16.8 million. Net earnings flows from Alamosa County and into Saguache County have increased in recent years. Despite recent gains, per capita income in the area lags behind other areas in Colorado (table 10). Per capita incomes of \$23,216 in Alamosa (2003) and \$18,063 in Saguache, ranked 50th and 62nd in the state, respectively.

Over time, local unemployment rates have been persistently above the statewide averages (table 11). The seasonality of many jobs in agriculture, tourism, and trade; and service firms catering to students at Adams State College contribute to that pattern, as well as to the lower than average per capita incomes.

Demographic Characteristics

Alamosa County's population tends to be younger than that of either Saguache County or the state of Colorado. Alamosa County has a increased share of residents between 15 and 34 (table 12). Saguache County, in contrast, has a increased share of residents 55 years and older, many of whom are retired or semi-retired.

² Personal income includes work-related earnings, social security and other income maintenance payments, unemployment benefits, retirement, and income derived from investments. Total personal income is an indicator of the relative size of an economy, while changes in income over time may reflect changes in economic welfare, but also changes in the levels of economic activity, population, and inflation. Per capita, median, and other income measures provides a basis for comparing economic welfare between areas.

Both counties have relatively large minority populations. More than one of four residents in Alamosa and Saguache counties are nonwhite, compared to about one of six statewide. Hispanics and Latinos comprised over 40% of the local population in 2000, and American Indians accounted for 3.7%. Apaches, Navajos, and Utes were the most commonly reported tribal affiliations. No established American Indian reservations are located in Alamosa or Saguache counties.

Over 72% of all residents in Alamosa County in 2000 had lived in the county in 1995, 28% having moved from elsewhere, primarily elsewhere in Colorado. More than 31% of Saguache County residents had moved there since 1995.

Housing

At the time of the 2000 census, Alamosa and Saguache counties recorded vacancy rates above the statewide average of 8.3%. In Alamosa County, overall vacancy rates were 10.2%, with 621 units vacant. More than 25% of all units were reported vacant in Saguache County (table 13). However, while more than half of the vacant units in Alamosa County were for rent or sale, 46% of the vacant units (361 units) in Saguache County were reported as being for seasonal, recreational, or occasional use. The latter includes about 75 units located in Crestone, the Baca Grande subdivision, and nearby areas.

TABLE 10. PER CAPITA PERSONAL INCOME, 2000 TO 2003

	2000	2001	2002	2003	% Change 2000–2003	Statewide Rank (of 64)
Alamosa County	\$ 20,568	\$ 21,588	\$ 22,984	\$ 23,216	13%	50
Saguache County	\$ 15,260	\$ 17,081	\$ 18,337	\$ 18,063	18%	62
Colorado	\$ 33,370	\$ 34,491	\$ 34,228	\$ 34,561	4%	NA

Source: U.S. Bureau of Economic Analysis, 2005

TABLE 11. UNEMPLOYMENT RATES, 2000 TO 2005

	Annual Average					2005 (June)
	2000	2001	2002	2003	2004	
Alamosa County	3.5%	5.8%	6.3%	6.7%	6.2%	5.9%
Saguache County	5.3%	8.6%	7.4%	5.6%	7.0%	7.6%
Colorado	2.6%	3.9%	5.9%	6.0%	5.5%	5.2%

Sources: Colorado Department of Labor and Employment, 2005; and U.S. Bureau of Labor Statistics, 2005

TABLE 12. SELECTED DEMOGRAPHIC CHARACTERISTICS, 2000

	Median Age (Years)	Persons 15 to 34 years	Persons 55 years and older	Race: White	Hispanic or Latino
Alamosa County	30.6	32.7%	17.1%	74.6%	41.4%
Saguache County	36.9	23.8%	21.1%	74.1%	45.3%
Colorado	34.3	19.6%	17.6%	85.2%	17.1%

TABLE 13. SELECTED HOUSING CHARACTERISTICS

	Census 2000				New Units Built, 2000 to 2004
	Total Units	Percent Occupied	Total Vacant Units	Units for Seasonal, Recreational or Occasional Use	
Alamosa County	6,088	89.8%	621	75	+ 270
Saguache County	3,087	74.5%	787	361	+ 454

Source: U.S. Census Bureau 2002 and 2005

Recent population growth and migration are reflected in levels of new residential construction. An estimated 270 new housing units (a 4% increase over the total housing stock in 2000) have been built in Alamosa County. During the same period, 454 new homes were reported in Saguache County (nearly a 15% increase in five years). Many of these units are located in the Baca Grande subdivision, with the pace of new development reportedly spurred by the designation of Great Sand Dunes National Park and Preserve.

As of 2005, housing at the park included 13 dwelling units used on a full-time or seasonal basis, including seven individual units, three of which are shared housing for seasonal employees, one duplex (two units), a triplex apartment building, and one trailer. In addition, two trailer pads are available for seasonal use by employees with their own RV or trailer. An older trailer that does not comply with NPS standards for occupancy is also on the park

inventory, but plans are in place to remove it.

Traffic and Emergency Services

The primary highway access to the main entry to the park is via SH 150 from the south and Alamosa County Road 6N from the west. The former connects to SH 160, the major east-west highway across southern Colorado, and the latter connects to SH 17, a key north-south regional highway in the San Luis Valley. Several USFS gravel and dirt roads provide motorized access to the eastern boundary of the preserve.

North of the park, Saguache County Road T is a paved road that extends east from SH 17 and terminates at two destinations—Crestone and the Baca Grande subdivision. Thus, traffic on County Road T is related primarily to these destinations. The Crestone destination includes the town of

Crestone (population 73 in 2000) and three USFS trailheads with a total of 30 to 35 vehicle spaces and a 13-site campground associated with one of the trailheads. The Baca Grande destination includes a small Colorado College satellite facility, a restaurant, and several other small businesses, over 600 residences, more than a dozen spiritual retreat centers, and two informal points of pedestrian access to the national park from the terminus of public (Saguache County) roads. One of these county roads terminates within a few hundred yards of the national park boundary; the other terminates at the boundary, where public vehicle access ends. Both local and nonlocal visitors use these access points; some visitors park their vehicles at or near the terminus of the county roads, which can be inconvenient to those living nearby. Park visitors using horses are not allowed access at these points. Some people also park illegally within the Baca Grande subdivision to access adjacent USFS lands.

County Road T has experienced an estimated increase of 10 to 20 trips per day due to national park-related traffic. As discussed above, some of that traffic continues onto county roads within the Baca Grande subdivision. Traffic data are not available to accurately assess the relative magnitude of such traffic for County Road T and roads within the subdivision. However, traffic increases are expected on county roads in the near future due to residential growth in the Baca Grande subdivision (the number of residences could more than triple during the next 15 to 20 years) and an increase in spiritual retreat visits (from more retreat centers and more events per center). Therefore, the contribution of national park/preserve-related traffic is likely to remain small in comparison to traffic generated by residents of the Crestone / Baca Grande community; their guests,

construction contractors, and recreation visitors to the national forest; and guests and staff of the spiritual organizations, monasteries, and retreat centers in the community.

Traffic on the major state highways in the region, shown in table 14, is heaviest in and around the city of Alamosa, declining rapidly with distance from the city. For example, the annual average daily traffic (AADT) of 5,600 vehicles on SH 17 in Alamosa in 2004 had decreased to 2,800 AADT north of County Road 6N, and to 1,600 AADT north of Moffat. Similarly, traffic volume on SH 160, east of Alamosa, had declined by nearly 60% between the junctions with SH 17 and SH 150. Traffic volume on SH 150, which park staff believe carries more park-related traffic than does County Road 6N, was 670 AADT.

Average annual daily traffic associated with the park is estimated at 400 to 450 vehicles. That estimate is based on vehicle counts at the main entrance and allowances for staff, vendors, and other traffic that enter the park boundary, but turn around before the main entrance. That traffic volume represents about 6.5% of the combined traffic of SH 160 and SH 17 near their respective intersections with SH 150 and County Road 6N.

Another issue related to highway traffic is that of highway accidents and public safety, specifically demands on local law enforcement and emergency medical first responders. In Alamosa County, the county sheriff responds from its Alamosa headquarters to accidents and incidents on county roads, with a staff of seven patrol officers / first responders. The department reports that incidents are rare in the vicinity of the national park and preserve. Troop 5B of the Colorado State Patrol Troop, headquartered in Alamosa, handles incidents on state highways (150 and 17) and dispatches,

as necessary, the Mosca-Hooper Fire Department to provide extrication assistance. Emergency medical service,

including ambulance transport, is dispatched from the San Luis Valley Regional Medical Center.

TABLE 14. TRAFFIC CHARACTERISTICS NEAR THE GREAT SAND DUNES, 2004

Route/Location	Annual Average Daily Traffic	Cars and Other Light Duty Vehicles	Trucks
SH 17, north of junction with SH 160 in Alamosa	5,600	5,370	230
SH 17, south of County Road 2S	3,300	3,030	270
SH 17, north of County Road 6N	2,800	2,590	210
SH 17, north of Moffat and County Road U60	1,600	1,470	130
SH 150, north of SH 160	670	610	60
SH 160, at junction with SH 17 in Alamosa	9,900	8,990	910
SH 160, west of Alamosa at El Rancho Lane	4,100	3,460	640
SH 160, at junction with SH 150	4,100	3,470	630

Source: Colorado Department of Transportation 2005

The Mosca-Hooper Volunteer Fire Department (24 volunteers) provides primary structural fire protection for the park. The park is a signatory to the “Annual Fire Operating Plan” for the six-county area of the San Luis Valley. This plan provides for mutual aid, whereby the closest available forces respond as needed to wildland fires within the planning area. The Mosca-Hooper Volunteer Fire Department, Baca-Grande Volunteer Fire Department (a 27-member department supported financially by the Baca Grande Property Owner’s Association), and Kundalini Fire Management (a 20-member department that also serves the Baca Grande subdivision and surrounding area) all respond to fires within the park boundary. Likewise, park staff provide initial attack assistance for wildland fires occurring outside the park boundary in neighboring jurisdictions.

Under agreements between the federal government and neighboring counties, national park rangers may respond to other emergency situations outside park boundaries. The need for such response, which would generally arise when an incident occurs near the park and when on-duty sheriff’s deputies and state patrol officers are responding to other events, arises very infrequently.

In Saguache County, Troop 5B of the Colorado State Highway Patrol responds from its Alamosa headquarters to emergency calls on state highways and dispatches the Baca Grande Volunteer Fire Department and Baca/Crestone Ambulance Service (16 volunteers, 1 paid). The latter provides emergency medical service to an area of approximately 600 square miles. The county sheriff responds to other incidents (Pamela Gribb, pers. comm., 2005).

Land Use and Ownership

The predominant land uses in the study area include agriculture, forested areas, natural areas supporting wildlife, rural residential, residential, commercial, and industrial lands. The latter are concentrated in and near Alamosa, other communities in the area, and along the major highway corridors through the region.

Land use adjacent to the park is a combination of forested lands (Rio Grande National Forest), range and farmland (including lands associated with Medano Ranch and the newly established USFWS Baca National Wildlife Refuge), the Oasis commercial development immediately adjacent to the park near the main entrance, and rural residential development. The latter includes the Baca Grande subdivision and Crestone to the north, and the Zapata subdivision to the south. The San Luis Lakes State Park and portions of the Bureau of Reclamation's Closed Basin Project are situated southwest of the park.

The majority of Alamosa and Saguache counties have been zoned as agricultural, with residential uses allowed "by right." Other uses in unincorporated areas require approvals from the respective zoning administrators and commissions. Separate zoning and land-use regulations govern development in Alamosa, Center, and Saguache.

Privately owned lands comprise over two-thirds of Alamosa County, an increased share that characterizes Colorado as a whole. Another 19% of the land is in federal management and about 12% is owned and managed by the state (table 15). Federal land management agencies include the BLM, USFWS, USFS, National Park Service, and Bureau of Reclamation.

Federal lands account for approximately 69% of the lands in Saguache County, a much higher share than in either the state as a whole or Alamosa County. Another 4% of the land in the county is managed by the state and 27% privately owned. The latter includes a small amount of land managed by local public entities such as municipalities or school districts.

An important dimension of the extensive federal land ownership are payments-in-lieu-of-taxes, or PILT. PILT is a federal program administered by the BLM, which distributes annual payments to local governments that contain qualified federal lands within their jurisdictional boundaries. The payments are intended to help offset the diminished property tax receipts due to nontaxable federal lands within their boundaries.

A county's eligibility for PILT is based primarily on the acres of federal lands in the USFS and national park systems, and lands administered by BLM. A total of 79,182 entitlement acres were located in Alamosa County in FY 2005, with 1,393,880 acres in Saguache County (table 16). Of those lands, the National Park Service manages 13,081 acres in Alamosa County and 117,670 acres in Saguache County. These NPS acreages reflect federal land acquisition and administrative management changes associated with the park and preserve as of October 1, 2004.

Actual PILT payments are affected by congressional appropriation levels. Fiscal year 2005 PILT payments to counties were \$107,594 to Alamosa County and \$456,617 to Saguache County. In recent years, congressional appropriations have funded about 68% of the total PILT entitlements.

Saguache and Alamosa counties also received payments under the Refuge Revenue Sharing Program. Similar in

principle to PILT, this program involves only lands administered by the USFWS. In 2004, payments were \$2,000 to Saguache County and \$10,699 to Alamosa County. The payment to Saguache County reflects lands acquired by the USFWS through September 2004 (Fowler 2005).

Economic Contributions of Great Sand Dunes Park and Preserve

The location and operations of the park function as an important cog in the regional economy. Spending by visitors to the park, as well as NPS personnel and operating and maintenance expenditures, support local business establishments and generate tax revenues to help support local government.

Visitor Spending

Total recreation visits of 268,824 were recorded at the Great Sand Dunes National Park and Preserve in 2004. Of that total, 43,100 visits involved overnight stays in the park; the remainder were day visits. Based on the 2002 Visitor Survey, 64% of the latter were by nonresidents, of which over 90% spent at least one night in the region³. Using procedures developed by the National Park Service to estimate the economic impacts of its operations, these figures result in an estimated total of 135,995 party-days.⁴

³ The visitor survey defined the region as locations within a one-hour drive of the Great Sand Dunes. That radius encompasses Alamosa, Saguache, Crestone/Baca Grande, and other communities within the San Luis Valley.

⁴ A "party-day" is a standardized measure of visitor use that accounts for varying sizes of travel groups, lengths of visit, day versus overnight visits, and multiple entries into a park. Party-days are used to develop economic impact estimates using expenditure data that are typically collected and reported for a group of visitors, i.e., a party, on an average "per day" or "per trip" basis. The expenditure day typically includes camping or overnight lodging expenditures. Since not all visitors stay overnight, converting recreation visits to party-days provides a basis for estimating overall expenditures using average expenditures.

Based on the estimated profile of users to the park, average spending per party-day in the region is estimated at \$90.60, yielding total estimated annual visitor spending associated with the park of \$13.13 million (table 17). Most of the total, \$9.02 million (69%), is by visitors staying overnight in area motels, bed and breakfasts, and other lodging accommodations. Nonlocal day users account for the second-largest share of spending, \$2.79 million or 19%.

An estimated \$9.18 million of the total visitor spending is captured in Saguache, Alamosa, or other nearby counties located within a reasonable distance to accommodate overnight visitors prior to or following their visit. The remaining \$3.96 million leaves the region to cover the cost of goods sold. Locally captured receipts include those by motels, RV parks, and other accommodations, as well as restaurants, cafes, retail merchants, and other recreation and entertainment establishments. Locally captured visitor spending includes nearly \$300,000 in annual purchases of books, maps, and other items sold by the Western National Parks Association at the gift shop in the visitor center. A portion of that total is returned to the park as a contribution via an agreement between the National Park Service and Western National Parks Association.

Total spending by visitors also includes entry and camping fees at the park. In FY 2004, such receipts included nearly \$353,000 in entry fees and \$150,000 in camping fees. A portion of the fees collected by the park accrues directly to the park for use in meeting the backlog of capital facility and maintenance needs.

Overall, visitor spending associated with the park supports an estimated 334 jobs across the region, generating \$4.1 million in annual personal income. This is in addition to jobs and income associated with park

operations and staff, which are discussed in the next section.

Park Operations

The annual budget for NPS operations at the Great Sand Dunes National Park and Preserve represents an economic infusion into the regional economy. Spending of

wage and salary income by NPS employees stimulates induced effects in the region, and spending by the National Park Service on utilities, supplies, and services support additional sales, jobs, and income. The effects of National Park Service operations are in addition to the effect of visitor spending associated with the park.

TABLE 15. LAND OWNERSHIP

County	Total Land Area (Acres)	Ownership (Percent)		
		Federal	State	Private and Local Gov't
Alamosa	462,854	19%	12%	69%
Saguache	2,027,724	69%	4%	27%
Colorado	66,614,084	37%	5%	58%

Source: Colorado Department of Local Affairs 2001, and Department of the Interior 2005

TABLE 16. FEDERAL PAYMENT IN LIEU OF TAXES, FISCAL YEAR 2005

County	Total Land Area (Acres)	PILT Entitlement (Acres)	Entitlement Share of Total	Total PILT Receipts
Alamosa	462,854	79,182	17.1%	\$ 107,594
Saguache	2,027,724	1,393,880	68.7%	\$ 456,617

Sources: Colorado Department of Local Affairs 2001, and Department of the Interior 2005

TABLE 17. ANNUAL SPENDING IN SAN LUIS VALLEY BY VISITORS TO THE GREAT SAND DUNES

Category	User Segment			
	Local Day User	Nonlocal Day User	Motels, B&Bs, etc.	Camping
Spending per Party-Day	\$ 38.11	\$ 45.08	\$ 165.94	\$ 65.69
Party-Days	21,075	32,613	54,372	27,934
Total Spending	\$ 803,000	\$ 1,470,000	\$ 9,022,000	\$ 1,835,000
Total Spending – All Users	\$13,131,000			

Sources: MGM2 and Sammons/Dutton LLC

The annual base operating budget at the park for FY 2002 through FY 2004 averaged about \$1.45 million. An increase in the base budget went into effect in FY 2005, coinciding with the expansion of the park.

In 2004, the park was funded for 22 full- and part-time, year-round employees, plus 21 seasonal employees (six FTEs). The NPS payroll for personnel was \$1.45 million in salaries and benefits, or more than 86% of the total operating budget in fiscal 2004. The National Park Service spent another \$191,000 for utilities, services and travel, supplies, and small equipment items.

National Park Service spending in the local economy in FY 2004 is estimated to have supported 37 jobs in the San Luis Valley, including 28 FTE jobs at the park and an equivalent of nine additional jobs supported by the park's direct local spending and that of NPS employees. NPS operations generated an estimated \$1.66 million of personal income in 2004, including the direct payroll of staff.

Overall, spending by the park and park staff generates an estimated \$1.45 million in expenditures for housing, utilities, transportation, and other goods and services.

Combined Effects of Great Sand Dunes Visitor Spending and Park Operations

The combined effects of Great Sand Dunes visitor spending and park operations include 371 full- and part-time jobs (2.8% of all local jobs), \$15.58 million in spending, and \$5.76 million in personal income. Local spending supports local businesses and generates various fees and tax revenues that help support local government.

Attitudes and Lifestyle Issues Associated with the Park

Although there is no single, established, defined community associated with the Great Sand Dunes, there is a virtual community comprised of the staff, visitors, neighbors and adjacent landowners, park volunteers, American Indians, and many other interested individuals and entities. The latter include local, nonlocal, and even international residents, private enterprises, public-interest groups, governmental agencies, and other institutions and organizations. The broader community also encompasses the property owners and residents of the nearby Zapata subdivision, employees and members of The Nature Conservancy, and the property owners, residents, institutions, and spiritual retreats in Crestone and the Baca Grande subdivision to the north. Many members of the broader community were active in efforts to see the park established and consider themselves to have a vested interest in the park.

Within that broad community exists a wide spectrum of views, perspectives, and attitudes regarding the park itself and associated resources and opportunities. For some, the park is viewed primarily as an outdoor recreational resource, for others a unique and globally significant environment warranting conservation. Even among outdoor enthusiasts, attitudes regarding the park vary among those who seek solitude and backcountry experiences commonly associated with wilderness, those who desire motorized access to large portions of the existing nonwilderness, and those who view the park and the surrounding environs as significant in a metaphysical

or holistic sense, contributing to their spiritual, emotional, or psychic well-being.

Members of this virtual community, be they individuals, groups, or institutions, ascribe to multiple views toward the park, how it presently affects them, and how it could affect them if the park were managed differently in the future. Moreover, many may see both benefits and adverse effects on their personal and community lifestyle, depending on how the park is managed. For example, some residents of the Crestone/Baca Grande community and elsewhere see economic development potentials associated with future recreation use, while also being concerned about the potential traffic impacts of such use. In fact, among local residents, the subject of public access to the northwest part of the park is perhaps the single most critical issue associated with future management of the park, and resolution of that issue may shape their sentiments toward the park over the long term.

HEALTH AND SAFETY

Approximately 260,000 people visited the Great Sand Dunes during 2004 for recreational purposes, primarily during the summer (NPS 2005a). Because of the expanded land base and redesignation as a national park, visitation is expected to increase in the spring, fall, and winter seasons. Total annual recreation visits are projected to reach approximately 375,000 in 2025.

The health and safety of park visitors, staff, and neighbors are of great importance to the National Park Service. Areas of concern related to health and safety identified during the scoping and planning process for this GMP include: dogs, fire, traffic safety within the park, and personal accidents/injuries.

Dogs

Leashed dogs have been allowed in the park (formerly the monument) for years, and are currently allowed throughout the park and preserve. Dogs that are being used for hunting are permitted off-leash in the preserve only⁵. Dogs were also allowed in this area (preserve) prior to 2000, when it was managed by the USFS.

Health and safety concerns related to dogs include visitor injury, intimidation, and annoyance; dog waste in surface waters; and safety/health of dogs themselves (from traversing hot sand or temperature extremes while confined to visitor vehicles). Between 2000 and 2004, no dog bites were reported in the park. No information is available about bites that may have occurred, but were not serious enough to require medical treatment. In the 2002 Visitor Survey question about park safety, only one respondent of 364 mentioned off-leash dogs as a safety concern (NPS 2002). However, the park sometimes receives complaints about aggressive dogs. Because no personal injury incidents have been reported, this health and safety issue is not analyzed in detail in this document. Other topics connected with dogs (e.g., water quality, visitor experience, and wildlife effects) are discussed, however, in separate sections of this document.

⁵ Unleashed dogs, up to eight in a pack, may be used to chase and tree mountain lions in the preserve. As of 2005, the mountain lion hunting season lasted from November 17 to March 31. The preserve is located in Management Unit 82, for which six mountain lion licenses were available in 2005. It is also legal to use unleashed dogs in the preserve to pursue, bring to bay, retrieve, flush, point (but not kill) small game, waterfowl, game birds, or furbearers. Some small game seasons are open year-round.

Fire

Between 1983 and 1997, there was an annual average of 1.3 recorded wildland fires in the park (NPS et al. 2005). One human-caused wildfire began in the Zapata subdivision south of the park in 2000 and burned into the park, destroying a seasonal residence, the amphitheater, plus various signs, barriers, etc. This fire burned approximately 3,000 acres of mostly grassland and shrubland habitat, with some pinyon-juniper and aspen woodlands, plus a riparian area (NPS et al. 2005).

A number of towns, subdivisions, and individual residences are located near the park and could be affected by fires that start in the park. These communities include Crestone/Baca Grande, Moffat, Hooper, Mosca, and Zapata. Park visitors, NPS staff, and Nature Conservancy staff based at Medano Ranch could also be affected, as could Baca National Wildlife Refuge employees. Capacities at various park camping areas include the Pinyon Flats campground (650 people), designated backcountry campsites (42 people), and primitive campsites along Medano Pass Road (400 people). The Nature Conservancy also has guests occasionally at Medano Ranch; most visit between March and October (NPS et al. 2005).

The *Greater Sand Dunes Interagency Fire Management Plan Environmental Assessment / Assessment of Effect* (April 2005), analyzed environmental effects of this cooperative fire management plan. Those discussions are not repeated in this GMP. New fire risks associated with the GMP alternatives are those caused by humans using new areas of the park. In particular, the proposed campground in the northern portion of the park (three public nodes alternative) could pose fire risks. Also, if Medano Ranch buildings are

left unmaintained (dunefield focus—maximize wildness alternative), they could pose a potential structural/wildland fire (accidental or arson) hazard.

Traffic Safety Within the Park

Visitors are directly affected by the experiences they have when they arrive at the park and make their way to its principal features, primarily by automobile. Scenic driving is a common recreational activity in the park (NPS 2002). The main park road provides access to the park headquarters, visitor center, Montville trailhead, dunes access road, amphitheater, Medano Pass primitive road, and Pinyon Flats campground. In addition, numerous turnouts along the main park road provide panoramic views of the dunes and the surrounding mountain ranges (NPS n.d.).

Twenty-three motor vehicle accidents were reported in the park from 2000 to 2004 (see tables below) (NPS 2005b). Of this number, 11 were reported along the main road, accounting for nearly half of all accidents of this type in the park. The highest number of motor vehicle accidents (10) occurred in 2004, and half of those occurred along the main road. With the exception of the year 2002, traffic accidents increased in frequency during 2000–2004. It is not clear whether this trend will continue, but it is likely to if more roads are available and if visitation increases. Eighteen of the 23 accidents occurred during the busiest visitor season (May to September), and the most traveled roads—i.e., the main road and Medano Pass Road—experience the largest number of accidents. These patterns are likely to continue.

TABLE 18. GREAT SAND DUNES ACCIDENTS BY LOCATION 2000–2004

Location	Number	% of Total
Main Road (entrance)	11	48
Medano Road	4	17
Medano Pass	3	13
Dunes Lot	2	9
Campground	2	9
Visitor Center	1	4
Total:	23	100 %

TABLE 19. GREAT SAND DUNES ACCIDENTS BY YEAR 2000–2004

Year	Number	% of Total
2000	2	8
2001	5	22
2002	1	4
2003	5	55
2004	10	44
Total:	23	100 %

When the dunes parking lot fills, visitors park along the shoulders of the dunes lot access road and portions of the main park road. Visitors then walk along the road to reach dunes access points. Although this phenomenon has not resulted in accidents to date, this is a safety concern as visitation is expected to increase. Actions proposed in the GMP alternatives that could (1) introduce accidents in new areas, or (2) increase the number of vehicles in existing areas, and which have the potential to affect the incidence of vehicle, vehicle-pedestrian, vehicle-bicycle, or bicycle-pedestrian accidents include:

- public vehicle access to Medano Ranch headquarters

- public vehicle access to the north part of the park (former Baca Ranch)
- increased parking capacity at the dunes parking area
- multiuse path or bicycle lanes from the park entrance to the visitor center
- hiking/biking path from Pinyon Flats campground to the dunes parking area

Impacts of these actions as they relate to traffic safety are discussed in the environmental consequences chapter.

Personal Accidents/Injuries

Of the nearly 1 million visitors who visited the park and preserve during the period 2000 to 2004, 95 experienced accidents or other health-related incidents. This equals roughly one visitor in every 10,500 (NPS 2005b).

Emergency medical service (EMS) and search and rescue (SAR) records from 2000 to 2004 provide information about visitor safety at the park. During this period, 95 EMS and SAR incidents occurred (NPS 2005b). Of these, six (6%) occurred outside the dunefield area and 89 (94%) occurred in and around the dunefield, including the visitor center and campground. Of the incidents outside the dunefield area, one required both a SAR component and an EMS component. There were 28 SAR incidents and 61 EMS incidents in and around the dunefield. In 18 of 31 SAR incidents, the subjects were found uninjured. The most numerous causes of EMS responses were illness and trauma from falls (NPS 2005b).

New areas open to visitor use or actions in the GMP alternatives that could change the incidence of visitor accidents include:

- visitor use in the north part of park (former Baca Ranch)
- eventual visitor use in the south part of the park (Medano Ranch)
- new hiking trails in the preserve
- allowing historic structures to decline
- encounters with bison

The Medano Ranch and former Baca Ranch areas are open landscapes composed of sand, shrubland, grassland, and riparian corridors. Visitor safety risks in this area include dehydration, heat stroke, lightning, exposure, sudden and unexpected weather changes (frostbite/hypothermia), altitude, and disorientation. In the north part of the park (former Baca Ranch) limited EMS access in the event of an accident is a concern. In the Medano Ranch area, buildings that are allowed to gradually deteriorate by nature's forces and encounters with bison are of interest. To date, there have been no bison/staff or bison/visitor incidents at Medano or Zapata ranches (Robertson 2005).

The mountainous preserve is composed of aspen forests, mixed montane conifer forests, alpine dry tundra and moist meadow, pinyon-juniper woodland, and spruce-fir woodland. This mix of terrain and habitat draws many hikers and campers. New hiking trails could affect the incidence of visitor accidents. Technically challenging terrain, altitude, lightning, dehydration, heat stroke, exposure, frostbite/hypothermia, altitude, disorientation, and restricted EMS access in the event of an accident are of concern.

Various historic buildings, which may or may not be maintained, are located in areas where visitors may be present. Buildings that are left to deteriorate by nature's forces could pose safety risks. Although the National Park Service plans to assess buildings to see if they pose a human safety risk, rapid degradation or a shortage of park staff to monitor the condition of buildings could contribute to unsafe conditions. Unsafe conditions could include hantavirus from rodent habitation, or structural failings such as rotting roofs, floors, or frame. Often, historic habitation sites have hidden pipes, barbed wire, and other sharp metal objects that pose injury risks. Such buildings could also shelter potentially dangerous wildlife such as rattlesnakes.

NATIONAL PARK SERVICE OPERATIONS

Operations and Management

Great Sand Dunes National Park and Preserve is administered by a superintendent and several division chiefs. Management of the park is organized into several functional divisions. As of 2005, there were 28 FTEs. The GMP alternatives could necessitate minor staff increases. When the expanded park is fully staffed, there would be from 33 to 38 FTEs, depending on the alternative. The added staff would address park operational, maintenance, and visitor service needs for an increasing number of visitors, a larger geographic area, and an expanded inventory of access points, trails, equipment, and facilities. Implicit therein would be a need for future increases in the park's annual operating budget. However, overall budgets for the National Park Service are established by congressional appropriation, with budgets for individual units established by allocating the overall

budget among the competing needs within the agency. Future budget constraints could limit or delay increases in the Great Sand Dunes budget, while inflationary effects erode current budgets. These factors would limit future staffing and implementation of GMP elements.

The park also benefits from cooperative arrangements for managing land resources and providing services (and in some cases, sharing of resources). Nonetheless, these arrangements require staff time and other resources to implement. Numerous federal, state, local, and private organizations and agencies work cooperatively with Great Sand Dunes staff.

Administration

The administration division provides coordination and is responsible for park budget, fiscal, and real property management activities. Administration also has responsibility for human resources, information management, and park housing administration. As of 2005, there were 2.2 FTEs in this division.

Friends of the Dunes is a nonprofit citizen's support group for the Great Sand Dunes. The organization provides volunteer and financial aid for Great Sand Dunes projects, assists with visitor education efforts, and promotes recreational opportunities at the dunes. Western National Parks Association is a nonprofit cooperating association of the National Park Service that supports interpretive activities at the park through development of publications, book, and merchandise sales at the visitor center, etc.

Interpretation and Visitor Services

Interpretation includes education services for diverse audiences, interpretation of

identified park themes, staffing the visitor center, and providing information and orientation for park visitors through personal and nonpersonal services (e.g., park Web site, publications, exhibits, and Volunteer-In-The-Parks program). The main base of operations for interpretive staff is the visitor center building. Depending on the GMP alternative, new interpretive staff could be needed at Medano Ranch. As of 2005, there were four FTEs in interpretation.

Visitor services include fee collection and campground management. Fee collection includes revenue management, greeting visitors, visitor safety, and dissemination of resource protection messages. As of 2005, there were 5.5 FTEs in visitor services.

Resource and Visitor Protection

The resource and visitor protection division is responsible for visitor and employee safety, resource protection, emergency response, park and facility patrols, security, emergency medical services, search and rescue, structural and wildland fire, law enforcement, air operations, resource protection education, dispatch, and concession operations in the park. This division also provides emergency and law enforcement response and aid to local, county, and state agencies through cooperative agreements. Addition of the preserve and areas like the former Baca Ranch and Medano Ranch substantially enlarged the boundaries of the old national monument. As a result, the park now includes additional natural and cultural resources that require protection and patrols. More area and more visitors means more need for medical services, law enforcement, dispatch, patrols, resource protection education, fire protection, and search and rescue. As of 2005, there were seven FTEs in this division.

Facility Maintenance

Maintenance is responsible for the operation and maintenance of all park facilities and equipment including: utilities (water, wastewater, power, and solid waste), structures and grounds, front-country and backcountry visitor use areas, trail systems, picnic areas, roads, park signs, and vehicles. New facilities, structures, roads, trails, and use areas will require additional maintenance. As of 2005, there were 7.9 FTEs in this division.

Resource Management / Museum Collections Management

The resource management division is responsible for management of natural and cultural resources. It oversees the research program; consults with outside resource experts, agencies, and associated tribes; plans for future research and management needs; monitors and protects resources; ensures that management has pertinent scientific information on which to base decisions; and provides information for staff and visitor education. As of 2005, there were 6.5 FTEs in this division.

Resource management and museum collections share museum collections management and library management responsibilities. The park's museum collection includes natural objects (floral and faunal specimens), cultural objects and materials, and archives and photographs.

Facilities

The park includes structures within the original national monument, and structures within the park expansion area (Alpine

Camp and structures associated with Medano Ranch, which is currently owned by The Nature Conservancy, but could be transferred to the National Park Service during the life of this GMP). There are also other historic structures in the former monument (e.g., Shockey's cabin, Herard Homestead, etc.), but the GMP would not alter management of these structures.

The National Park Service monitors deferred maintenance in the national park system through the use of an asset tracking system known as the Facility Management Software System. Deferred maintenance is work that should have been done at specific times but was not, primarily due to budget constraints. The National Park Service is striving to reduce the deferred maintenance backlog by prioritizing projects and funding them through various funding sources, including the Fee Demonstration Program.

Park Buildings

National Park Service buildings and structures associated with the original monument include the visitor center, Pinyon Flats campground, amphitheater, comfort stations at the dunes parking lot, park headquarters and entrance station along the main park road, maintenance buildings, horse shelter and corrals, resource laboratory, and park housing area. Table 20 provides sizes for individual structures.

Two new additional housing units would be built in the existing employee housing area under the no-action alternative. No other changes are proposed to any of these areas or structures, so they will not be discussed further in this document.

TABLE 20. NATIONAL PARK SERVICE BUILDINGS AND STRUCTURES

Structure	Sq. Feet	Structure	Sq. Feet
Visitor Center	13,800	Comfort Stations (5)	474
Amphitheater	600	Mission 66 Comfort Station	400
Amphitheater Bridge	—	Dome Comfort Station	616
Entrance Station	667	Water Tank	—
Superintendent’s Residence (headquarters)	1,926	Residential Trailer	980
Resources Lab and Offices	2,560	Residential Trailer	840
Shop	3,716	Residence (3)	1,787
Maintenance Storage Bldg.	2,400	Residence (3)	1,512 ea.
Fire/Search and Rescue Cache	2,220	Residence (apartments)	1,625 ea.
Fee Booth	63	Residence (duplex)	2,661
Horse Barn	1,292	Trailer Pads (2)	—
Wood Shed	203	Well Houses (4)	120 ea.

Alpine Camp. Alpine Camp is proposed for use in all alternatives as a backcountry patrol cabin. This site includes a simple one-room “cabin,” a frame privy, a small one-room tack building, and a corral. Alpine Camp is not discussed further because no changes are proposed for this area.

Medano Ranch. Medano Ranch includes the headquarters complex, which consists of a main ranch house on the north and other buildings located along the edges of the open ranch yard. These buildings roughly form a square. Support facilities for ranch workers are located at the east part of the square, while animal facilities are located on the west and south. A large corral area lies south of the buildings. Several smaller log buildings that are no longer needed for ranching operations are now gone. About half of the original Medano Ranch structures still stand.

Buildings and structures are listed in table 21 (NPS 2004).

Roads and Trails

Roads and trails provide access to many of the park’s natural wonders. Roads provide access to facilities such as the visitor center, picnic areas, and campgrounds. Trails provide access to more remote locations within the park such as lakes, scenic overlooks, mountain passes, and the dunes.

Roads. The main park road is a 4.5-mile, two-lane paved road connecting the main park entrance on the south boundary to the Pinyon Flats campground and amphitheater, which lie at the road’s northern terminus. Piñon Circle is a two-lane paved road running from east to west that provides access to administrative facilities (maintenance area, resource management lab, fire cache facility, and employee residences). The dunes access road is a two-lane paved road running from east to west, connecting the main park road to the dunes parking area and the Mosca Creek picnic loop. Medano Pass primitive road is an unimproved four-wheel-drive road that runs northeast from near the Pinyon Flats

campground through the park and preserve. Cow Camp Road is an improved gravel road in the northwestern portion of the park (NPS n.d.).

At the park headquarters, visitor and employee parking (11 spaces, one wheelchair accessible) is provided north and south of the building. At the visitor center, 54 parking spaces are provided for passenger vehicles, including two wheelchair-accessible spaces and two spaces for RVs and buses. Sixteen spaces are designated for employee parking. The dunes parking areas (north and south) have

a combined capacity of 93 passenger vehicle spaces and 11 oversize spaces (for RVs, trailers, etc.). The Montville trailhead parking area provides 25 passenger vehicle spaces (including one wheelchair accessible), for the Montville Nature Trail, the Wellington Ditch Trail, and the Mosca Pass Trail. The Pinyon Flats amphitheater parking area provides 22 passenger vehicle spaces, including one wheelchair-accessible space and four RV/bus parking spaces. An RV dump station is located near this parking area, which is also used for loading and unloading visitors' horses from trailers (NPS 2005b).

TABLE 21. MEDANO RANCH BUILDINGS AND STRUCTURES

Structure	Description
Main Ranch House	Log ranch house consisting of three small one-story cabins joined together with a log addition to the east (pre-1912 with post-1947 additions)
Bunkhouse/Kitchen	A rectangular building measuring 28 ft 8 in x 21 ft
Cook's House	A small one-story, rectangular log building measuring 29 ft 4 in x 13 ft
Harness Shed	A simple one-story rectangular (26 ft 6 in x 12 ft 4 in) frame building
Draft Horse Barn	A one-story square log building measuring 28 ft x 28 ft
Meat House	Pre-1920 log building measuring 13 ft 6 in
Privy	Pre-1941 frame building measuring 6 ft 4 in x 6 ft 4 in
Cottonseed Cake House	Pre-1930 (possibly 1880s) frame building measuring 40 ft x 19 ft
Corral	Pre-1912 irregular corral measuring approximately 550 ft (east-west) by 300 ft (north-south) with wide central alley (15 ft wide) running east-west
Machine Shed	Post-1947, long rectangular structure measuring 81 ft 5 in x 20 ft 7 in
Metal Silo	Post-1947, cylindrical metal silo of unknown dimensions
Shed	Post-1947 log building measuring 48 ft 1 in x 20 ft 4 in
Machine Shed	Post-1947, long, narrow log building measuring 84 ft 4 in x 25 ft

Roads at Medano Ranch include the main ranch road, which extends north from County Road 6N to ranch headquarters, and then west to Dollar Lake and Hooper. Two four-wheel-drive roads run to Big and Little Springs and numerous smaller two-tracks follow fencelines (Robertson 2005).

Trails. The Montville Nature Trail is a short loop trail located 0.2 mile east of the visitor center. It showcases flora, fauna, and natural park processes. Mosca Pass Trail heads east from the visitor center into the Sangre De Cristo Mountains to Mosca Pass, where it leaves the preserve and becomes a road. From this same trailhead,

the Wellington Ditch Trail extends north to the Pinyon Flats amphitheater and campground. From that point, the trail becomes the Sand Ramp Trail and heads north, skirting the mountain apron, crosses Medano Creek, then heads west to Sand Creek. North of Sand Ramp Trail, the Sand Creek Trail extends to the northeast along Sand Creek to the Sand Creek Lakes. Music Pass Trail connects to Sand Creek Trail east of Sand Creek Lakes. The Dunes Overlook Trail is located off the Sand Ramp Trail, north of Pinyon Flats campground. The Medano Lake Trail extends west from a parking area along Medano Pass primitive road, southwest of the pass summit. There are also several connector trails such as the one between Pinyon Flats campground and the dunefield.

The three public nodes—new dunes experiences and the NPS preferred alternative propose additional trails in the northern portion of the park to provide access to the mountain front.

Campgrounds

Pinyon Flats campground is the only developed campground in the park. Located north of the visitor center, the campground is open year-round and has 88 campsites available on a first-come, first-served basis. Fire grates, picnic tables, flush toilets, and drinking water are available. The campground is located in pinyon-juniper forest and has striking views of the dunes and Sangre de Cristo Mountains. None of the GMP alternatives propose changes to the Pinyon Flats campground. Designated backcountry campsites in the park can accommodate up to 42 people, and primitive campsites along Medano Pass primitive road can accommodate up to 400 people.

The Great Sand Dunes Oasis, which is open seasonally, is located at the entrance to the park. Various facilities are available here, including a store, campground (70 spaces), lodge, RV spaces with hookups, small cabins, showers, and a RV dump station.

San Luis Lakes State Park, located in the low dunes outside the southwest corner of the Great Sand Dunes, includes the 51-site Mosca campground (open seasonally). It features a panoramic view of the lake, the surrounding mountains, and the dunes. All sites have electrical hookups, sheltered tables, fire grates, and drinking water. It also includes a RV dump station and laundry facility, plus a bathhouse with modern restrooms and hot showers. Campsites can accommodate motor homes, trailers, or tents.

The Crestone/Baca Grande community, located immediately north of the park, also has camping facilities. The private Camper Village near Crestone has approximately 10 campsites for RVs (saguache.com 2005). The North Crestone Campground is a USFS campground located 1.2 miles north of Crestone. It has 13 campsites with tables and fire grates. It includes hand pumps for water and vault-style privies (USFS 2005b). The UFO Watchtower private campground, located on SH 17, has a number of primitive sites with no facilities available (ufowatchtower 2005). Commercial campgrounds are also available in Alamosa and Blanca, Colorado.

OTHER ENTITIES AND MANAGEMENT AGENCIES' OPERATIONS

During the development of the GMP, concerns arose relative to the impacts of the various GMP alternatives on the operations of other public land and resource management agencies (particularly CDOW, USFS, and USFWS)

as well as other organizations (e.g., The Nature Conservancy and Lexam). These concerns related to public vehicle access to and through the northern portion of the park, and designation of wilderness (with possible attendant consequences for monitoring, management, and other activities). The bases for these concerns are described below, and the concerns are addressed as an impact topic under “Other Entities and Management Agencies’ Operations” in chapter four.

Public Access Across the Northern Park Boundary

When the Great Sand Dunes National Park and Preserve was established in 2004, the federally acquired Baca Ranch lands within the NPS boundary became open to the public via pedestrian access, but not via public vehicle access. Public pedestrian access to new NPS lands now occurs where public rights-of-way abut the NPS boundary. A key issue in this plan is whether or not to provide public vehicle access to the new northern public lands. Some alternatives in this GMP propose public vehicle access to a small trailhead, parking area, and in one alternative, a small primitive campground. There are a number of planning considerations and constraints regarding such access that involve existing agreements, Saguache County and its residents, and other federal agencies. While this plan has alternatives and a proposal for a backcountry access zone to provide public vehicle access to the northern portion of the park for backcountry use, this GMP does not resolve the question of how such access might ultimately be achieved. It instead leaves flexibility, allowing for ongoing collaboration and planning with the many entities involved.

Cow Camp Road

Cow Camp Road (sometimes referred to locally as Lexam Road) is an improved gravel road located within the Baca National Wildlife Refuge and the northern portion of Great Sand Dunes National Park. Some alternatives in this GMP propose that segments of Cow Camp Road within the national park be designated a backcountry access zone to allow public vehicle access to a small trailhead, parking area, and in one alternative, a campground. Lexam has a surface-use agreement permitting the company to use Cow Camp Road to exercise its subsurface mineral rights within the former Baca Ranch. Lexam’s surface-use agreement will expire in the year 2011, unless Lexam begins producing oil, gas, or minerals on the former Baca Ranch. In that case, the surface-use agreement could be extended beyond the life of this GMP. The surface-use agreement contains language relieving Lexam of liability for others’ use of Cow Camp Road. To allow acquisition of Baca Ranch by the federal government, The Nature Conservancy assumed liability for the federal government’s use of the road. The Nature Conservancy does not wish to assume liability for public vehicle use, so such use would not be allowed until expiration of the Lexam surface-use agreement.

County Roads and Baca Grande Subdivision

Saguache County public roads through the Baca Grande subdivision provide the current public pedestrian access to new northern NPS lands. Camino Real ends 0.2 mile short of the NPS boundary, and the public right-of-way continues to the park boundary. If the county completed the 0.2 mile road to the NPS boundary, the

National Park Service could construct a connection to Cow Camp Road or another primitive road in the backcountry access zone shown in the proposal and some of the alternatives. Public roads within the subdivision do connect to Liberty Road, currently gated and closed to public vehicle use at the NPS boundary (more on Liberty Road below). Residents and others currently park on the county rights-of-way and walk into the national park at the end of Camino Real and Liberty Road. Residents of the subdivision and numerous spiritual retreat centers are concerned about traffic and associated impacts that may occur if public vehicle access to federal lands is developed via one of these public rights-of-way.

Baca National Wildlife Refuge

As described above, some alternatives in this GMP propose that segments of Cow Camp Road within the national park be designated a backcountry access zone to allow public vehicle access for backcountry use. Cow Camp Road extends through the Baca National Wildlife Refuge and was considered during the draft GMP for providing public vehicle access to the park. Early in the NPS planning process, there was a remote possibility of vehicle access for wildlife-dependent public use of the refuge that could also provide national park access. However, the USFWS clarified later in the planning process that for the life of the GMP, the USFWS does not plan to develop wildlife-dependent public use on the east side of the refuge that would require visitors to traverse substantial amounts of refuge habitat and that would facilitate access to the proposed backcountry access zone of the park. Thus, public use of Cow Camp Road or other roads across the refuge to directly access the park would comply with USFWS policy. However, there is an existing Baca

Grande emergency egress easement that could be developed to provide indirect access to the park.

Liberty Road

For the last several decades, Liberty Road has been a Baca Ranch road. As the Baca Grande subdivision was purchased and developed, roads within the subdivision leading to the Liberty Road gate became Saguache County public roads. The roads traverse one of the most densely developed portions of the subdivision and are adjacent to several spiritual retreat centers.

The federal government obtained the remainder of the Baca Ranch and Liberty Road in 2004. Liberty Road, from the park/subdivision boundary south, was privately owned and not open to public use prior to 2004. The first 0.7 mile of Liberty Road crosses NPS land and the road then roughly forms the boundary for about 6.0 miles between the park and the Baca Mountain Tract of the Rio Grande National Forest, with the road lying on USFS lands. The road ends at the Liberty town site.

When the National Park Service obtained jurisdiction of the first 0.7 mile, the agency installed a gate and the road has since been an administrative road only. The National Park Service and the USFS, as well as private landowners to the south, have vehicle access, but the general public does not. The National Park Service allows pedestrian access along Liberty Road. Pedestrians typically park their vehicles on the county road outside the park. To avoid parking congestion from horse trailers, the National Park Service does not currently allow horse access at the northern park boundary.

County roads to the Liberty Road gate provide the only existing public vehicle access to the park boundary, but there are concerns about opening the Liberty gate to provide public vehicle access to public lands. As stated above, county roads to the Liberty gate traverse a densely developed area in Baca Grande subdivision and several spiritual retreat centers whose residents are concerned about potential impacts of traffic. Liberty Road crosses sensitive riparian areas and the route becomes loose sand farther south of those crossings. With regular vehicular use, Liberty Road would quickly become impassible to all but four-wheel-drive vehicles due to sandy conditions. The USFS has not finished planning for the Baca Mountain Tract, so the potential uses in this new USFS area are still unknown. Therefore, the National Park Service cannot analyze the impacts of new uses, and this GMP does not resolve the question of Liberty Road as an access option to the area. Instead, it encourages ongoing collaboration and planning to determine the best option.

Designation of Additional Wilderness

Designation of additional wilderness within the park is recommended in two of the GMP alternatives (NPS preferred alternative and the dunefield focus—maximize wildness alternative). The Wilderness Act of 1964 (Public Law 88-577) provided for the establishment of the National Wilderness Preservation System. The Wilderness Act states, “In order to assure that an increasing population, accompanied by expanding settlement and growing mechanization, does not occupy and modify all areas within the United States and its possessions, leaving no lands designated for preservation and protection in their natural condition, it is hereby declared to be the policy of Congress to

secure for the American people of present and future generations the benefits of an enduring resource of wilderness.” Although there is great similarity between the National Park Service Organic Act and the Wilderness Act, Congress applied the Wilderness Act to the National Park Service to strengthen its protective capabilities. National Park Service *Management Policies 2001*, section 6 states, “The National Park Service will evaluate all lands it administers for their suitability for inclusion within the National Wilderness Preservation System. For those lands that possess wilderness characteristics, no action that would diminish their wilderness suitability will be taken until after Congress and the president have taken final action. The superintendent of each park containing wilderness will develop and maintain a wilderness management plan to guide the preservation, management, and use of the park’s wilderness area, and ensure that wilderness is unimpaired for future use and enjoyment as wilderness.” Therefore, all wilderness categories, including suitable, study, proposed, recommended, and designated, shall be treated as wilderness.

The Colorado Division of Wildlife has expressed concern about the potential consequences of wilderness designation on CDOW efforts to control elk numbers. Declines in bighorn sheep and mule deer populations along the Sangre de Cristo range have been attributed, at least preliminarily, to the burgeoning elk population in and near that mountain range. Growing elk numbers are also thought to be responsible for habitat degradation in portions of the Sangre de Cristo Wilderness. It has been suggested that elk are using the national park as a refuge, since no hunting is allowed on NPS lands outside of the preserve. The CDOW concern is that if additional portions of the park are designated as wilderness, methods for controlling the increasing elk herd,

particularly those requiring use of motorized vehicles (e.g., “hazing” or herding elk to areas where hunting is permissible) will be unavailable. The result could be that the elk population would grow unchecked, resulting in damage to natural habitats and neighboring agricultural areas, further declines in other native ungulate species, and increased risk of a disease outbreak in the elk herd itself.

Wilderness designation does not necessarily preclude the use of ATVs or other vehicles or equipment to carry out needed control actions. The “minimum requirement” concept and “minimum tool” and “primitive tool” procedures, as specified in the Wilderness Act (1964), *NPS Management Policies* (NPS 2001), *National Park Service Reference Manual 41*, and *Minimum Requirement Decision Guide*, could be applied for elk management activities within designated and recommended wilderness areas. The need for active elk management, and the selection of strategies and tactics, would

have to be clearly demonstrated and justified by the cooperative elk/bison study currently being conducted by the National Park Service and others. If that study does demonstrate such a need, elk management actions within designated or recommended wilderness areas would be conducted using minimum impact tactics. Strategies and tactics would be selected commensurate with elk behavior and values to be protected, as well as to minimize long-term environmental impacts. Theodore Roosevelt National Park, most of which is designated wilderness, has made such an evaluation and determined it to be acceptable to use helicopters to round up elk, bison, and horses.

The Colorado Division of Water Resources has expressed concern about the potential impacts of wilderness designation on access to monitoring wells within new wilderness. The minimum requirements process discussed above would also apply to water-monitoring activities.

IMPACT TOPICS CONSIDERED BUT NOT ANALYZED IN DETAIL

MUSEUM COLLECTION

Great Sand Dunes National Park and Preserve’s museum collection consists of prehistoric and historic objects, natural history specimens, artifacts, and archival and manuscript material. The curation facility at the Great Sand Dunes National Park and Preserve, which is located in the NPS visitor center, provides adequate climate-controlled, secure storage for museum collections. There is adequate storage space for the foreseeable future in this facility. The GMP alternatives do not propose any changes to how museum collection items are curated or stored, so

this topic was dismissed from detailed analysis.

ETHNOGRAPHIC RESOURCES

Ethnographic resources are traditional sites, structures, objects, landscapes, and natural resources that communities define as significant to their way of life.

Seinanyédi, An Ethnographic Overview of Great Sand Dunes National Park and Preserve, by David R.M. White, Ph.D., was written for the National Park Service in 2005. This overview identified communities who traditionally have an association

with resources in the San Luis Valley and with Great Sand Dunes National Park and Preserve.

Over 30 American Indian tribes, Spaniards, Mexicans, Mestizo, Hispanics, African Americans, Asian Americans, Pacific Islanders, and European Americans have affiliations with the San Luis Valley and the park. Connections with ethnographic resources were determined in consultation with the Utes, Navajos, Jicarilla Apaches, Keresan Pueblos, Tewa Pueblos, Tiwa Pueblos, and Towa Pueblo of Jemez (White 2005).

Ethnographic resources within and near the park are particularly important to Jicarilla Apaches, Navajos, Puebloan, and Ute peoples. They often visit and collect resources as part of their cultural heritage. Collected resources may include pinyon nuts, various edible and medicinal plants, and sand for sacred sand paintings. Landscape features that pertain to emergence narratives are considered culturally significant. These features include water resources, Mt. Blanca, and areas not disclosed to the public (White 2005).

Ethnographic resources will not be affected by the GMP alternatives. American Indian groups and individuals will continue to be able to collect resources and visit significant areas of the park that they have traditionally visited. This topic was therefore dismissed from detailed analysis. However, a large area within the dunefield considered important by the tribes is addressed in the “Archeology” sections.

FLOODPLAINS

Executive Order 11988 (*Floodplain Management*) requires federal agencies to avoid, to the extent possible, the long- and

short-term adverse impacts associated with occupancy and modifications of floodplains, and to avoid direct and indirect support of floodplain development whenever there is a practicable alternative.

Section 4.6.4 of NPS *Management Policies* states that the National Park Service will manage for the preservation of floodplain values and minimize potentially hazardous conditions associated with flooding. NPS Director’s Order – 77-2 and the accompanying *Procedural Manual* (2003) provide guidance and procedures for implementing floodplain protection and management actions in units of the national park system.

There are a number of alluvial fans along the western foothills of the Sangre de Cristo Mountains. The main park roadway crosses numerous ephemeral stream drainages and one perennial stream (Mosca Creek). The ephemeral streams tend to develop during flood events that occur periodically on the alluvial fans. Mosca Creek is relatively small (average peak flow of less than 5 cfs) and has a small floodplain of no more than 30 feet across. Surface runoff is carried by corrugated culverts under the roadway that occasionally run across the roadway from east to west (NPS 2005c).

The dunes parking lot is situated in the bottomlands adjacent to Medano Creek. Medano Creek is intermittent in this area, generally flowing in the spring and into late summer. When flowing, it is a braided stream that spreads out and moves back and forth across the relatively flat, sandy landscape. Thus, this area lacks a well-defined floodplain such as those associated with more typical, rectangular stream channels. Since this area lacks well-defined floodplains, the statistical parameters used for flood stage, flood frequency, and stream stage cannot be applied here. However, impacts to floodplains associated with providing bicycle lanes on the main park

road (NPS preferred alternative), hiking/biking paths (NPS preferred alternative, dunefield focus—maximize wildness alternative), or new day-use parking areas (dunefield focus—maximize wildness alternative) in the frontcountry zone would be anticipated to be long term, adverse, localized, and negligible. No human risk from floodplains would be associated with these facilities.

A floodplains statement of findings is not required for this project. NPS *Procedural Manual 77-2: Floodplain Management*, B-“Excepted Actions” indicates that exceptions include “picnic facilities, scenic overlooks, foot trails, and small associated daytime parking facilities in non-high-hazard areas provided that the impacts of these facilities on floodplain values are minimized.”

PRIME AND UNIQUE FARMLANDS

In 1980, the CEQ directed that federal agencies must assess the effects of their actions on farmland soils classified by the NRCS as prime or unique. Prime farmland is defined as soils that produce general crops such as common foods, forage, fiber, and oil seed; unique farmland produces specialty crops such as fruits, vegetables, and nuts.

The NRCS has identified several hundred acres of soils north and northeast of the San Luis Lakes State Wildlife Area as “unique farmland,” as “prime farmland if irrigated,” or as “prime farmland if irrigated and reclaimed of excess salts and sodium.” These prime and unique farmland areas, located on Medano Ranch, are owned or leased by The Nature Conservancy. Some are irrigated and used as forage areas for bison on Medano Ranch. None of the GMP alternatives would affect the soil qualities that make these soils prime or

unique. Irrigation might be discontinued under certain alternatives if/when The Nature Conservancy transfers management responsibility to the National Park Service, but the qualities that make these soils suited for forage production or other agricultural uses would be maintained, or could be restored at some point in the future if irrigation were restored. Because no prime or unique farmland soils would be destroyed or converted to uses that would impair their special qualities, this topic was dismissed from detailed analysis.

AIR QUALITY

The Clean Air Act of 1965, as amended (42 USC 7401 *et seq.*) was established to promote the public health and welfare by protecting and enhancing the nation’s air quality. The act established specific programs that provide special protection for air resources and air quality-related values associated with NPS units. Section 118 of the Clean Air Act requires parks to meet all state, federal, and local air pollution standards. NPS *Management Policies 2001* addresses the need to analyze potential impacts to air quality during park planning. Great Sand Dunes National Park is classified as a class I air quality area (Clean Air Act, as amended).

Sources of air pollution within the planning area include automobiles, space and water heating equipment, fuel storage tanks, campfires, wildfires, wood burning stoves, and agriculture. Despite these sources, air quality within the planning area has historically been excellent. In 2001, estimates of emissions at the park were tabulated for many of these sources (NPS Fire Management EA 2005). These estimates indicate that Great Sand Dunes National Park and Preserve has attained state and federal ambient air quality standards.

The Clean Air Act also states that the federal land manager has an affirmative responsibility to protect park air quality-related values from adverse air pollution impacts.

Today, only PM₁₀ (particulate matter) is monitored at the park, and visibility is currently the only air quality resource value known to be affected by pollution (Fred Bunch, pers. comm., 2005). Effects of the GMP alternatives on visibility (primarily from dust plumes from vehicles) are addressed in the “Scenic Resources” and “Visual Quality” sections of this GMP. Other impacts on regional or local air quality from the GMP alternatives would be negligible. Air pollution from sources outside the park would continue to be addressed through Clean Air Act authorities and through cooperative efforts between the National Park Service and other entities. Air quality was therefore dismissed from detailed analysis.

NATURAL SOUNDSCAPE

In accordance with NPS *Management Policies 2001* and Director’s Order – 47: *Sound Preservation and Noise Management*, an important component of the National Park Service mission is preservation of natural soundscapes associated with national park units. Natural soundscapes exist in the absence of human-caused sound. The natural ambient soundscape is the aggregate of all natural sounds that occur in an area, together with the physical capacity for transmitting natural sounds. Natural sounds occur within and beyond the range of sounds that humans can perceive and can be transmitted through air, water, or solid materials. The frequency, magnitude, and duration of human-caused sound considered acceptable varies among NPS units as well as potentially throughout each park unit,

being generally greater in developed areas and less in undeveloped areas.

Noise sources in and around the Great Sand Dunes include visitors and employees, vehicles, motorized and mechanical equipment, aircraft passing overhead, and noise generated from surrounding residential and agricultural areas. A study conducted at the then monument from July 1993 until October 1994 concluded that the background sound level averaged less than 45 decibels 99% of the time, less than 40 decibels (the sound of a library) 90% of the time, and less than 35 decibels 50% of the time (NPS 1995 Ambient Sound Monitoring).

New trails, trailheads, public and administrative use areas, and a primitive campground are proposed in various GMP alternatives and could introduce low levels of sound (especially from human voices and passenger vehicles) into new areas of the park, but this would also have a negligible to minor adverse impact on visitors and employees. During construction, human-caused sounds would increase due to construction-related activities, vehicle traffic, and construction crews. Any sounds generated from construction would be temporary, lasting only as long as the construction activity continues, and would have a negligible to minor adverse impact on visitors and employees. The topic of natural soundscapes was therefore dismissed from detailed analysis.

WILD AND SCENIC RIVERS

Ten streams within the national park and preserve have been evaluated and found eligible and suitable for inclusion in the wild and scenic rivers system (appendix H). The GMP alternatives would not adversely affect the qualities that make these streams eligible and suitable for designation. This

impact topic was therefore dismissed from detailed analysis.

ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL

The implementing regulations of NEPA require that energy requirements, natural or depletable resource requirements, and conservation potential be analyzed. Any differences between the alternatives in terms of these factors would be localized and negligible. This impact topic was dismissed from detailed analysis.

INDIAN TRUST RESOURCES

Secretarial Order 3175 requires that any anticipated impacts to Indian trust resources from a proposed project or action by Department of the Interior agencies be explicitly addressed in environmental documents. The federal Indian trust responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights, and it represents a duty to carry out the mandates

of federal law with respect to American Indian and Alaska Native tribes. There are no Indian trust lands, assets, resources, or treaty rights associated with Great Sand Dunes National Park and Preserve. This impact topic was therefore dismissed from detailed analysis.

ENVIRONMENTAL JUSTICE

Executive Order 12898 requires federal agencies to identify and address disproportionately high and adverse human health or environmental effects of federal programs and policies on minority and low-income populations and communities. Executive Order 13045 requires federal agencies to identify and address disproportionately high and adverse human health or environmental effects of federal programs and policies on children. None of the actions proposed in the GMP alternatives would have a disproportionate and adverse impact on minority populations, low-income populations or communities, or on children. Therefore, environmental justice was dismissed from detailed analysis.



Chapter Four: Environmental Consequences

INTRODUCTION

The National Environmental Policy Act of 1969 mandates that an EIS disclose the environmental impacts of a proposed federal action. In this case, the proposed federal action is the implementation of the GMP for Great Sand Dunes National Park and Preserve. The alternatives in this document provide broad management direction. Thus, this environmental impact statement should be considered a programmatic document. Prior to undertaking specific actions to implement the GMP, park managers will determine if more detailed environmental documents must be prepared, consistent with the provisions of NEPA.

The first part of this chapter discusses terms and assumptions used in the discussions of impacts. The next two parts cover policy and terminology related to cumulative impacts and impairment of park resources. The third part discusses the

relationship of the impact analyses to requirements of section 106 of the NHPA. The impacts of the alternatives are then analyzed in the order they appear in Chapter Two: Alternatives. Each impact topic includes a description of the impacts of the alternative, a discussion of cumulative effects, and a conclusion. Following the discussion for each alternative is a brief discussion, as required by NEPA, of unavoidable adverse effects, effects from short-term uses and long-term productivity, and irreversible and irretrievable commitments of resources.

Mitigation measures that are common to each action alternative are provided in chapter two. In this chapter, mitigation measures are only included for cultural resources, and where mitigation measures specific to that alternative would avoid, minimize, and/or mitigate adverse impacts to the particular resource topic.

TERMS AND ASSUMPTIONS

Each impact topic area includes a discussion of impacts, including the intensity, duration, and type of impact. *Intensity* of impact 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.

Duration of impact considers whether the impact would occur over the short term or long term. *Short-term* impacts are those that, within a short period of time, generally less than five years, would no longer be detectable as the resource or

value returns to its pre-disturbance condition or appearance. *Long-term* impacts refer to a change in a resource or value that is expected to persist for five or more years. The *type* of impact refers to whether the impact on the resource or value would be *beneficial* (positive) or *adverse* (negative).

The impact analyses for the action alternative (NPS preferred, dunefield focus—maximize wildness, and three public nodes) 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.

Note that aside from evaluating the cumulative impacts for certain topics, the planning team did not reexamine decisions and impacts identified by the National Park

Service in the *Great Sand Dunes Interagency Fire Management Plan, Environmental Assessment / Assessment of Effect* (NPS 2005), and *Environmental Assessment / Assessment of Effect, Rehabilitate Main Park Roads* (NPS et al. 2005).

CUMULATIVE IMPACTS

CEQ regulations, which implement NEPA, require assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person takes such other actions” (40 CFR 1508.7).

Cumulative impacts are considered for both the no-action and the action alternatives. These impacts were determined by combining the impacts of the alternatives 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 Great Sand Dunes and in the surrounding area. The geographic scope for this analysis was the northern San Luis Valley, and the temporal scope was within five to seven years of 2005. The following actions or projects were identified for the purposes of conducting the cumulative effects analysis:

GREAT SAND DUNES NATIONAL PARK AND PRESERVE ACT (2000)

This act authorized a change in the designation of Great Sand Dunes from a national monument to a national park, established the national preserve, and authorized establishment of the 92,617-acre Baca National Wildlife Refuge. A comprehensive conservation plan for the refuge has not been scheduled, but will provide details regarding future management. The act also added Kit Carson Peak and surrounding lands (13,599 acres in all) to the Rio Grande National Forest. Planning for the new USFS Baca Mountain Tract began in 2006.

NATIONAL PARK SERVICE VISITOR CENTER RENOVATION (2004)

Renovations to the NPS visitor center at the Great Sand Dunes were completed in September 2004. The project included constructing additions to the southwest and northeast ends of the existing building; providing expanded and improved spaces for visitor information, orientation, and interpretation; providing new exhibits; and supplying more functional spaces for NPS operations (interpretive offices and work space, ranger offices, first-aid room, conference room, curatorial storage, etc.).

DISCONTINUATION OF CATTLE GRAZING ON THE FORMER BACA RANCH (2004)

In the fall of 2005, ownership of the Baca Ranch was transferred to the federal government. Soon thereafter, cattle grazing was discontinued on these former ranch lands lying within the national park.

GREATER SAND DUNES INTERAGENCY FIRE MANAGEMENT PLAN (2005)

This plan outlines prescribed fires, fire suppression, and fuel reduction/management activities for approximately 275,000 acres of the greater Sand Dunes area, including the park, Baca National Wildlife Refuge, and The Nature Conservancy's Medano-Zapata Ranch.

DEVELOPMENT/EXPANSION OF RETREAT CENTERS IN THE BACA GRANDE AREA (PAST, ONGOING)

The Baca Grande is a private, mostly residential development on the north part of the expanded national park. The easternmost portion of the Baca Grande was set aside to accommodate various spiritual and religious retreat centers located primarily in the forested foothills. The number of retreat centers continues to grow, and today includes about 20 organizations representing a wide cross-section of world spiritual and religious institutions. Many of these retreats have short- and/or long-term visitors and residential members/staff.

GROWTH OF THE CRESTONE / BACA GRANDE AREA (PAST, ONGOING)

Development interest in the Baca Grande subdivision and adjacent community of Crestone increased during the period leading up to and since the Great Sand Dunes Act of 2000. The Baca Grande subdivision currently has over 600 dwelling units, many of which are currently used occasionally or seasonally. This residential community has recently experienced an increased pace of growth, and the number of residential units could more than triple during the life of this GMP.

WILDERNESS RESTORATION IN THE SOUTH COLONY LAKES BASIN AREA (ONGOING)

South Colony Lakes basin, located within the Sangre de Cristo Wilderness and the San Isabel National Forest, lies north of the national preserve. The basin is ringed by rugged alpine peaks and is heavily used by recreationists. The USFS, with assistance from the Rocky Mountain Field Institute, is working to improve the natural ecological conditions and wilderness values of the basin through mitigation of recreational threats to biological and physical resources and restoration of damaged sites. Recent work includes refining hiking/climbing routes and trails, closing social trails, and restoring damaged sites and slopes.

OIL AND GAS EXPLORATION ACTIVITIES ON FORMER BACA RANCH LANDS (PAST, FUTURE)

Lexam Explorations, Inc. ("Lexam") retains subsurface mineral rights to most of the former Baca Ranch. Lexam has conducted oil and gas exploration activities on lands that were formerly part of the Baca

Ranch, but are now within the national park. Continuation of these activities, which include exploratory drilling and seismic testing using “thumper trucks,” is reasonably foreseeable for the near future. However, Lexam and others retaining subsurface mineral rights within Great Sand Dunes National Park and Preserve must now conduct such activities according to 36 CFR 9, subpart B, which regulate activities in the exercise of rights to oil and gas that are not owned by the United States. These regulations are designed to ensure that such activities are conducted in a manner consistent with park purposes, preventing or minimizing damage to the environment and other resource values, and ensuring to the extent feasible that all national park system units are left unimpaired for the enjoyment of future generations. The regulations require an NPS-approved plan of operations.

REHABILITATE MAIN PARK ROADS AND PARKING (2006)

The National Park Service recently rehabilitated the main park road, the dunes lot access road, and associated parking areas at Great Sand Dunes by improving the condition of the pavement and its underlying structure. The dunes parking area was expanded (~5% additional paved surface) and reconfigured to improve traffic flow and increase parking for buses and RVs.

ESTABLISHMENT OF A WATER RIGHT TO FULFILL THE PURPOSES OF THE NATIONAL PARK AND PRESERVE (FUTURE)

The Great Sand Dunes Act of 2000 directed the Secretary of the Interior to appropriate water for maintaining groundwater levels, surface water levels, and stream flows on,

across, and under the national park and preserve, to accomplish the purposes of the national park and preserve, and to protect park resources and park uses. The National Park Service has filed for such a right in state water court and park managers are working to establish this water right.

RELOCATE HORSE LOADING AREA AND RV DUMP STATION FROM AMPHITHEATER PARKING LOT (FUTURE)

The National Park Service plans to relocate the horse loading area and RV dump station from the amphitheater parking area to the west side of the main park road. The horse loading area would have a dirt surface and the RV dump station surface would be paved.

SALE/DEVELOPMENT OF PRIVATE LAND PARCELS NEAR THE PARK ENTRANCE (FUTURE)

At the time of this writing, a private land parcel, about 40 acres in size, was for sale near the park entrance. The parcel is located on the west side of SH 150, inside the expanded park boundary. This parcel is currently zoned rural. Within rural zoning, agricultural operations are allowed, including construction of single-family residences. Because there is a commercial operation across SH 150 from this parcel, it is reasonably foreseeable that the parcel, once purchased, could be rezoned to commercial.

ELK HERD REDUCTION (FUTURE)

The size of the northern San Luis Valley elk herd has grown to nearly 6,000 animals, which is well above the 1,500-animal herd objective set by CDOW. A three-year

cooperative research study is underway that will provide much needed information on elk movements, distribution, and habitat selection. This information will be used in

the preparation of an interagency elk management plan, which is expected to include strategies for reducing the size of the elk herd.

IMPAIRMENT OF NATIONAL PARK RESOURCES

National Park Service *Management Policies 2001* require analysis of potential effects to determine whether or not alternatives or actions would impair park resources. 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 seek ways to avoid, or minimize to the greatest degree practicable, adversely impacting park resources and values. However, laws do give NPS managers discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of the park, so long as the impact does not constitute impairment of the affected resources and values.

Although Congress has given the National Park Service the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the National Park Service must leave park resources and values unimpaired unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values. An impact to

any park resource or value may constitute impairment, but an impact would be more likely to constitute impairment to the extent that it has a major or severe adverse effect on a resource or value whose conservation is:

- necessary to fulfill specific purposes in the establishing legislation or proclamation of the park
- key to the natural or cultural integrity of the park
- identified as a goal in the park's general management plan or other relevant National Park Service planning documents

Impairment may result from NPS activities in managing the park, visitor activities, or activities undertaken by concessioners, contractors, or others operating in the park. A determination on impairment is made in the "Conclusion" section for the following resource topics: archeology, historic structures, cultural landscapes, vegetation, ecologically critical areas, federal threatened and endangered species, wildlife, soils and geologic resources, wetlands, and water resources.

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

In this GMP, impacts to cultural resources are described in terms of type, context, duration, and intensity, which is consistent with the regulations of the CEQ that implement NEPA. CEQ regulations and NPS *Conservation Planning, Environmental Impact Analysis and Decision-making* (Director's Order – 12) call for a discussion of mitigation, as well as an analysis of how effective mitigation would be in reducing the intensity of a potential impact (e.g., reducing the intensity of an impact from major to moderate or minor). Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation under NEPA only.

Section 106 of the NHPA (16 USC 470(f)) requires federal agency officials to take into account the effects of their undertakings on historic properties, and to afford the ACHP an opportunity to comment. ACHP regulations (36 CFR 800) outline procedures for federal agency officials to follow in complying with section 106.

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 800.16(i)). According to the criteria of adverse effect in ACHP 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 that “*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 SHPO and other consulting parties (possibly including the ACHP) regarding measures to avoid, minimize, or mitigate adverse effects to a historic property. These agreed-upon measures are memorialized in a memorandum of agreement that is signed by the agency, SHPO, and other consulting parties.

The ACHP regulations do not specify thresholds for effects and do not recognize adverse versus beneficial effects. Effects are determined relative to the character-defining features of the NRHP-listed or eligible property—36 CFR 800 does not define what constitutes mitigation, but it provides a process for determining appropriate mitigation in consultation with the SHPO 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.

The impact analyses in this GMP are for the purposes of NEPA. They are intended to assist the National Park Service with coordinating its compliance with NEPA and section 106 of the NHPA. However, it must be emphasized that the National Park Service does not intend to use this GMP/EIS to meet section 106 compliance for actions discussed in the document in accordance with 36 CFR 800.8(c). This was clarified in a meeting with staff of the Colorado SHPO on September 19, 2006, and represents a divergence from previous statements. The National Park Service will comply with section 106 in accordance with 36 CFR 800 as it continues land and resource planning and refines its management options with alternatives

analyses and specific proposals. As is required under 36 CFR 800, the National Park Service will consult with the Colorado SHPO and other consulting parties to determine areas of potential effects; to identify cultural resources and evaluate their NRHP eligibility; to determine effects on historic properties; and to 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). A section 106 summary is included for each of the cultural resource topics discussed (NPS preferred alternative only).

METHODS AND ASSUMPTIONS FOR ANALYZING IMPACTS

ARCHEOLOGY

Archeology site locations within the park were obtained from recent technical reports and the Colorado SHPO. Recent archeological survey reports that contained survey boundaries and recently recorded sites and their locations were obtained from the consultant that conducted the research in the area. Referenced material included the prehistoric context, literature of archeological research in the San Luis Valley, 36 CFR 800, compliance documents, and park literature and maps. Professional archeologists were also consulted regarding site integrity and distribution.

Applying CEQ regulations for NEPA analysis, the thresholds for the intensity of impacts on archeological sites are defined as follows:

Negligible: Impacts are at the lowest levels of detection—barely perceptible and not measurable.

Minor – Adverse: Impacts are measurable or perceptible, but slight and localized within a relatively small area of a site or group of sites. Impacts do not affect the character-defining features of a NRHP-eligible or listed site.

Minor – Beneficial: Impacts would act as a preservation mechanism.

Moderate – Adverse: Impacts are measurable and perceptible, change one or more character-defining features, but do not diminish the integrity of the site to the extent that its NRHP eligibility is jeopardized.

Moderate – Beneficial: Stabilization of a site.

Major – Adverse: Impacts are substantial, noticeable, and permanent. The impact is severe or of exceptional benefit. For NRHP-eligible or listed sites, the impact changes one or more character-defining features, diminishing the integrity of the resource to the extent that it is no longer eligible for listing in the NRHP.

Major – Beneficial: Intervention and preservation of a site.

HISTORIC STRUCTURES

Information regarding historic buildings and structures was compiled from a variety of resources. The Colorado SHPO was consulted for building and structure site records as well as planning and compliance reports. Secondary historical references from libraries and planning, compliance, research, and survey reports were compiled from consultants who have conducted research in the area. Park resource specialists and knowledgeable individuals were also consulted.

Applying CEQ regulations for NEPA analysis, the thresholds for the intensity of impacts on historic buildings and structures are defined as follows:

Negligible: Impacts are at the lowest levels of detection—barely perceptible and not measurable.

Minor – Adverse: Alteration of a feature(s) would not diminish the overall integrity or character-defining features of a NRHP-eligible or listed building structure or district.

Minor – Beneficial: Stabilization/preservation takes place in accordance with the *Secretary of the Interior’s Standards for the Treatment of Historic Properties*.

Moderate – Adverse: Impacts to a NRHP-eligible or listed building, structure, or district would change the character-defining features of the resource, but does not diminish the integrity of the resource to the point of being ineligible.

Moderate – Beneficial: Rehabilitation of a structure takes place in accordance with the *Secretary of the Interior’s Standards for the Treatment of Historic Properties*.

Major – Adverse: Impacts to a NRHP-eligible or listed building, structure, or district would change character-defining features of a resource, diminishing the integrity of the resource to the extent that it is no longer eligible for listing in the NRHP.

Major – Beneficial: Restoration of a structure would take place in accordance with the *Secretary of the Interior’s Standards for the Treatment of Historic Properties*.

CULTURAL LANDSCAPES

Information regarding cultural landscapes was compiled from a variety of resources. The Colorado SHPO was consulted for resource locations and site records as well as planning and compliance reports. Secondary references were collected from libraries and planning, compliance, research, and survey reports were compiled from consultants who have conducted research in the area. Park resource

specialists and knowledgeable individuals were also consulted.

Applying CEQ regulations for NEPA analysis, the thresholds for the intensity of impacts on historic buildings and structures are defined as follows:

Negligible: Impacts are at the lowest levels of detection—barely perceptible and not measurable.

Minor – Adverse: Alteration of a feature(s) would not diminish the overall integrity or character-defining features of a NRHP-eligible or listed cultural landscape.

Minor – Beneficial: Preservation of landscape patterns and features would occur in accordance with the *Secretary of the Interior’s Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*.

Moderate – Adverse: Impacts to a NRHP-eligible or listed cultural landscape would change the character-defining features of the landscape, but does not diminish the overall integrity of the resource to the point of being ineligible.

Moderate – Beneficial: Rehabilitation of a landscape or its patterns and features would occur in accordance with the *Secretary of the Interior’s Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*.

Major – Adverse: Impacts to a NRHP-eligible or listed cultural landscape would change character-defining features of a landscape, diminishing the integrity of the

resource to the extent that it is no longer eligible for listing in the NRHP.

Major – Beneficial: Restoration of a landscape or its patterns and features would occur in accordance with the *Secretary of the Interior’s Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*.

VEGETATION

Available information describing vegetation included existing research reports, planning documents, regional taxonomic keys, state programs, national databases and mapping efforts, and consultation with park specialists; this information was gathered, reviewed, and summarized. Vegetation distribution and species composition information was obtained from written reports and plant lists prepared by the CNHP and from CDOW GAP mapping efforts. Wetlands and rare plant species and habitats are discussed under the “Wetlands” and “Ecologically Critical Areas” sections, respectively, and are not re-examined here. Specific impact elements are discussed here in relation to the life zones and in relation to each assessed alternative.

Impacts to vegetation were evaluated by comparing projected changes resulting from GMP alternatives to existing conditions or the no-action alternative, as appropriate. These evaluations were based on consideration of park fundamental resources and values, information concerning life zone and plant community distribution and species composition, and professional experience. Driving variables used to examine impacts included habitat parameters such as soils and their stability,

topography, presence of nonnative plant species, existing land use and adjacent land use, and the potential for social trail establishment.

The thresholds to determine vegetation/plant community impacts are defined as follows:

Negligible. Impacts are barely detectable and/or would affect a minimal area of vegetation. Impacts to the plant communities at key organizational levels are not detectable in the short term and are not expected in the long term.

Minor. Impacts are slight but detectable, and/or would affect a small area of vegetation. The severity and timing of changes are not expected to be outside natural variability and not expected to have long-term effects on plant communities. Vegetation patterns may have short-term disruptions on a broad spatial scale. Key ecosystem processes may have short-term disruptions that are within natural variability, and habitat for all species remains functional.

Moderate. Impacts are readily apparent and/or would affect a large area of vegetation. The severity and timing of changes are expected to be outside natural variability for short periods and changes within natural variability may be long term in nature. Vegetation patterns may experience permanent disruption or loss on a limited spatial scale. Key ecosystem processes may have short-term disruptions that are outside natural variability, and habitat for all species remains functional.

Major. Impacts are severely adverse or exceptionally beneficial and/or would affect a substantial area of vegetation. The severity and timing of changes are expected to be outside natural variability for short to long periods or to be permanent. Changes within natural variability may be long term or permanent. In extreme cases, species may be extirpated from the park and vegetation patterns simplified, key ecosystem processes may be disrupted, or habitat for species rendered not functional.

ECOLOGICALLY CRITICAL AREAS

Available information describing ecologically critical areas (defined for this GMP as CNHP potential conservation sites with a rank of B1 or B2) was compiled and reviewed from existing research reports, planning documents, state and federal natural areas and state heritage programs, and consultation with park specialists. During analysis of the ecological aspects of the park area and selection of ecologically critical areas, several potential impact types recognized and described by state heritage program and university researchers (e.g., hydrologic modification, residential development, mining, grazing livestock, recreation, road construction, and invasion of nonnative species) were noted. These potential impact types and others (e.g., visitor use) were then considered for each GMP alternative. This section also addresses impacts in an ecosystem context to rare park plants identified by the CNHP as deserving of special attention and protection (CNHP 1998).

Impact thresholds for this topic are defined as follows:

Negligible: The impact is barely detectable and/or would affect a minimal area of upland, riparian, or wetlands habitat, but no individuals or populations of important plant and/or animal species and/or plant communities within an ecologically critical area. Impacts to the composition and function of ecosystems at key organizational levels are not detectable in the short term and are not expected in the long term.

Minor: The impact is slight, but detectable, and/or would affect a small area of upland, riparian, or wetlands habitat, but no individuals or populations of important plant and/or animal species and/or plant communities within an ecologically critical area. The severity and timing of changes to parameter measurements are not expected to be outside the natural variability and not expected to have any long-term effects on biological, abiotic, or ecosystem resources. Certain common patterns may have short-term disruptions on a broad spatial scale. Key ecosystem processes may have short-term disruptions that are within natural variability, and habitat for all species remains functional.

Moderate: The impact is readily apparent and/or would affect a large area of upland, riparian, or wetlands habitat for and individuals or populations of important plant and/or animal species and/or plant communities within an ecologically critical area. The severity and timing of changes to parameter measurements are expected to be outside the natural variability for short periods and changes within the natural variability may be long term

in nature. Ecosystem patterns may experience permanent disruption or loss on a limited spatial scale. Key ecosystem processes may have short-term disruptions that are outside natural variability, and habitat for all species remains functional.

Major: The impact is severely adverse or exceptionally beneficial and/or would affect a substantial area of upland, riparian, or wetlands habitat for and/or many individuals or populations of important plant and/or animal species and/or plant communities within an ecologically critical area. The severity and timing of changes to parameter measurements are expected to be outside the natural variability for short to long periods or to be permanent. Changes within natural variability may be long term or permanent in nature. In extreme cases, species may be extirpated from the park and ecological patterns simplified, key ecosystem processes may be disrupted, or habitat for any important species is rendered not functional.

FEDERAL THREATENED AND ENDANGERED SPECIES

In accordance with 50 CFR 402(a), federal agencies are required to review all actions to determine whether an action may affect listed species or critical habitat. If such a determination is made, formal consultation is required unless the federal agency determines, with the written concurrence of the USFWS, that the proposed action is not likely to adversely affect any listed species or critical habitat. It is NPS policy to survey for, protect, and strive to recover all species native to national park system units that are

listed under the Endangered Species Act. The National Park Service strives to fully meet its obligations under the National Park Service Organic Act and the Endangered Species Act to both proactively conserve listed species and prevent detrimental effects on these species by cooperating with the USFWS to ensure that NPS actions comply with both the written requirements and the spirit of the Endangered Species Act (NPS 2001), and cooperating with the USFWS and other agencies/entities to facilitate delineation of critical habitat, development and implementation of species recovery plans and candidate conservation agreements, and to proactively manage for proposed and candidate species.

Federally listed threatened and endangered species were evaluated using NEPA analysis and Endangered Species Act determinations as defined in 50 CFR 402 and the *Endangered Species Consultation Handbook* (1998). Based on this analysis, the federally listed threatened and endangered species and federal candidate species that have the potential to occur within the park, with the exception of the southwestern willow flycatcher, yellow-billed cuckoo, bald eagle, Mexican spotted owl, and Canada lynx, were dismissed as impact topics (see table 2). Anticipated impacts to the southwestern willow flycatcher, yellow-billed cuckoo, bald eagle, Mexican spotted owl, and Canada lynx are discussed in this chapter.

Impacts to the addressed federally listed or candidate species were evaluated by comparing projected changes resulting from GMP alternatives to existing conditions or the no-action alternative, as appropriate. These evaluations were based on the presence of potential habitat within the park, and on the potential presence of each species in the park as no established populations are known for any of the

addressed species. No critical habitat for any of the addressed species occurs in the park.

Interagency meetings were held throughout the development of this GMP. Input from these meetings indicated two aspects of the plan alternatives that should be evaluated relative to potential impacts on the federally listed or candidate species retained as impact topics. These two aspects related to (1) the potential for increased visitor use of backcountry areas, particularly in the upper reaches of the preserve where potential Canada lynx and Mexican spotted owl habitat occurs, but also in lower elevation backcountry areas relative to potential southwestern willow flycatcher, yellow-billed cuckoo, and bald eagle habitat, and (2) differences in the alternatives relative to leashed dogs and their potential impacts on Canada lynx.

Impact thresholds for the addressed federally listed or candidate species are defined as follows:

Negligible: An action that could result in a change to a population or individuals of a species, but the change would be so small that it would not be of any measurable or perceptible consequence.

Minor: An action that could result in a change to a population or individuals of a species. The change would be measurable, but small and localized and of little consequence.

Moderate: An action that would result in some change to a population or individuals of a species. The change would be measurable and of consequence, beneficial, or adverse.

Major: An action that would result in a noticeable change to a

population or individuals of a species. The change would be measurable and either result in a major beneficial or adverse impact on a population or individuals of a species.

WILDLIFE, INCLUDING COLORADO STATE-LISTED SPECIES

National Park Service policy (NPS 2001) dictates that, to the greatest extent possible, parks will inventory, monitor, and manage state and locally listed species in a manner similar to the treatment of federally listed species. In addition, the parks are to inventory other native species that are of special management concern to parks (such as rare, declining, sensitive, or unique species and their habitats) and manage them to maintain their natural distribution and abundance (NPS 2001).

The National Park Service determines all management actions for the protection and perpetuation of federally, state, or locally listed species through the park management planning process, and includes consultation with lead federal and state agencies, as appropriate.

Animal species listed by the state of Colorado as threatened, endangered, or as species of special concern that have the potential to occur within the park (see table 2), were analyzed relative to the anticipated impacts of, and differences of those impacts among the four alternatives. The analysis indicated that the alternatives may have the potential to affect species associated with riparian corridors, including the following state-listed species:

- Rio Grande sucker – state endangered
- Rio Grande chub – state species of special concern

- Rio Grande cutthroat trout – state species of special concern
- Townsend’s big-eared bat – state species of special concern

and wetlands-associated species, including:

- greater sandhill crane – state species of special concern

These taxa are evaluated below, along with general wildlife members of their communities including, as a group, migratory bird species associated with wetlands habitats that may be affected by cessation of irrigation on the former Medano Ranch. This grouping of species is intended to focus the reader on impacts to species sharing habitats, and to simplify explanation of those impacts. Additional wildlife that may be differentially affected by the proposed alternatives includes mule deer, elk, and bighorn sheep. Management of elk numbers may vary under the different alternatives, having different consequences for mule deer and bighorn sheep numbers and herd health; therefore, potential impacts to these species are evaluated jointly below. The alternatives differ with regard to the presence of leashed dogs within the preserve. As these differences may have varying impacts on bighorn sheep, potential impacts to bighorn sheep are also evaluated.

Impacts to Colorado state-listed wildlife species and wildlife (includes terrestrial and aquatic species) were evaluated by comparing projected changes resulting from GMP alternatives to existing conditions or the no-action alternative, as appropriate. Input from management agencies such as USFS and CDOW was acquired via interagency meetings and subsequent interactions. Input from these meetings and interactions indicated the following topics relating to Colorado state-

listed wildlife species and wildlife species need to be addressed:

- potential impacts of alternatives on species occurring in or associated with riparian corridors (Rio Grande sucker, Rio Grade cutthroat trout, and Townsend’s big-eared bat)
- potential impacts of alternatives on greater sandhill cranes and other wetlands-associated migratory bird species
- potential impacts of alternatives on ungulate (elk, mule deer, and bighorn sheep) herd numbers and health
- potential impacts of alternatives, specifically relative to leashed dogs in the national preserve on bighorn sheep

Impact thresholds for Colorado state-listed wildlife species and wildlife are defined as follows:

Negligible: Impacts to Colorado state-listed wildlife species and wildlife species would not be observable or measurable and would be well within the range of natural variability.

Minor: Impacts to species or their habitat would be detectable, but still within the range of natural variability, and would be short term. Demographic and genetic factors may have small, short-term changes, but long-term characteristics would remain stable. No interference with feeding, reproduction, or other activities affecting population viability would result from the impacts. Sufficient functional

habitat would remain to support viable populations.

Moderate: Impacts on activities necessary for survival and on species habitats can be expected on an occasional basis, but are not anticipated to threaten potential or continued existence of the species in the park. Changes to species demography, behavior, or genetic structure could be outside the natural range of variability, but only for short periods of time.

Major: Impacts to Colorado state-listed species and wildlife species or their habitats would be detectable, outside the natural range of variability, and long term or permanent.

SOILS AND GEOLOGIC RESOURCES

Information describing soils and geologic resources was compiled and reviewed from existing research reports, planning documents, and consultation with park specialists. During analysis of the soils and geologic resources of the park area, several potential impact types were recognized and described: soil compaction and erosion (from visitor use), disruption of geologic processes, and soil disturbance or destruction. These are discussed in relation to each assessed alternative.

The thresholds to determine the intensity of impacts to soils or geologic resources are defined as follows:

Negligible: The impact is barely detectable and/or would result in no measurable or perceptible changes to soils or geologic resources.

Minor: The impact is slight, but detectable and/or would result in small but measurable changes in soils or geologic resources; the effects would be localized.

Moderate: The impact is readily apparent and/or would result in easily detectable changes to soils or geologic resources; the effects would be localized.

Major: The impact is severely adverse or exceptionally beneficial and/or would result in appreciable changes to soils or geologic resources; the effects would be regionally important.

WETLANDS

Available information describing wetlands included existing research reports, planning documents, state programs, national mapping efforts, and consultation with park specialists; it was gathered, reviewed, and summarized for this document. Wetlands distribution information was obtained from written reports prepared by the CNHP and from CDOW GAP and USFWS *National Wetlands Inventory* mapping efforts. Based on the available *National Wetlands Inventory* maps for the park, it seems that efforts to map wetlands to date have focused on particular areas (e.g., the southwest portion of the national park, Sand Creek, and Medano Creek). As a result, wetlands in other park areas (for example, those along Deadman Creek, Cold Creek, and Pole Creek) are not shown on the *National Wetlands Inventory* maps. For the purposes of assessing impacts, it was assumed that wetlands (as defined by the National Park Service) do in fact, exist in such areas despite the fact that they are not shown on the *National Wetlands Inventory* map.

Wetlands are a protected resource managed under federal executive and director's orders:

Executive Order 11990 was issued in 1977 "to avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative." This order directs the National Park Service to: (1) provide leadership and to take action to minimize the destruction, loss, or degradation of wetlands; (2) preserve and enhance the natural and beneficial values of wetlands; and (3) to avoid direct or indirect support of new construction in wetlands unless there are no practicable alternatives to such construction and the proposed action includes all practicable measures to minimize harm to wetlands.

Approved in 1998, Director's Order – 77-1: *Wetland Protection* (NPS 1998) was developed for use by the National Park Service in carrying out its responsibilities under Executive Order 11990. The general policies, requirements, and standards included in the manual are: (1) no net loss of wetlands and a long-term goal of net wetlands gain, (2) parkwide wetlands inventories, (3) restoration and enhancement of degraded wetlands habitats, (4) planning and siting facilities to avoid or minimize effects to wetlands, (5) restoration of degraded wetlands as compensation for adverse effects to wetlands, and (6) compliance with federal environmental regulations.

Impacts to wetlands were evaluated by comparing projected changes resulting from GMP alternatives to existing conditions or the no-action alternative, as appropriate. These evaluations were based on consideration of the park's fundamental

resources and values, information concerning wetlands distribution and functional values, and professional experience. Driving variables used to examine impacts included surface and groundwater hydrology, water quality and quantity, topography, and existing land use. Because it can be difficult to separate wetlands from riparian habitats, both are included in this analysis.

The thresholds to determine wetlands impacts are defined as follows:

Negligible. The impact is barely detectable and/or would result in no measurable or perceptible changes to wetlands.

Minor. The impact is slight but detectable and/or would result in small but measurable changes in wetlands and/or wetlands hydrology; the effects would be localized.

Moderate. The impact is readily apparent and/or would result in easily detectable changes to wetlands and/or wetlands hydrology; the effects would be localized.

Major. The impact is severely adverse or exceptionally beneficial and/or would result in appreciable changes to wetlands and/or wetlands hydrology; the effects would be regionally important.

WATER RESOURCES

Information describing water resources was compiled and reviewed from existing research reports, planning documents, and consultation with park specialists. During analysis of the water resources of the park

area, several elements were considered to determine impacts, including water rights, surface and groundwater hydrology, surface and groundwater quality and quantity, topography, and existing land use. Specific impact elements are discussed in relation to each assessed alternative.

The thresholds to determine water resources impacts are defined as follows:

Negligible. The impact is barely detectable and/or would result in no measurable or perceptible changes to water resources.

Minor. The impact is slight but detectable and/or would result in small but measurable changes in water resources; effects would be localized.

Moderate. The impact is readily apparent and/or would result in easily detectable changes to water resources; effects would be localized.

Major. The impact is severely adverse or exceptionally beneficial and/or would result in appreciable changes to water resources; effects would be regionally important.

VISITOR USE AND EXPERIENCE

Information concerning visitors and their opinions in and around the Great Sand Dunes was gathered and reviewed. This information included visitor surveys, public use statistics, casual and written visitor and public comments, and impressions gathered by experienced park staff.

Visitor use projections were based on analysis of past visitation trends and patterns at the park, input developed by the

planning team regarding reasonably foreseeable use associated with the various management zones and activity sites, and long-term development and population forecasts for nearby communities, the region, state, and nation. The use projections are presented here to help readers understand how visitor experience would be affected by changes in use levels. However, the use projections also provide a context for other impact topics (for example, socioeconomic impacts and impacts on NPS operations) discussed elsewhere in this chapter.

Impacts on the visitor experience were evaluated by comparing projected changes resulting from the GMP alternatives to existing conditions or the no-action alternative, as appropriate. These evaluations were based on consideration of the park's fundamental resources and values, information about what contributes or detracts from desirable visitor experiences at the park (from visitor surveys and comments), and professional experience.

The thresholds for this impact topic are as follows:

Negligible: The impact is barely detectable to individual visitors.

Minor: The impact is small but detectable to individual visitors.

Moderate: The impact is of medium intensity and is readily apparent to individual visitors.

Major: The impact is severely adverse or exceptionally beneficial and is conspicuous to individual visitors.

SCENIC RESOURCES AND VISUAL QUALITY

Information on scenic resources and visual quality was compiled from planning documents, research reports, surveys, and consultation with park resource specialists. Impacts were evaluated by comparing projected changes resulting from the GMP alternatives to existing conditions or the no-action alternative, as appropriate. These evaluations were based on consideration of the park's fundamental resources and values, information about what contributes or detracts from scenic and visual quality in and around the park (from public comments and visitor surveys), and professional experience.

Intensity impact thresholds for this topic are as follows:

Negligible: Effects would be at or below the level of detection.

Minor: Effects would be small, but detectable and mostly localized.

Moderate: Effects would be readily apparent, but not widespread.

Major: Effects would be severely adverse or exceptionally beneficial or readily apparent and widespread.

SOCIOECONOMICS

Economic effects are commonly expressed in terms of the number and types of jobs supported, changes in income, the number of visitors to the park, and the resulting changes in local tourism spending. Less well-defined economic effects include the indirect effects from ongoing park operations and the effects on local government fiscal conditions. Examples of social

impacts include effects on regional population growth, housing, community facilities and services, land use, and community attitudes and lifestyles.

The analytical approach to address these issues was based on four key factors directly linked to implementation of the GMP:

- estimated costs of building new facilities and infrastructure
- changes in the number of park staff and federal spending to operate the park
- changes in the number of visitors to the park
- visitor characteristics, including where they are from, their spending patterns, how long they stay, and which park entrance they use

Indirect consequences of those four factors, such as impacts on traffic, are also considered.

Construction costs for the GMP alternatives were estimated by the project team based on actual costs of construction projects at other NPS units. Future staffing levels and operating costs were also estimated by the project team, assuming maintenance and service levels remain about the same as those currently provided at the park. Actual future costs could be different than the estimates in this analysis because they would be based on future NPS policies, operations and maintenance policies adopted at the park, and budgets approved by Congress for the National Park Service in general, or the Great Sand Dunes specifically.

Projected visitor use is based on past visitation patterns at the park; assumptions developed by the planning team about reasonable use for the management zones

and new activity sites; and long-term population growth in the region, state, and nation. The results anticipate increased annual visitor use for all alternatives, generally rising over time, with possible temporary and multi-year variation, including short-term declines due to extended drought, economic recession, or other factors.

Projected annual visitor use is used along with other data and assumptions to describe each alternative in monetary terms; for example, future payroll at the park. The monetary values are inputs to the Money Generation Model II (MGM2)⁶ which is used to estimate the total number of jobs, spending, and income in the surrounding region.

Estimates of the number of jobs in the region are tied to NPS operations, GMP-related construction, and visitor spending. The estimated jobs include park staff; construction contractors; suppliers of equipment, material, and other goods and services supported by those activities and the secondary impacts on local retail stores, restaurants, motels, other types of private businesses, and governments as the money from those activities circulates through the regional economy. MGM2 estimated the total number of jobs; some would be full-time, others part-time or seasonal.

Estimated personal income includes wages and salaries of employees, self-employment earnings, and allowances for dividends, interest, retirement, social security, unemployment, and similar sources of income. Personal income estimates are reported without any adjustments for inflation.

⁶ The MGM2 is an economic model developed for the National Park Service to produce quantifiable measures of economic benefits that can be used for planning, concessions management, budget justifications, policy analysis, and marketing. More information about the MGM2 can be obtained at <http://planning.nps.gov/mgm/>.

Economic impacts associated with the GMP alternatives are assessed in terms of scale/intensity, duration, and type/character. These three parameters are defined as follows:

Scale/Intensity

The scale or intensity of the social and economic impacts refers to the change(s) associated with the GMP alternatives when compared to current conditions or future conditions under the no-action alternative. Changes are described in numerical terms where possible to do so with the available information; otherwise, they are described in qualitative terms. In addition to the relative magnitude of change, factors considered in describing scale and intensity include how likely people are to be aware of the changes, how easy it would be to measure the effects of the changes, and how many people or how large an area would be affected. The scale/intensity impact thresholds for economic and social conditions are defined below.

None/Negligible: Effects on adjacent landowners, neighbors, businesses, agencies, community infrastructure, social conditions, etc., would be nonexistent, barely detectable, or detectable only through indirect means and with no discernible impact on local social or economic conditions.

Minor: Effects on adjacent landowners, neighbors, businesses, agencies, community infrastructure, social conditions, etc., would be small, but detectable, localized in terms of geographic area, affect a small number of people, comparable in scale to typical year-to-year or seasonal variations, and not expected to substantively alter

established social or economic structures over the long term.

Moderate: Effects on adjacent landowners, neighbors, businesses, agencies, community infrastructure, social conditions, etc., would be readily apparent or observable across a larger geographic area, affect many people, and could have noticeable effects on the established economic or social structure and conditions over the long term.

Major: Effects on adjacent landowners, neighbors, businesses, agencies, community infrastructure, social conditions, etc., would be readily detectable or observable, affect a large segment of the population, extend across much of a community or region, and have a substantial influence on the established social or economic conditions.

Duration

Social and economic changes caused by the alternatives may be temporary or last for longer periods of time. Temporary impacts may be noticeable at the local level, but still not result in long-term changes of the core economic and social conditions. Long-term impacts, on the other hand, may lead to changes in the economic base, construction or closure of public facilities, major changes in private real estate markets, how people and groups relate to one another, and other changes to established social and economic conditions.

Short Term: Short-term effects are those that occur during and in response to the planning, design, construction, and major maintenance of buildings, trails, parking areas, and other improvements

associated with federal spending for each alternative. These effects diminish or disappear after the project is completed. Short term may also describe the first or early response in social or economic conditions to more fundamental changes in park management and operations and to increasing visitor use, but which give way to broader changes over time. Generally, short term describes those effects that may last up to five years.

Long Term: Long-term effects are those that last longer than five years, including some of which may not begin until after completion of direct activities associated with the initial federal government spending or changes in management associated with each alternative. Such changes include increases in the park's base budget for operations and maintenance, those related to changes in visitation over time.

Type/Character

Social and economic consequences may be beneficial, adverse, or indeterminate.

Beneficial: Effects that many individuals or groups would accept or recognize as improving economic or social 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, and economic and social diversity and sustainability.

Adverse: Effects that most individuals or groups would accept or generally recognize as diminish-

ing economic or social welfare, either in general or for a specific group of people, businesses, organizations, or institutions. Examples of adverse effects include fewer job opportunities, increases in the cost of living without matching increases in higher income, or an erosion of public sector fiscal resources to fund public facilities and services.

Indeterminate: Those for which the size, timing, location, or individuals, or groups that would be impacted cannot be determined, or those which include both beneficial and negative effects, in some instances affecting different communities, populations, or public entities or jurisdictions, such that the net effect is indeterminate.

HEALTH AND SAFETY

Information about health and safety was compiled from various sources, including the National Park Service, surrounding agencies and organizations (e.g., Baca Grande Property Owners Association), other knowledgeable individuals, and secondary sources such as park studies, visitor surveys, planning documents, and research reports.

Thresholds for the intensity of impacts are defined as follows:

Negligible: Public health and safety would not be affected, or effects would be at low levels of detection.

Minor: Effects would be small but detectible. If mitigation were needed, it would be relatively simple and would likely be successful.

Moderate: Effects would be readily apparent but localized. Mitigation measures would probably be necessary and would likely be successful.

Major: The effects would be readily apparent, substantial, and would affect health and safety on a regional scale. Extensive mitigation measures would be needed, and their success would not be guaranteed.

NATIONAL PARK SERVICE OPERATIONS

Information about park operations was compiled from various sources including the Great Sand Dunes National Park and Preserve, the National Park Service, other surrounding agencies and organizations, and knowledgeable individuals. The information gathered includes park staffing and maintenance records; campground locations and capacities; and secondary sources such as park environmental assessments, visitor surveys, and other planning documents and research reports. Examples of operational considerations include needs for maintenance, protection, and patrol activities, and time required for park staff to get to/from monitoring, and areas requiring attention (e.g., trailheads, campsites, research sites, etc.). Impact thresholds for NPS operations are defined as follows:

Negligible: Effects would be at or below the level of detection.

Minor: Effects would be small but detectable. The change would be noticeable to staff, but probably not to the public.

Moderate: Effects would be readily apparent to staff and possibly to the public in terms of effects on visitor experience.

Major: Effects would be readily apparent to staff and the public, and would result in substantial, widespread changes.

OPERATIONS OF OTHER ENTITIES AND MANAGEMENT AGENCIES

Interagency and public meetings were held during the development of the GMP alternatives to acquire information concerning the potential impacts of the alternatives on the operations of other public land and resource management agencies, and other organizations. This information was considered in the development of the alternatives as presented in this document, and is used below to evaluate potential impacts of those alternatives. The thresholds for this impact topic are as follows:

Negligible: Effects on other management agencies or organizations would be nonexistent or barely detectable.

Minor: The impact is small but detectable or would affect relatively few management actions, agencies, or organizations.

Moderate: The impact is readily apparent or would affect many management actions, agencies, or organizations.

Major: The impact is severely adverse or exceptionally beneficial and would affect the majority of adjacent or relevant management agencies and organizations.

IMPACTS OF THE NO-ACTION ALTERNATIVE

ARCHEOLOGY

Management of cultural resources would continue according to current policies. Visitor use would increase over time and remain focused in frontcountry areas and on established roads and trails. Areas with concentrations of archeological resources located in the frontcountry, along creeks, and along established trails would have impacts from trampling of sites, vandalism, and theft. However, the incidence of unintentional or incidental damage would likely remain relatively low. Impacts would be site specific, adverse, and would range from minor to moderate, depending on the site and type of impact activity.

Continuation of current access to park expansion lands, which is limited, would have a continued beneficial impact because access to sensitive cultural resources is also limited. The Nature Conservancy would continue to manage Medano Ranch. Thus, there would be no general public access to sensitive archeological resources in this large area. Potential effects from trampling and vandalism would be minimized or avoided in these areas. Impacts would be long term, beneficial, and minor.

Cumulative Impacts. Residential and spiritual retreat growth in the Crestone/Baca Grande area has undoubtedly adversely affected archeological resources. Additional, as yet undisturbed resources would likely be disturbed or destroyed in the future as this area continues to grow (from ground disturbance during construction and from looting and unintentional disturbance). The foreseeable development of private land near the park entrance could similarly affect archeological resources. Rehabilitation of main park

roads and parking could have potential adverse impacts (long-term, localized, minor to moderate), as described under NEPA to a NRHP-eligible archeological site (5AL405) from construction activities and heavy equipment. The interagency fire management plan could have beneficial effects if areas identified for prescribed burns or fuel reduction are first surveyed for archeological resources. This would expand identification of and knowledge about regional archeological resources. The no-action alternative would contribute both adverse and beneficial effects as analyzed under NEPA. Effects on historic properties, including archeological sites, would be determined through compliance with section 106 of the NHPA as part of planning for those actions. This effects determination would be made in consultation with the Colorado SHPO and other consulting parties in accordance with 36 CFR 800.

Mitigation. In general, facilities would be located and designed to avoid or minimize direct and indirect adverse effects to archeological resources. If avoidance is not possible, mitigation measures would be developed in consultation with the Colorado SHPO, federally recognized American Indian tribes, and others in accordance with 36 CFR 800.

Conclusion. Impacts related to visitor use would continue to be site specific, adverse, and would range from minor to moderate as analyzed under NEPA. Continuation of current access (limited) to park expansion lands and The Nature Conservancy management of Medano Ranch would have minor beneficial impacts as analyzed under NEPA. This could result in *no impairment* of archeological resources from this

alternative under NEPA (see specific definition of impairment in the “Impairment of National Park Resources” section). In all cases, the National Park Service would comply with section 106 of the NHPA regarding its management of all archeological sites.

HISTORIC STRUCTURES

Under the no-action alternative, current NPS maintenance practices at park headquarters would continue. Medano Ranch headquarters would continue to be managed and maintained by The Nature Conservancy. This agency’s maintenance practices would continue and public access would continue to be restricted, thus preserving ranch integrity. As a result, negligible, long-term, beneficial impacts would occur at Medano Ranch headquarters. The no-action alternative is not anticipated to affect other historic structures. The National Park Service would comply with section 106 of the NHPA regarding its management of all historic structures.

Cumulative Impacts. No cumulative effects would be anticipated.

Mitigation. No mitigation measures for historic structures are proposed for the no-action alternative. However, the National Park Service would comply with section 106 of the NHPA regarding its management actions (and lack of maintenance for all historic structures in the park), including mitigation.

Conclusions. As analyzed under NEPA, Medano Ranch would experience negligible, long-term, localized, beneficial impacts from continued maintenance practices by The Nature Conservancy. There would be *no impairment* of historic structures from this alternative under

NEPA (see specific definition of impairment in the “Impairment of National Park Resources” section). In all cases, the National Park Service would comply with section 106 of the NHPA regarding its management of historic structures.

CULTURAL LANDSCAPES

Potential cultural landscapes (Medano Ranch and NPS administrative) would not be affected by elements of the no-action alternative. Under the no-action alternative, current NPS maintenance practices at park headquarters would continue, providing negligible, long-term, beneficial impacts as analyzed under NEPA. Medano Ranch headquarters would continue to be managed and maintained by The Nature Conservancy, whose maintenance practices and restricted public access policies would continue, thus preserving ranch integrity. As a result, negligible, long-term, beneficial impacts would occur at Medano Ranch headquarters. Thus the no-action alternative would have long-term, negligible, beneficial impacts under NEPA on cultural landscapes.

Cumulative Impacts. No cumulative effects would be anticipated.

Mitigation. No mitigation measures for cultural landscapes are proposed for the no-action alternative. However, the National Park Service would comply with section 106 of the NHPA regarding its management actions (and lack of maintenance) for all historic structures in the park.

Conclusion. The no-action alternative would negligibly affect cultural landscapes in a beneficial way. There would be no cumulative impacts and no impairment of cultural landscapes from this alternative under NEPA (see specific definition of

impairment in the “Impairment of National Park Resources” section). In all cases, the National Park Service would comply with section 106 of the NHPA regarding management actions involving cultural landscapes.

VEGETATION

Under the no-action alternative, visitation at the eastern portion of the dunefield would increase over time (see “Visitor Use and Experience” section for projections) so the dunefield in this area would experience more use and sparse dunefield plant communities would experience increased trampling, wind erosion, and landslide effects. Popular locales within the sub-alpine and tundra life zones could also experience increased use over time. Day-use hiking would increase near the northern park boundary, but equestrian use would not increase much because there would be no horse gate at the northern boundary, nor would there be a trailhead in the northern portion of the national park. Increased use in these areas over time would mean more potential for introduction of nonnative plant species, social trail establishment, and incidental trampling of vegetation. The likelihood of nonnative plant species being spread by seed from hiker’s boots and clothing, dog fur, horse-hair and manure, and wind, with increased visitation and ground disturbance. Effects would be short and long term, negligible to minor, and adverse.

The park would identify and manage nonnative plant populations, reducing their effect on native plant communities or possibly eliminating some stands from the landscape, thus improving species composition and habitat quality. This would have a long-term, minor to moderate, beneficial impact on plant

community composition and habitat quality.

Managed bison grazing would continue on Medano Ranch under The Nature Conservancy management; as such, bison would continue to be confined in an area smaller than that over which they would roam under natural conditions. Some adverse effects to plant communities of the sabkha and sand sheet life zones could occur (e.g., from streambank trampling, shifts in species composition due to selective consumption of more palatable species, and introduction of nonnative plant species). The end result would be long-term, minor to moderate, adverse impacts on Medano Ranch upland plant communities.

Cumulative Impacts. Generally, native plant communities of the San Luis Valley and of the park have been affected by over a century of livestock grazing and the effects are sometimes intensified by periods of drought. Depending on the local environment, grazing effects can range from minor shifts of plant and animal species composition to more serious wind and water erosion (e.g., blowouts and gulying) and nonnative plant introductions. Cattle grazing was discontinued on the former Baca Ranch lands in 2004, and some past adverse livestock impacts may gradually be reversed in the future. Rehabilitation of main park roads and parking areas, which includes increasing the capacity of the dunes lot by ~5%, would result in minor, long-term, localized, adverse impacts on vegetation. Introduction of nonnative landscape plants from adjacent developed lands would result in adverse effects to native plant communities. Some native plant communities have undergone historic disturbance during past land-use activities and are therefore subject to such nonnative plant species invasion. The no-action alternative could have

adverse effects on vegetation from increased visitor use. Combined with past, present, and reasonably foreseeable future actions, the no-action alternative would have long-term, minor to moderate, adverse, and minor to moderate beneficial effects on plant communities.

Conclusion. Increased visitation over time would mean more potential for introduction of nonnative plant species, trampling of vegetation, and establishment of social trails. Continued existence of a managed bison herd could also adversely affect plant communities. Adverse impacts would be long term and minor to moderate. Control of nonnative plant species, especially noxious weeds, would have long-term, moderate, beneficial impacts on plant communities. There would be *no impairment* of vegetation from this alternative (see specific definition of impairment in the “Impairment of National Park Resources” section).

ECOLOGICALLY CRITICAL AREAS

Under the no-action alternative, visitation at the eastern portion of the dunefield would increase over time, so the dunes, which comprise a portion of the Great Sand Dunes ecologically critical area, would experience more use and the seven rare sand sheet and dunefield plant communities, rare plant species (James cryptanth and slender spider-flower), and rare wildlife (insects and small mammals) could be subject to increased trampling, wind erosion, and landslide effects. Day-use hiking would increase near the northern park boundary, but equestrian use would not because there would be no horse gate on the northern boundary, nor a trailhead in the northern portion of the park. This activity could affect the Deadman Creek ecologically critical area, which supports three rare plant communities

(including narrowleaf cottonwoods), rare plant species (Smith whitlow grass and canyon bog orchard), and rare wildlife (Townsend’s big-eared bat and Rio Grande cutthroat trout). Increased use over time would mean more potential for introduction of nonnative plant species, social trail establishment, and incidental trampling of vegetation and soils. The end result would be long-term, minor to moderate, adverse impacts on ecologically critical area plant communities and wildlife habitat.

Backcountry use by hikers would increase in the northern portion of the park, having its greatest effect (vegetation trampling and social trail establishment) within the Deadman Creek and San Luis Lakes / Sand Creek ecologically critical areas. The likelihood of nonnative plant species being spread by seed from hiker’s boots and clothing, dog fur, horsehair and manure, and wind increases with increased visitation and ground disturbance. The effects would be short and long term, minor to moderate, and adverse.

The park would identify and manage nonnative plant populations, reducing their effect on native plant communities or possibly eliminating some stands from the landscape, improving species composition and habitat quality. This would have a long-term, minor to moderate, beneficial impact on ecologically critical area plant communities and wildlife habitat.

Under Nature Conservancy management, managed bison grazing would continue on Medano Ranch. Some adverse effects to plant communities of the sabkha and sand sheet life zones within the San Luis Lakes / Sand Creek ecologically critical area (e.g., from streambank trampling, shifts in species composition due to selective consumption of more palatable species, and introduction of nonnative plant species) would be expected. The end result

would be long term, minor to moderate, adverse impacts on Medano Ranch portions of the San Luis Lakes / Sand Creek ecologically critical area plant communities and wildlife habitat.

Cumulative Impacts. Generally, native plant communities of the San Luis Valley, the park, and the ecologically critical areas within have been affected by over a century of livestock grazing; the effects are sometimes intensified by periods of drought. Depending on the local environment, grazing effects can range from minor shifts of plant and animal species composition to more serious wind and water erosion (e.g., blowouts and gullying) and nonnative plant introductions. Cattle grazing was discontinued on the former Baca Ranch lands in 2004, and some past adverse livestock impacts may gradually be reversed in the future. Introduction of nonnative landscape plants from adjacent developed lands would result in adverse effects to native plant communities. Some native plant communities have undergone historic disturbance during past land-use activities and are therefore subject to such nonnative plant species invasion. The no-action alternative would have impacts on ecologically critical areas from increased use. Combined with past, present, and reasonably foreseeable future actions, the no-action alternative would have long-term, minor to moderate, adverse, and minor to moderate beneficial effects on ecologically critical areas.

Conclusion. Increased visitation over time would mean more potential for introduction of nonnative plant species, trampling of vegetation, and establishment of social trails. Continued managed bison grazing could also adversely affect plant communities. Effects would be long term, minor to moderate, and adverse. Control of nonnative plant species, including noxious weeds, would have long-term, minor to

moderate, beneficial impacts on ecologically critical areas within the park. There would be *no impairment* of ecologically critical areas from this alternative (see specific definition of impairment in the “Impairment of National Park Resources” section).

FEDERAL THREATENED AND ENDANGERED SPECIES

Under the no-action alternative, recreation would remain concentrated in the existing developed area east of the dunes and the easternmost portion of the dunefield. As with all four alternatives, the existing parking area that is adjacent to potential southwestern willow flycatcher and yellow-billed cuckoo habitat, would continue to be used. Dispersed use in the preserve and areas of the park east of the dunefield, portions of which present potential Mexican spotted owl and Canada lynx habitat, would increase modestly over time because vehicle access would not be allowed. Backcountry use would be focused around Upper Sand Creek, Medano Pass primitive road, the Mosca Pass corridor, and the northernmost portion of the national park because of relatively easy access to these areas, although their isolation dampens the potential impact of human population growth in the surrounding areas. Day-use hiking may increase in the vicinity of Deadman Creek, near the northern park boundary, as well as in backcountry areas south of this riparian corridor that may provide potential bald eagle roosting and nesting habitat. The numbers of visitors to these areas would remain relatively low, and would decrease with elevation and topographic complexity and distance from access points. Given the difficulty of reaching much of the elevated reaches of the preserve, visitor use is not anticipated to have detectable or measurable impacts

on any of the addressed federal species moving through or attempting to take up residence in those areas. Impacts of visitation under this alternative would be no to negligible, short and long term, and adverse.

Under the no-action alternative, unleashed dogs used for hunting would continue to be allowed in the preserve, as allowed by law and as regulated by CDOW. Leashed dogs not used for hunting would also continue to be allowed in the preserve. Thus, in this alternative, both leashed and unleashed dogs would be allowed in the preserve; a continuation of the current condition. Temporary disturbance of individuals may occur due primarily to unleashed hunting dogs, impacts to potential Canada lynx or their habitat due to dogs in the preserve would be short and long term, and only negligibly adverse.

Under the no-action alternative, livestock watering ponds and structures would be removed. This action is anticipated to have no to negligible impact on riparian habitat for the southwestern willow flycatcher, yellow-billed cuckoo, and bald eagle.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions that might interact with aspects of the no-action alternative to affect potential populations of, or habitat for, the addressed species within the park include general growth of the human populations surrounding the park, oil and gas exploration on former Baca Ranch lands, wilderness restoration efforts in the South Colony Lakes basin area (north of the national preserve), and a potential elk herd reduction in the future. Population growth is anticipated to be a contributor to modest increases in visitation within the park. Oil and gas exploration is underway on the adjacent Baca National Wildlife Refuge, which may impact lowland habitats outside the park

boundaries for riparian and wetlands-associated species such as the southwestern willow flycatcher, yellow-billed cuckoo, and bald eagle. Oil and gas exploration within the park is possible due to privately held mineral rights, but would require additional compliance with NEPA.

Wilderness restoration efforts north of the preserve may increase the potential habitat for Mexican spotted owls and Canada lynx along the range, and reduction of elk would avoid or reduce the impacts that overly large populations of this native ungulate can have on a range of habitats and the food chains based on those habitats. Taken in combination with these cumulative impacts, the no-action alternative is anticipated to have no to negligible adverse impacts on potential use or establishment of southwestern willow flycatcher, yellow-billed cuckoo, bald eagle, Mexican spotted owl, or Canada lynx within the park.

Mitigation. Mitigation measures are undertaken to reduce potential impacts to federally listed or candidate species. Mitigation measures include the following:

- Canada lynx habitat in the preserve will follow the guidelines provided in the LCAS.
- Activities in the vicinity of bald eagle habitat will follow the CDOW raptor guidelines for seasonal avoidances and buffer distances.
- A NEPA process and additional consultation will be initiated if oil and gas exploration on lands within the park subject to private mineral rights occurs.
- Prior to implementation of any activity in or near riparian habitat, surveys will be conducted for the southwestern willow flycatcher,

yellow-billed cuckoo, and bald eagle nests and winter roosts. Additional section 7 consultation with the USFWS may be appropriate if the proposed activity may affect these species.

- Prior to the implementation of any activity in or near dense coniferous forests on steep slopes, surveys will be conducted for the Mexican spotted owl. Additional section 7 consultation with the USFWS may be appropriate if the proposed activity may affect this species.

Additional consultation with the USFWS would be required if any of the following occurred:

- documentation of use of relevant habitats within the park and preserve by the southwestern willow flycatcher, yellow-billed cuckoo, or Mexican spotted owl
- initiation of activities anticipated to impact the single bald eagle winter roost site in the western portion of the park
- identification of additional bald eagle winter roost sites or of bald eagle nest sites within the park
- establishment of den sites by Canada lynx within the park

Renewed discussions and consultation with the USFWS, should any of the above events occur, would focus on development of specific conservation measures to reduce potential impacts on these species. Such conservation measures would be based on the recommendations provided by the current USFWS recovery plan or further

coordination with the USFWS for the relevant species.

Conclusion. Impacts on potential Mexican spotted owls and Canada lynx within the park due to increased visitation over time would be moderated or reduced with the increase in elevation and ruggedness of the terrain such that only no to negligible, short- and long-term, adverse impacts on these species or their habitats in the park are anticipated. Similarly, impacts on potential southwestern willow flycatchers, yellow-billed cuckoos, and bald eagles within the park due to increased visitation over time would be moderated or reduced with increased distance from access points such that only no to negligible, short- and long-term, adverse impacts on these species or their habitats in the park are anticipated. The continued presence of unleashed hunting dogs, as well as leashed nonhunting dogs in the national preserve is anticipated to continue to have no to negligible, adverse effects in the short and long terms, on lynx passing through or trying to establish ranges within the national preserve. The no-action alternative is anticipated to have no to negligible, adverse impacts on potential establishment of the addressed species within the park. These impacts correlate to a determination of “*may affect—not likely to adversely affect*” for the southwestern willow flycatcher, yellow-billed cuckoo, bald eagle, Mexican spotted owl, and Canada lynx for this alternative. There would be *no impairment* of federal threatened and endangered species from this alternative (see specific definition of impairment in the “Impairment of National Park Resources” section).

WILDLIFE, INCLUDING COLORADO STATE-LISTED SPECIES

Species Associated with Riparian Corridors

Visitation in and near the eastern portion of the dunefield would increase over time so Medano Creek and Mosca Creek would experience more use. The Medano and Little Medano drainages serve as actual or potential refugia for the Rio Grande sucker, Rio Grande chub, and Rio Grande cut-throat trout. Increased use over time could result in impacts to these riparian corridors such as decreased water quality due to increased sedimentation, introduction of pollutants, and introduction of nonnative species and diseases. However, given standard monitoring and mitigation practices, such adverse impacts would be anticipated to be only negligible to minor.

Day-use hiking would increase in the vicinity of Deadman Creek, near the northern park boundary. Equestrian use would not increase appreciably—without a horse gate or trailhead it would remain difficult for equestrians to access this portion of the park. The mature narrowleaf cottonwood groves along the banks of Deadman Creek would likely attract hikers for resting and other passive pursuits. There would be no trails to direct use away from this area, so the Deadman Creek corridor could become the preferred route of east-west hiking travel in this portion of the park. The wildlife issue for consideration in Deadman Creek is the potential impacts on Townsend's big-eared bats from increased use. These bats often forage along riparian corridors in the western United States and are moth specialists (Schmidt 2003). Degradation of the Deadman Creek corridor could potentially result in a decrease in the prey base for this

species if woody vegetation, some of which probably serves as host plants for moths, is adversely affected. Assuming standard monitoring and remediation of habitat conditions, such impacts would be anticipated to be negligible to minor and adverse.

Wetlands-Associated Species

Under the no-action alternative, livestock watering ponds and structures would be removed, resulting in long-term, negligible to minor, adverse impacts (from drying) on species associated with introduced wetlands (such as the greater sandhill crane). When watering ponds and structures are removed, natural flows could be reintroduced to other areas. Expansion or reestablishment of wetlands plant communities in those areas may have long-term, negligible to minor, beneficial impacts on wetlands-associated species. The result of this scenario would be a combination of negligible to minor adverse impacts on wetlands-associated species within the park, and negligible to minor beneficial impacts to the same species both inside and outside (downstream of) the park.

Under management by The Nature Conservancy, bison would continue to graze on Medano Ranch within the park. Irrigation of hay meadows with flows from Sand, Big Spring, and Little Spring creeks as a means of improving bison forage would also continue. Although bison may cause wetlands impacts such as streambank and bottom erosion, these impacts are typically less severe than those caused by cattle. Bison, unlike cattle, tend not to remain in and around wet areas after they drink (Wuerthner 1998). Continued irrigation of meadows would maintain wetlands that were introduced or expanded over a century ago (e.g., wet meadow, emergent wetlands, aquatic, etc.), when irrigation was first introduced. Thus, under the no-action

alternative, bison grazing and irrigation of hay meadows would continue to have minor beneficial and minor adverse impacts on wetlands-associated migratory bird species such as the greater sandhill crane.

Ungulate Herd Numbers and Health

Under the no-action alternative, access points into the park would remain as they currently exist. Access across the northern boundary of the park would continue to be limited to pedestrian traffic. The no-action alternative does not provide for possible future evaluation of public vehicle access routes to the mountain front; a goal of both the USFS and CDOW. Administrative access via Liberty Road would be permitted under this alternative, as it is under all alternatives.

Adverse impacts to ungulates from continued limited hunting access to USFS lands adjacent to the park would continue. Decreased hunting pressure on elk in this area may exacerbate rapid population increases that may be linked to declines of other native ungulate populations (bighorn sheep and mule deer), and to habitat degradation in the Sangre de Cristo wilderness. Estimated numbers of elk hunters who would access the preserve and adjacent USFS lands via a northern access route through the park range from 20 to 30 for each of the three five-day seasons; equating to 60 to 90 hunters annually (CDOW, R. Rivale, pers. comm., April 28, 2005). The preserve and adjacent USFS lands are in CDOW game management unit 82; an area approximately twice the size of the park. According to the CDOW Web site, the total elk harvest in 2005, across all of game management unit 82, was 164 elk. The number of bulls was 107. The ongoing elk research project data suggest that a declining recruitment rate, coupled with

successful recreational hunting harvest, have driven an overall herd decline in the past four or five years. Based on a total hunter number of 1,729, this represented a harvest rate of 19%. Therefore, the potential number of elk not harvested from the park and adjacent USFS lands is estimated at approximately 9 to 10 cows, and 5 to 6 bulls.

While the current estimate of 4,000 elk is substantially fewer than the previous estimate of nearly 6,000 elk in the San Luis Valley herd, this herd is still more than twice the 1,500-animal goal established by CDOW. Removal or nonremoval of 9 to 10 cow elk and 5 to 6 bull elk would not make a critical difference in efforts to reduce the size of the herd. Furthermore, review of historic harvest records for game management unit 82 show no substantial decline in the number of elk harvested relative to years prior to park expansion. Therefore, this aspect of the alternative is expected to have only minor adverse impacts on ungulate herd numbers and health.

Bighorn Sheep

Under the no-action alternative, unleashed dogs used for hunting would continue to be allowed in the preserve. Leashed dogs not used for hunting would also continue to be allowed in the preserve. Thus, in this alternative, both leashed and unleashed dogs would be allowed in the preserve; a continuation of the current condition.

Bighorn sheep, as prey animals, are anticipated to react negatively to dogs, whether on-leash or off. In a study of bighorn sheep, MacArthur et al. (1982) conducted human-disturbance trials on bighorn sheep that were already partially habituated to humans. In this study, a person approached a group of sheep from a road, from a road accompanied by a dog

on-leash, and from a ridge away from the road. The strongest negative reactions in the sheep were recorded when a human with a leashed dog approached (MacArthur et al. 1982). Furthermore, no reduction in heart-rate response was observed with repeated trials; instead, heart-rate response actually increased successively with each leashed-dog trial. In earlier studies, these same authors demonstrated that free-ranging dogs and coyotes evoked the maximum heart-rate responses (MacArthur et al. 1979). In their later study, MacArthur, Geist, and Johnston (1982) concluded that among all the stimuli they studied, “The presence of dogs on sheep range should be discouraged.”

The mere presence of dogs, which wild prey animals do not distinguish from other predators, can cause stress in prey species (Simes 1999). While sight and sound of the dogs are obvious direct cues, the scent of dogs and the wastes they leave behind have a much longer impact on prey species of an area, potentially preventing such species from approaching and using essential resources such as watering holes or cover for a period of time.

The presence of unleashed hunting dogs in the preserve is a component of all alternatives proposed for this GMP and would be a continuation of the current condition (see chapter three, “Health and Safety—Dogs” section for details). What is being evaluated is the difference among the alternatives relative to leashed dogs in the preserve. If only leashed dogs were allowed in the preserve, the stress impacts attributable to their presence would be greater. However, given that unleashed hunting dogs would be free to roam within the limits established by their handlers, the presence of leashed dogs is not anticipated to add significantly to dog-related stresses. As such, leashed dogs allowed in the preserve under the no-action alternative are anticipated to

contribute minor to moderate adverse impacts on bighorn sheep populations within the park.

Cumulative Impacts. Cumulative actions contributing to impacts on riparian-associated species as described above include growth of the human population in the area surrounding the park, oil and gas exploration on former Baca Ranch lands, and elk herd reduction. The first two of these would contribute adverse impacts, while elk herd reduction would contribute beneficial impacts, specifically to the riparian corridor habitats. In combination with these cumulative actions, the no-action alternative is anticipated to contribute negligible to minor, adverse impacts.

Cumulative actions contributing to ungulate herd numbers and health include the enabling legislation for the expanded park (negative impacts from elk hunting not permitted in expansion areas of the national park), but also beneficial impacts from increased protection for habitats and species (from conservation-based NPS management). Also contributing to ungulate herd numbers and health would be the interagency fire management plan, which should provide beneficial impacts through habitat management and enhancement. Finally, the elk herd reduction tentatively planned for the future, pending justification stemming from ongoing research and appropriate NEPA analysis, would most likely provide beneficial impacts to elk by reducing numbers to levels closer to the predicted carrying capacity of the area, and reducing the risk of diseases often associated with high herd densities. Beneficial impacts to other ungulates (mule deer and bighorn sheep) would stem from reduced elk impacts on shared habitats, and reduced likelihood of exposure to diseases. Combined with past, present, and reasonably foreseeable future actions, the no-action alternative would be

anticipated to contribute minor adverse impacts to ungulate herd numbers and health.

Cumulative actions contributing to impacts on bighorn sheep would include increased human population in the area surrounding the park, and elk herd reduction. The first of these would contribute adverse impacts (from more leashed dogs in the preserve), while elk herd reduction would contribute beneficial impacts by reducing competition from, habitat impacts due to, and the threat of diseases from, elk. In combination with these cumulative actions, the no-action alternative is anticipated to contribute minor adverse impacts and negligible to minor beneficial impacts on bighorn sheep within the park.

Conclusion. The no-action alternative would have negligible to moderate adverse impacts on species associated with riparian corridors due to increased recreational use; negligible to minor adverse impacts on wetlands-associated species within the park due to removal of artificial water sources, and negligible to minor beneficial impacts to the same species outside (downstream of) the park due to possible increase of downstream waters; minor adverse impacts on ungulate herd numbers and health due to continued limited access for elk hunting; and minor to moderate adverse impacts on bighorn sheep populations within the park due to the presence of leashed dogs in the national preserve. There would be *no impairment* of wildlife from this alternative (see specific definition of impairment in the “Impairment of National Park Resources” section).

SOILS AND GEOLOGIC RESOURCES

Increased day-use hiking in the northern portion of the national park would create social trails. Vehicles parking along road

shoulders (when the dunes parking lot fills) would cause localized disturbance and soil compaction. The end result would be long-term, mostly localized, minor to moderate, adverse impacts to soil resources.

Cumulative Impacts. Establishment of a water right to fulfill the purpose of the national park and preserve would minimize further lowering of local groundwater levels or surface water flows, which could indirectly benefit sand recycling. Oil and gas exploration on lands that were formerly part of the Baca Ranch, but are now within the national park, has occurred and these activities could continue in the near future; however, any activities would be subject to 36 CFR 9B (*Nonfederal Oil and Gas Rights*), which require such activities be conducted in a manner consistent with park purposes and preventing or minimizing damage to the environment. Minor expansion and reconfiguration of the dunes parking area and relocation of the horse loading area and RV dump station would also cause localized soil disturbance and destruction. The no-action alternative would contribute adverse, localized impacts to soils and geologic resources. Combined with past, present, and reasonably foreseeable future actions, the no-action alternative would have long-term, minor to moderate, mostly localized adverse impacts on soils and geologic resources.

Conclusion. Increased day-use hiking in certain areas and vehicles parked along road shoulders (when the dunes parking lot fills) would cause localized soil disturbance, compaction, and social trailing. Impacts to soil resources would be long term, mostly localized, minor to moderate, and adverse. There would be *no impairment* of soils and geologic resources from this alternative (see specific definition of impairment in the “Impairment of National Park Resources” section).

WETLANDS

Recreation use would remain concentrated in the existing developed area east of the dunes and the easternmost portion of the dunefield, so Medano Creek wetlands in these areas would experience more use. Day-use hiking would increase in the vicinity of Deadman Creek near the northern park boundary. Equestrian use would not increase appreciably—without a horse gate or a trailhead it would remain difficult for equestrians to access this portion of the park. The mature narrowleaf cottonwood groves along the banks of Deadman Creek would likely attract hikers for resting and other passive pursuits. There would be no trails to direct use away from this area, so the Deadman Creek corridor could become the preferred route of east-west hiking travel in this portion of the park. In each case, increased use over time would mean more potential for introduction of nonnative species and incidental trampling of soils and vegetation in wetlands areas. The end result would be long-term, negligible to minor, adverse impacts on creek-associated wetlands and riparian habitats.

Livestock watering ponds and structures would be removed, resulting in long-term, negligible to minor, adverse impacts (from drying) on introduced wetlands. When watering ponds and structures are removed, natural flows could be reintroduced to other areas. Expansion or reestablishment of wetlands plant communities in those areas would have long-term, negligible to minor, beneficial impacts. The park would identify and manage nonnative plant populations, reducing their effects on native wetlands communities and possibly eliminating some nonnative stands from the landscape. This would have long-term, minor to moderate, beneficial impacts on

wetlands species composition and habitat quality.

Under management by The Nature Conservancy, bison would continue to graze on Medano Ranch within the park. Irrigation of hay meadows with flows from Sand, Big Spring, and Little Spring creeks as a means of improving bison forage would also continue. Although bison may cause wetlands impacts such as streambank and bottom erosion, these impacts are typically less severe than those caused by cattle. Unlike cattle, bison tend not to remain in and around wet areas after they drink (Wuerthner 1998). Continued irrigation of meadows may aid groundwater recharge and maintain wetlands that were introduced or expanded over a century ago (e.g., wet meadow, emergent wetlands, aquatic, etc.), when irrigation was first introduced. Thus, under the no-action alternative, bison grazing and irrigation of hay meadows would likely continue to have long-term, minor, beneficial, and minor, adverse impacts on wetlands.

Cumulative Impacts. Livestock grazing typically adversely affects wetlands and riparian resources by causing shifts in species composition, erosion of streambanks and bottoms, and browsing of wetland grasses, shrubs, and tree seedlings. Cattle grazing was discontinued on the former Baca Ranch lands in 2004, and some past adverse livestock impacts may gradually be reversed in the future. Under the no-action alternative, beneficial and adverse wetlands impacts would result from increased use (especially in certain areas), removal of livestock-related water control structures, control of nonnative noxious plant populations, and continued bison grazing and hay meadow irrigation. Combined with past, present, and reasonably foreseeable future actions, the no-action alternative would have long-term, minor, beneficial impacts, and minor

to moderate adverse effects on wetlands resources.

Conclusion. Increased use levels over time would mean more potential for introduction of nonnative species and incidental trampling of soils and vegetation in wetlands areas. The end result would be long-term, negligible to minor, adverse impacts on creek-associated wetlands and riparian habitats. Removal of livestock watering ponds and structures would have long-term, negligible to minor, adverse impacts (from drying) on introduced wetlands, and long-term, negligible to minor, beneficial impacts on naturally occurring wetlands. Management of nonnative plant populations in new park areas would have long-term, minor to moderate, beneficial impacts on wetlands species composition and habitat quality. Bison grazing and irrigation of hay meadows would likely continue to have long-term, minor, beneficial, and minor adverse impacts on wetlands. There would be *no impairment* of wetlands from this alternative (see specific definition of impairment in the “Impairment of National Park Resources” section).

WATER RESOURCES

Under the no-action alternative, visitation in general would increase over time, and it would increase proportionally in certain areas (e.g., in the north portion of the park). Increased use levels over time would mean more potential for trash and human or dog waste to be washed into streams and lakes, thus degrading water quality. Because there would be no new trails in the northern part of the park that would direct use away from Deadman Creek, social trails could be a problem in this stream corridor and could cause bank erosion that would contribute to stream sedimentation. The end result of these actions would be long-

term, negligible to minor, localized, adverse impacts to surface water and potentially to shallow groundwater quality (due to the close relationship between surface water and shallow groundwater).

Medano Ranch would be managed by The Nature Conservancy. Bison would continue to graze there, and irrigation of hay meadows with flows from Sand, Big Spring, and Little Spring creeks would continue as a means of improving bison forage. Continued irrigation of hay meadows could aid local groundwater recharge if surface waters are diverted locally to more permeable soils (instead of flowing to less permeable playas where more water would evaporate). Because groundwater levels are closely related to local creek flows, sustained irrigation could also support local stream flows. More research is needed to determine the nature of potential impacts on groundwater and surface water. Prior to discontinuing irrigation, a study would be conducted to provide more information about possible effects of this action.

Cumulative Impacts. Establishment of a water right to fulfill the purposes of the park would minimize additional lowering of local groundwater levels. Oil and gas exploration activities on lands that were formerly part of the Baca Ranch (but are now within the national park) are reasonably foreseeable in the near future; however, any such activities are subject to 36 CFR 9B, which requires that such activities be conducted in a manner that is consistent with protection of water resources (among other resources). The no-action alternative would have both beneficial and adverse effects on water resources, as discussed above. Combined with past, present, and reasonably foreseeable future actions, the impact of the no-action alternative on water resources would be long term, minor to moderate, and adverse.

Conclusion. Increased use levels would result in increased wastes and sediments in certain surface waters. Social trails could cause bank erosion and stream sedimentation in the Deadman Creek stream corridor. These actions would result in short- and long-term, negligible to minor, localized, adverse impacts to surface water and potentially shallow groundwater quality. Irrigation of hay meadows on Medano Ranch is likely to continue to have impacts on surface and groundwater quality, but more information is needed to understand the nature of those impacts. There would be no impairment of water resources from this alternative (see specific definition of impairment in the “Impairment of National Park Resources” section).

VISITOR USE AND EXPERIENCE

Visitor Use Projections

Long-term growth in visitor use would include increases in annual visits by both permanent and seasonal residents of the San Luis Valley and surrounding region, and by nonresidents visiting Great Sand Dunes as part of a day trip or multiday outing. The principal influence motivating long-term visitor use under this alternative would be population growth, particularly in the San Luis Valley and Colorado. Net population growth of nearly 30% is projected in Alamosa and Saguache counties between 2005 and 2025. Colorado’s population is projected to reach 6.65 million during the same period, an increase of more than 2.0 million over the estimated 2004 population of 4.6 million (CDLG 2004 and Census 2004). The nation’s population is projected to approach 350 million residents by 2025, an increase of almost 56 million as compared to the 293.7 million residents in 2004 (Census 2004).

Other factors affecting future visitor use under the no-action alternative include:

- increased development and growth of the year-round and seasonal population along the park’s northern boundary (Baca Grande/ Crestone area)
- maintenance of current campground capacity and trails and trailheads
- continued management of Medano Ranch by The Nature Conservancy
- park expansion and change in designation to a national park and preserve
- absence of new public vehicle access to interior areas of the park

Annual use, given the above, is projected to increase to nearly 375,000 by 2025 (table 22). The period of heaviest use would remain the three-month period of June through August.

TABLE 22. CURRENT AND PROJECTED ANNUAL VISITORS IN 2025 NO-ACTION ALTERNATIVE

2004 (recorded)	2004 (adjusted baseline)	2025 (projected)
268,400	291,000	374,800
Increases Over 2004 (adjusted)		
Annual Visits (number)		+83,800
Annual Visits (percent)		+29%

Recreation use would remain concentrated in the existing developed area east of the dunes and the easternmost portion of the dunefield. Dispersed use in the preserve and areas of the park west of the dunefield would increase modestly over time because

public access would be limited to foot and horseback. An increase in day use would occur along the park's northern boundary with the Baca Grande subdivision. Subdivision residents, seasonal occupants, and their guests would account for much of the increase, although access and use by the general public would also occur in this area. Day-use increases in winter and other traditionally lower-use months would be relatively more here during the off-season, due to the proximity to the Baca Grande/Crestone area.

Although most visitor use would remain focused in the eastern part of the dunefield, some people would visit backcountry areas. Backcountry use would be focused around Upper Sand Creek, Medano Pass primitive road, the Mosca Pass corridor, and the northernmost portion of the national park because of ease of access.

Visitor Experience

Opportunities for types and locations of activities (hiking, camping, scenic driving, exploring the dunes environment) would be similar to now. Many equestrian users would undoubtedly be frustrated by having no easy way to access the north part of the park (no trailhead or horse gate would be provided). The only way to get a horse to the north part would be to ride from the southeast part of the park, or from one of the mountain passes. Continued limited access for equestrians would represent a long-term, minor, adverse impact on visitor experience.

Over the long term, as summertime visitor use increased, visitors would encounter more people at the area of focused use east of the dunefield (main park road, visitor center, dunes parking lot, Medano Creek area, and Pinyon Flats campground), along the Medano Pass primitive road, and along

trails in the national park and in the preserve. The dunes parking area would fill often, so visitors would be forced to park along the shoulders of the dunes access road and main road. This would be frustrating, both to visitors who must walk along the roadway to reach the dunes, and to drivers who are trying to find a parking place. Some potential repeat visitors would undoubtedly choose not to return to the park due to dissatisfaction with the crowded conditions (e.g., at the campground or Medano Pass primitive road). Crowding and other visitor frustrations related to visitor numbers in the focused use area east of the dunefield would have a long-term, moderate, adverse impact on visitor experience.

Interpretation, information, and education activities would remain focused in the area east of the dunefield (visitor center, amphitheater, dunes area, day-use trails, etc.); there would be little change with respect to these services and opportunities.

Dogs would continue to be allowed in all areas of the park, provided they are on a leash. This means that visitor experience would continue to be affected, both positively and negatively, by dogs in the park. People who like to travel and/or recreate with their dogs would enjoy substantial freedom to do so, provided their dogs are kept on-leash. Dog-related problems and concerns (e.g., dog waste, aggressive dogs, and barking dogs) would continue and perhaps increase as visitor use increased over time. Maintenance of the current policy regarding dogs would have long-term, minor, adverse, and beneficial impacts on visitor experience.

This alternative would offer enjoyable wilderness experiences within most of the park's existing wilderness (Great Sand Dunes Wilderness and Sangre de Cristo Wilderness). There would be no new

points of access, so more remote areas would continue to offer ample opportunities for solitude and primitive experiences. This would be a long-term, moderate, beneficial impact. However, increasing visitor numbers over time could affect wilderness values (opportunities for solitude, evidence of human use, etc.) in less remote parts of the wilderness. This would constitute a long-term, moderate, adverse impact. There would be no new wilderness opportunities because no new wilderness is recommended for the no-action alternative.

Cumulative Impacts. Rehabilitation of main park roads and parking areas, which includes increasing the capacity of the dunes lot by ~5%, is planned for the near future and would modestly improve pedestrian and vehicle traffic flow in the immediate area. The no-action alternative provides no comprehensive means to address crowding and frustrations related to vehicle and pedestrian circulation in the frontcountry area. Ongoing wilderness restoration efforts in the South Colony Lakes basin area are improving wilderness experiences in the Sangre de Cristo Wilderness. The no-action alternative would help to maintain wilderness experiences in the portion of the Sangre de Cristo Wilderness area that lies within the Great Sand Dunes. Combined with past, present, and reasonably foreseeable future actions, the no-action alternative would have minor adverse and moderately beneficial effects on visitor experience.

Conclusion. Crowding and other visitor frustrations related to visitor numbers in the focused-use area east of the dunefield would have a long-term, moderate, adverse impact on visitor experience. Maintenance of the current policy regarding dogs would have long-term, minor, adverse, and beneficial impacts on visitor experience. Maintenance of existing wilderness

experience in remote areas would have a long-term, moderate, beneficial impact, and degradation of such values in less remote areas would have a long-term, moderate, adverse impact.

SCENIC RESOURCES AND VISUAL QUALITY

Under the no-action alternative, there would be no new human-made structures or vehicle areas in the national preserve that would affect scenic quality. The no-action alternative would not include new human-made structures, construction, or vehicle access in the new park lands that would affect scenic quality. This alternative would not introduce new sources of outdoor light, and therefore, would not affect views of the night sky. People wishing to access the northern part of the park on foot would continue to park their vehicles at certain points within the Baca Grande subdivision, along the north side of the park boundary. Scenic views would continue to be adversely affected by this practice, and impacts would likely increase over time as the size of the subdivision expanded and if the practice became more common. Impacts would be long term, localized, adverse, and minor to moderate in intensity.

Cumulative Impacts. Rehabilitation of main park roads and parking areas, which includes increasing the capacity of the dunes lot by ~5%, would result in a negligible, long-term, localized, adverse impact on scenic resources. Prescribed burns (fire management) would have short-term, minor, adverse, localized impacts on scenery and visibility. Continued residential growth in the Baca Grande subdivision, located north of the national park, means that more homes, retreat centers, commercial structures, and vehicles would be visible in this area of the landscape in the

future. Expanded residential development could also bring more dust and wood smoke. The private land parcel that is for sale near the park entrance could be rezoned to commercial and developed. Overall, such new development would intrude upon the area's natural scenery (at least from some vantage points), affect visibility, and introduce new light sources into the night sky. Regional population growth and development would also continue to introduce additional light into the night sky. 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 moderate localized and regional adverse impacts on scenery.

Mitigation. No mitigation is proposed for the no-action alternative.

Conclusion. The no-action alternative would have long-term, localized, minor to moderate, adverse impacts on scenery, but would not affect visibility or the night sky. There would be *no impairment* of scenic resources and visual quality from this alternative (see specific definition of impairment in the "Impairment of National Park Resources" section).

SOCIOECONOMICS

Implementation of the no-action alternative would occur at the same time as other economic, demographic, and social changes across the San Luis Valley. The Valley is expected to gain 13,000 more residents between 2005 and 2030, 27% more than the current population of 48,000. Most of the population growth is expected to occur in Alamosa and

Saguache counties, the latter including substantial growth in the Baca Grande subdivision. The Baca Grande Property Owners Association forecasts as many as 2,700 new homes in the subdivision by 2025, and an eventual total of more than 4,500 units. However, the Baca Grande community recently started a new long-term visioning and planning process that may result in revisions to those forecasts.

Visitor-Related Economic Impacts

Recreational visitor use at the park is projected to increase to nearly 375,000 visits per year by 2025, which is 106,000 (or 40%) more than in 2004 (266,800). Visitor use is expected to increase steadily over time, although year-to-year changes will vary, with some periods of faster or slower growth, and even periods of short-term declines. Peak visitor use is expected to continue to occur in July, with 80,800 visitors per month projected in 2025, compared to about 65,200 in July 2004.

Nonresidents who would come to the Great Sand Dunes as part of a one-day or multiday trip would account for most of the visitor growth over time. Economic and population growth in the San Luis Valley would result in more visitor use over the long term by permanent and part-time residents of the Valley and surrounding region. Residents of Crestone and the Baca Grande subdivision are expected to account for a larger share of future local use.

Visitors to the park under the no-action alternative would result in an estimated 192,660 party-days of visitation annually by 2025, which is 55,490 party-days more than that estimated for 2004 (137,170 party-

days)⁷. Increased local visitor spending at stores, motels and hotels, and other tourism related businesses and attractions would accompany the rising visitation with annual spending projected to reach \$18.43 million by 2025, a \$5.30 million increase over 2004 levels. Future visitor use and spending would vary by season, with peak visitor use in the summer. Of the total future visitor spending, \$432,000 would be for entry fees and sales of various passes, with another \$380,000 in annual merchandise sales through the Western National Parks Association operation at the visitor center.

Projected spin-offs from visitor spending include personal income of \$5.75 million per year, supporting a total of 472 jobs across the region. Those levels are \$1.65 million more in terms of annual income and 135 new jobs compared to the contributions related to park visitors in 2004. The visitor-related impacts would result in long-term benefits, but minor relative to the 2003 total employment of 13,271 jobs and \$470.4 million in total personal income in the two-county region.

Most of the visitor spending under the no-action alternative would be concentrated in the Alamosa area because the majority of users would use the park's main entrance, traveling from and to the west (SH 17) and south (SH 150). Market opportunities created by the increased spending could, over time, trigger more commercial development along the access roads to the park's main entrance and provide opportunities for more small-scale business activities, including more of the services

already provided via incidental business permits issued by the park.

Businesses in smaller communities, including Crestone, Baca Grande, Mosca, Moffat, Hooper, Blanca on the west, and Westcliffe and Gardner on the east, would also see increases in future sales to park visitors. However, the scale of such increases would be relatively small.

The state and some local governments would collect additional sales tax from the increases in visitor spending. County governments may also see property tax revenues climb due to new development and rising property values. Saguache County does not levy a sales tax, but could benefit indirectly from population growth under the no-action alternative because such growth would raise the cap on federal PILT. Alamosa County could also realize additional PILT from the acquisition of Medano Ranch.

The visitor-related economic impacts would be beneficial, but negligible in the short term and minor and beneficial over the long term.

Economic Impacts Related to GMP Implementation and Park Operations

Choosing the no-action alternative would provide an economic boost to the region in the form of \$6.8 million in future construction spending, \$7.4 million in other major spending, and increases in operating and maintenance expenditures. Over time, more staff would be needed to maintain and achieve current service levels across the expanded park and increased visitation, although such increases would depend on the park receiving budget increases. The additional staffing need is estimated at five

⁷ Party-days are a measure of visitor activity used to account for varying lengths of stay and different spending patterns among visitors. The conversion is necessary because spending data are typically collected and reported on "per day" or "per trip" basis, with spending on lodging or other accommodations a key category of spending.

FTEs, at an annual cost of approximately \$260,000.

Future capital construction and major maintenance spending at the park would create a series of short-term economic impacts in the region. Local construction and related industries would capture much of that spending. It is uncertain when that spending would happen because it depends on the timing and size of budgets approved by Congress for the National Park Service, the allocation of those budgets within the National Park Service, and future collections of entry and camping fees at the park, which can then be used to support projects. Annual payroll, operations, and maintenance by the park would produce long-term effects on employment, business sales, income, and other related measures. The economic effects associated with this federal spending are summarized below:

- capital construction (short term): 122 job-years⁸ of employment and \$3.39 million in personal income over time, between 2006 and 2025
- nonannual recurring (short term): 121 job-years of employment and \$3.38 million in personal income over time, between 2006 and 2025
- park operations (long term): 43 jobs (compared to 37 at present), including 33 FTEs of direct NPS staffing, and \$1.95 million per year in annual income

No major changes in the economic contributions made by The Nature Conservancy operation of Medano Ranch would occur

⁸ Temporary job impacts are expressed in terms of “job-years” to account for the variation in employment over time and prevailing employment patterns in the region. Total job-years does not distinguish between full-time and part-time jobs. The totals do, however, account for the effects of seasonal jobs on overall employment.

over the long term under the no-action alternative. The economic effects associated with park operations would be beneficial, but negligible to minor in the short term, and beneficial and minor over the long term.

Community Services

Over time, the rising number of visitors to the park would indirectly increase demands on community services and facilities across the region. Local water and wastewater systems would be affected by more people traveling through the area and staying in local lodging accommodations. However, the incremental demands associated with the increased visitation would not require additional capacity or staffing due to its seasonal nature, limited scale, and geographical dispersion. Tax revenues generated directly and indirectly by visitor spending would help provide resources to meet future needs.

Effects on community services under this alternative would be indeterminate and negligible over the short and long term.

Traffic and Emergency Services

Traffic volumes on area highways and roads would increase as a result of travel associated with the no-action alternative. Traffic increases would be more discernible on SH 150 or Alamosa County Lane 6N, the main access roads to the park, although future traffic would still be well below design capacity of these roads. Most park-related traffic would consist of light-duty vehicles and self-contained RVs that do not result in heavy wear on the paved road and thus, these roads would require little additional maintenance.

Traffic volume increases would occur on Saguache County Road T between SH 17 and Crestone/Baca Grande, and on roads within the Baca Grande subdivision. This would occur because the easiest way to get to the northern part of the park would be through the subdivision (although this alternative does not provide for public vehicle access into the north part of the park). Thus, visitors would park on local and county roads near the northern boundary of the park, as they do now. From there, they would walk into the park. Some people would drive around the subdivision to explore different routes of approach to the park boundary. Effects would be greatest on summer weekends and might increase over time as word spreads about easy access points, and as visitor volume increases over time. Given expected traffic volume from residential and spiritual retreat growth in the Baca Grande subdivision, the contribution of park visitor-related traffic would be minor. However, vehicle congestion from visitors parking (or trying to park) near the terminus of county roads could be an annoyance to some residents.

More travelers would cause more traffic accidents and demands on local law enforcement, emergency medical, and fire protection agencies. The scale of changes associated with the no-action alternative would not require law enforcement agencies to hire more staff, although they could contribute to an overall need for additional staff. While the frequency of incidents would remain relatively low, the distances and response time involved and the fact that many emergency medical and fire protection agencies in the area are staffed by volunteers, would impose a burden on these providers. The effects of the no-action alternative on traffic and emergency services would be long term, adverse, and minor in intensity.

Attitudes and Lifestyles

The Great Sand Dunes National Park and Preserve community is broad based, including representatives at the local, state, and national level. The no-action alternative would effectively maintain a form of status quo regarding the park's direct influences on community attitudes. Continuing National Park Service and Nature Conservancy operations, primarily within the context of the existing management, would not alter established visitor use opportunities or patterns within what were the boundaries of the national monument, and lack of new access would somewhat discourage use on most of the new national park lands. The lack of access would also achieve a type of *de facto* wilderness, which some would support, although it would limit opportunities to enjoy the solitude it offers.

For many, the no-action alternative could be a source of apprehension or frustration because it fails to establish clear management direction for the expanded park. Those who were actively engaged in efforts to promote establishment of the park might be particularly disaffected with this alternative. Others may see some advantage to this alternative, either because it avoids certain outcomes or impacts that they might find objectionable, or because it is perceived to leave management options open for further consideration.

Cumulative Impacts. From an economic and social point of view, one cannot easily isolate the park from many of the cumulative actions. Past and present actions, mainly the development and continued operation of large ranches, combined with the subsequent set-asides of public lands, were instrumental in the establishment of the park and adjacent land-use patterns that presently exist. Without those actions,

more of the land would likely have been subdivided for farm and ranch development, forever changing the landscape and lowering the likelihood that park expansion would occur.

Areas for potential cumulative interaction include development in the Crestone/Baca Grande subdivision and the potential sale and development of private lands along the major access roads to the park's main entrance. The development of the Baca Grande subdivision, including the spiritual centers, resulted in a situation where the park and the community became neighbors, each with interests and concerns regarding management and access in that portion of the park. Changes in either affect the other. Increased visitor use under the no-action alternative raises concerns for the community, particularly with respect to traffic and the presence of more nonresidents in the community. The incremental effects due to the no-action alternative would happen even as the community itself grows and changes with new residential construction and as new property owners and guests arrive in the community.

Over time, increases in the number of visitors to the park may increase the commercial development potential for private lands near the park's main entrance. Any sales and subsequent development would have economic implications, as well as changing visitor experience. The incremental effects of the no-action alternative would be negligible to minor in the short term and minor in the long term, and generally beneficial, as compared to other social or economic effects resulting from the cumulative actions.

Conclusion. The economic and social effects of the no-action alternative include negligible to minor short-term and minor long-term economic benefits, and

negligible indeterminate or adverse effects on demands for community services and facilities. Long-term consequences on attitudes and lifestyle are indeterminate, but in general are more likely to be adverse than beneficial.

HEALTH AND SAFETY

The no-action alternative would not change management practices related to fires (including campfires) in the park, so risks from wildfire would remain the same.

Roads, access, and vehicle traffic management within the park would remain essentially the same. However, with increased visitation and vehicles over time, there would be some additional risk of traffic accidents within the park. Although there have been no visitor/bison incidents to date, bison would remain on private land within the national park, so there would continue to be a negligible risk associated with their presence. Overall, impacts of the no-action alternative on health and safety would be long term, negligible, and adverse.

Cumulative Impacts. No cumulative impacts would be expected from the no-action alternative.

Conclusion. The no-action alternative would have long-term, negligible, adverse impacts on visitor safety.

NATIONAL PARK SERVICE OPERATIONS

Under the no-action alternative, NPS operations would be conducted much as they are now. Operations would continue to be based in facilities (park headquarters, visitor center, maintenance center, etc.) located east of the dunes. With a few minor

exceptions, these facilities would be generally adequate to operate the park under the no-action alternative.

Operational activities such as interpretation, resource protection, inventory and monitoring, research, and resource management would continue to be conducted, both in the former national monument and in the park expansion area. National Park Service staff would continue to work cooperatively with neighboring agencies and entities to address concerns and meet goals. The Nature Conservancy would continue to maintain its facilities at Medano Ranch. Assuming the park was eventually fully staffed, the no-action alternative would have no to negligible impacts on NPS operations.

Cumulative Impacts. There would be no cumulative effects on NPS operations from the no-action alternative.

Conclusion. The no-action alternative would have no to negligible effects on NPS operations.

OPERATIONS OF OTHER ENTITIES AND RESOURCE MANAGEMENT AGENCIES

Public Vehicle Access To/Through North Portion of the Park

Under the no-action alternative, access points into the park would remain as they currently exist. Access across the northern boundary of the national park would continue to be limited to administrative and permitted vehicle and public pedestrian traffic. By definition, the no-action alternative would continue existing management strategies. If ongoing USFS planning for the Baca Mountain Tract, which the National Park Service is cooperating in, determines public vehicle

traffic to their lands is appropriate, this condition may change.

Continued lack of public vehicle access to and through the northern reaches of the national park may impede visitation to and use of USFS lands adjacent to that portion of the park. However, there has been no public access to or through this area in recent history (i.e., past 50-plus years) due to private ownership (NPS, F. Bunch, pers. comm., September 29, 2006). This could have a minor adverse impact on hunting and associated impacts on the elk herd as described in the previous wildlife, including the “Colorado State-Listed Species, Ungulate Herd Numbers and Health” section.

Visitation, in general, is anticipated to increase in the future, which would result in adverse impacts to natural resources, particularly ecologically sensitive resources. Under the no-action alternative, remediation expenses for degradation of near-pristine conditions on adjacent USFS lands would not be anticipated to increase beyond those projected due to visitation trends.

Designation of Additional Wilderness Areas within the Park

Under the no-action alternative, no new areas within the park would be designated as wilderness. Therefore, this alternative would have no new wilderness-related effects on activities of other agencies and organizations.

Cumulative Impacts. The Great Sand Dunes Act (2000) authorized a change in designation of Great Sand Dunes from a national monument to a national park, established the national preserve, and created the Baca National Wildlife Refuge. The act also added Kit Carson Peak and

surrounding lands to the Rio Grande National Forest. A comprehensive conservation plan for the refuge, scheduled to begin in 2008, will provide details regarding future management. Planning for the new USFS lands is tentatively to begin in 2006 or 2007. The no-action alternative imposes relatively little extra work on the part of these two agencies relative to resource management planning. The potential impact of this alternative on USFS and CDOW elk management activities is somewhat reduced when considered cumulatively with the future elk management study and plan. Therefore, combined with past, present, and reasonably foreseeable future actions, the no-action alternative would have minor adverse effects on the management actions of other agencies.

Conclusion. The no-action alternative would be anticipated to have short- and long-term, minor, adverse impacts on the management actions of other agencies or entities, specifically CDOW and the USFS.

UNAVOIDABLE ADVERSE EFFECTS

Some impacts caused by human use (especially minor, inadvertent impacts to

archeological sites, vegetation, soils, water resources, etc.) are essentially unavoidable because barring people from the park would be inconsistent with the NPS mission.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible impacts are permanent. An irretrievable commitment of resources refers to resources that, once removed, cannot be replaced. Archeological resources that are stolen or vandalized are irreversibly lost. Even moving or disturbing such resources constitutes an irreversible commitment of resources because information is lost if the context (location and condition) is changed, even inadvertently. Thus, there would be some irreversible loss of commitment of archeological resources from this alternative.

RELATIONSHIP OF SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

There would be no adverse effects on biological or economic productivity from implementation of this alternative.

IMPACTS OF THE NATIONAL PARK SERVICE PREFERRED ALTERNATIVE

ARCHEOLOGY

Under the NPS preferred alternative, a substantial amount of visitor use would remain focused in frontcountry areas and on established roads and trails. Areas with concentrations of archeological resources located in the frontcountry, along creeks, and along established trails would have impacts from trampling of sites, vandalism, and theft. The new backcountry zone in the north area of the park (includes an access road and trailhead) would improve visitor access into the north portion of the national park and to other core park areas. Much of this area has not yet been surveyed for archeological resources

because it has until recently been privately owned. However, based on archeological information that is available from other areas of the park, archeological resources are likely present. Other trails would be added in as yet undetermined locations (within the backcountry adventure zone) in the northern portion of the national park and national preserve, so there would be the potential for impacts to sites in more areas of the park. Impacts under NEPA would be site specific, adverse, and would range from minor to moderate, depending on the site and type of impact activity.

Assuming The Nature Conservancy transferred management of Medano Ranch to the National Park Service, Medano Ranch headquarters would be used for NPS administrative purposes and opened on a limited, scheduled basis for public use (environmental education, etc.). Current ranch management practices that are destructive of archeological sites would cease under NPS management, benefiting

the archeological record. The nearby guided learning zone would help protect archeological resources because visitors would be escorted. Guided use would help direct use in a way that would prevent most inadvertent adverse effects. Also, guides would help monitor resources on a regular basis, at least during the warmer, busier months. Under this alternative, park staff would regularly be in the general area of Medano Ranch, serving as a deterrent to those who might otherwise intentionally harm sensitive archeological resources. The substantial wilderness recommendation in this alternative would help to protect resources in much of the park expansion area—it is much more difficult to gain access to remote areas if vehicles are not permitted, plus any signs of vehicle use (e.g., dust, tire tracks, or headlights at night) would alert the National Park Service to possible illegal activity. Nonetheless, it would still be possible for one person on foot or horseback to do intentional harm to archeological sites. Closer monitoring, the guided learning management zone, and the wilderness recommendation would provide long-term, minor, beneficial impacts under NEPA to archeological resources.

Cumulative Impacts. Population increase and development in the Crestone/Baca Grande area likely has adversely affected archeological resources. Additional, as yet undisturbed resources would likely be disturbed or destroyed in the future as this area continues to grow (from ground disturbance during construction and from looting and unintentional disturbance). The foreseeable development of private land near the park entrance could similarly affect archeological resources. Rehabilitation of main park roads and parking areas

could have potential long-term, localized, minor to moderate, adverse impacts under NEPA to a NRHP-eligible archeological site (5AL405) from construction activities and heavy equipment. The interagency fire management plan could have beneficial impacts under NEPA if areas identified for prescribed burns or fuel reduction are first surveyed for archeological resources and flammable cultural resources. If such resources are found and evaluated to be NRHP eligible, the National Park Service would develop measures to avoid, minimize, or mitigate adverse effects through compliance with 36 CFR 800. This would expand identification of and knowledge about regional archeological resources. The NPS preferred alternative would contribute both adverse and beneficial effects on archeological resources, and these impacts would be confined within the park. Combined with past, present, and reasonably foreseeable future actions, the NPS preferred alternative would have adverse effects under NEPA, analyzed as minor to moderate adverse impacts and minor beneficial effects on archeological resources.

Mitigation. In general, the National Park Service will comply with section 106 of the NHPA in accordance with 36 CFR 800 as part of the management planning for new facilities, areas of visitor use, and other practices and actions. This would include consultation regarding mitigation of any adverse effects.

Section 106 Summary. Under NEPA analyses, there is potential for minor to moderate adverse effects to archeological properties. In all cases, the National Park Service will comply with section 106 of the NHPA in accordance with 36 CFR 800 as part of the planning process for new facilities, areas of visitor use, a fire management plan, and other actions.

Conclusion. Impacts from visitor use in existing areas, new vehicle access, and new trails would be site specific, adverse, and would range from minor to moderate. Closer monitoring, the guided learning management zone, and the wilderness recommendation would provide long-term, minor, beneficial impacts to archeological resources. There would be *no impairment* of archeology from this alternative under NEPA (see specific definition of impairment in the “Impairment of National Park Resources” section). In all cases, the National Park Service will comply with section 106 of the NHPA during project planning.

HISTORIC STRUCTURES

Assuming management of Medano Ranch were transferred to the National Park Service, the headquarters complex would be used as an NPS administrative center, and for public uses on a limited, scheduled basis. Such uses would require some initial stabilization, as well as constant maintenance of the complex. This would prevent further deterioration of historic structures and constitute a minor, long-term, localized, beneficial impact. Adaptive reuse of these buildings would require modifications to the buildings, which, if not properly designed and implemented, could change character-defining historic features. Some minor buildings may be removed as well. These actions could have minor to major, long-term, localized, adverse impacts under NEPA analysis.

Opening the Medano Ranch headquarters area on an occasional basis for scheduled public activities would bring increased vehicle and pedestrian access and traffic. There would be more potential for vandalism, although such activity would be discouraged by the presence of NPS staff. Also, depending on the type and exact

location of public use, there could be increased wear and tear on historic structures. Impacts would be minor, long term, localized, and adverse as analyzed under NEPA.

In the frontcountry zone, an unevaluated ditch segment could be disturbed by the proposed hiking/biking path that would connect Pinyon Flats campground to the visitor center. If the ditch segment were determined eligible for the NRHP, effects could be long term, moderate to major, and adverse as analyzed under NEPA.

The extensive amount of recommended wilderness in this alternative would cause minor, long-term, localized, adverse impacts to peripheral ranch elements due to removal of fences and neglect of other elements such as roads and ditches as analyzed under NEPA. Furthermore, the National Park Service may decide to not maintain or to remove cabins and other structures in areas proposed for wilderness management. In all cases, the National Park Service will identify and evaluate NRHP eligibility of buildings and structures and determine the level of maintenance and management required as part of the planning process and compliance with section 106 of the NHPA.

Cumulative Impacts. No cumulative effects would be anticipated.

Mitigation. The National Park Service would comply with section 106 for its comprehensive planning for Medano Ranch, including restoration, rehabilitation, maintenance (or lack of), new construction, etc., to ensure that the historic character and integrity of the ranch is not adversely affected to the extent possible. Any needed mitigation measures at Medano Ranch would be determined in the context of section 106 compliance. The National Park Service would consult with

the Colorado SHPO and other consulting parties to comply with section 106 of the NHPA in planning for management of buildings and structures. This would include completing their identification and evaluation of NRHP eligibility.

The most effective mitigation measure for the canal segment would be to avoid it completely. If avoidance were not possible, a NRHP eligibility determination would be required, and if it were found to be NRHP eligible, the National Park Service would develop measures to avoid, minimize, or mitigate adverse effects to it (documentation would likely be required) through compliance with section 106 of the NHPA.

Section 106 Summary. There is a potential for adverse effects to Medano Ranch and other historic buildings and structures. The National Park Service would comply with 36 CFR 800 during planning for the comprehensive management (including adaptive use and maintenance) of Medano Ranch and all historic structures in the park. Preservation and/or rehabilitation in accordance with the *Secretary of the Interior's Standards for Preservation or Rehabilitation* and pertinent NPS guidance would result in historic buildings and structures not being adversely affected. Management decisions, including mitigation measures, would be made with appropriate section 106 compliance.

Conclusion. Potential effects to Medano Ranch would include minor, long-term, localized, beneficial impacts, as analyzed under NEPA, from rehabilitation associated with adaptive use and adverse effects (minor to major, long-term, localized, adverse impacts as analyzed under NEPA) from potential modifications to structures, public use, and vandalism. Other buildings and structures, as yet unevaluated for NRHP eligibility, could be adversely affected by decisions to not

maintain or otherwise manage them or from indirect effects of vandalism. If an unevaluated ditch segment is found to be eligible for the NRHP, and if this feature is to be disturbed, impacts could be moderate to major and adverse. If this feature were found to be ineligible for the NRHP or if it were avoided, impacts would be negligible. Through compliance with section 106, the severity of impacts can be reduced below the “major” threshold of the NEPA analyses. There would be *no impairment* of historic structures under NEPA from this alternative (see specific definition of impairment in the “Impairment of National Park Resources” section). In all cases, the National Park Service would comply with section 106 of the NHPA.

CULTURAL LANDSCAPES

Under the NPS preferred alternative, the Medano Ranch potential cultural landscape could experience various impacts. The ranch headquarters complex, the core of the cultural landscape, would be adaptively used as an administrative center with limited, scheduled public access for special events, environmental education, etc. Limited new facilities such as public restrooms and a covered outdoor meeting structure might be needed to support these purposes. Parking areas and changes to vehicle and pedestrian access would be needed as well. Minor to moderate, site-specific, beneficial impacts would occur with adaptive reuse of buildings for offices, storage, park programs, etc., because stabilization and maintenance would be assured. However, adverse effects (minor to major, long-term, site-specific, adverse impacts as defined under NEPA) could occur from renovation and rehabilitation (adaptive reuse), or if other changes were not carefully executed (that is, with the integrity of the cultural landscape in mind). Other potentially contributing elements of

the landscape, such as roads and ditches, could experience negligible, long-term, site-specific, adverse impacts as analyzed under NEPA through neglect and deterioration.

The NPS administrative potential cultural landscape could also be affected by this alternative. A nonhistoric fee booth located within this landscape (adjacent to the historic superintendent’s residence and entrance station) would be removed. This would constitute a moderate, long-term, site-specific, beneficial impact under NEPA.

Cumulative Impacts. No cumulative effects would be anticipated.

Mitigation. The National Park Service will comply with 36 CFR 800 during planning for adaptive use, maintenance, and other management of the potential Medano Ranch and the NPS administrative cultural landscapes. Preservation, rehabilitation, or management of the cultural landscapes in accordance with the *Secretary of the Interior’s Standards for Preservation or Rehabilitation* and pertinent NPS guidance would result in cultural landscapes not being adversely affected. If character-defining features of the cultural landscape may be adversely affected, the National Park Service will consult with the Colorado SHPO and other consulting parties as part of the planning process to develop and implement a memorandum of agreement with mutually acceptable measures to avoid, minimize, or mitigate adverse effects.

Section 106 Summary. There is the potential for adverse effects to potential Medano Ranch and NPS administrative cultural landscapes. To avoid such adverse effects, the National Park Service will comply with 36 CFR 800 during planning for adaptive use, maintenance, and other management of both landscapes.

Preservation or rehabilitation or management of the cultural landscape in accordance with the *Secretary of the Interior's Standards for Preservation or Rehabilitation* and pertinent NPS guidance would result in the landscape not being adversely affected. If NRHP character-defining features of the cultural landscape may be adversely affected, the National Park Service will consult with the Colorado SHPO and other consulting parties as part of the planning process to develop and implement a memorandum of agreement with mutually acceptable measures to avoid, minimize, or mitigate adverse effects.

Conclusion. The NPS preferred alternative could potentially have adverse effects (minor to moderate, beneficial impacts and negligible to major impacts under NEPA analyses) on the Medano Ranch potential cultural landscape. This alternative would also have beneficial moderate impacts on the NPS administrative potential cultural landscape. There would be *no impairment* of cultural landscapes under NEPA from this alternative (see specific definition of impairment in the “Impairment of National Park Resources” section). In all cases, the National Park Service will comply with section 106 of the NHPA.

VEGETATION

Visitation in the frontcountry and dunes play management zone would increase over time (see “Visitor Use and Experience” section for projections), so the dunefield in this area would experience more use and sparse dunefield plant communities would experience increased trampling, wind erosion, and landslide effects. Popular locales within the subalpine and tundra life zones could also experience increased use over time. Providing guided hiking and equestrian trails in the guided learning management zone of Medano Ranch

would minimize impacts to plant communities in this area. Unspecified new trails and trail links to adjacent lands (some would be located near the park perimeter) would result in adverse effects from construction and the potential for non-native plant species establishment. In general, impacts to vegetation from increased use and use in new park areas (including horse use) would be tempered by monitoring and management actions tied to a management zone-based carrying capacity approach (see chapter two “Management Zones” section for details). The overall result would be short- and long-term, minor to moderate, adverse impacts, and short- and long-term, minor, beneficial impacts to plant communities.

Relocation of the nonhistoric entrance station adjacent to the southern boundary, addition of bicycle lanes to the main entrance road (from the park boundary to the dunes parking lot), and constructing a hiking/biking path to connect the Pinyon Flats campground to the visitor center would result in short- and long-term, minor to moderate, adverse impacts to on-site plant communities of the sand sheet and dunefield life zones due to grading and placement of runoff control structures (disturbance and potential for nonnative plant species invasion) and paving (burial). Similar impacts to plant communities would be expected during and following construction of any cooperative or joint facilities (access routes, trailheads, ranger stations, etc.) with private partners and/or neighboring management agencies. A parking area and trailhead (with access route) to allow hiker and equestrian access to the northern park backcountry would adversely affect sand sheet plant communities due to grading and placement of runoff control structures (disturbance and potential for nonnative plant species invasion) and use of gravel overlays (habitat burial). The parking area and trailhead would be

located 0.5 mile or more north of Deadman Creek; however, the mature narrowleaf cottonwood groves present on the banks of Deadman Creek could potentially be attractive to hikers and horseback riders for resting, watering animals, and other passive pursuits. Trails constructed from the trailhead to the mountain front could result in impacts related to vegetation removal, social trail establishment, and the potential for nonnative plant species establishment. Most visitors would likely remain on designated trails (e.g., east of Liberty Road), which would avoid this riparian corridor. Seeking and finding a previously disturbed site, such as a drill pad on which to situate the trailhead and parking area, would result in beneficial effects to local plant communities. Visitors would use an existing primitive road for access, thus avoiding the surrounding plant communities. The overall result would be short- and long-term, minor to moderate, adverse, and minor to moderate beneficial impacts to plant communities in the northern portion of the park.

If The Nature Conservancy were to transfer Medano Ranch lands to the National Park Service, managed bison grazing would be discontinued. Over time, plant communities in this area would recover from impacts of managed bison grazing (e.g., streambank trampling, shifts in species composition from selective consumption of more palatable species, etc.). This would have short- and long-term, minor, beneficial impacts on sabkha and sand sheet plant communities.

The park would identify and manage nonnative plant populations, reducing their effect on native plant communities or possibly eliminating some stands from the landscape resulting in short- and long-term, minor to moderate, beneficial impacts on the species composition of

plant communities and their habitat quality.

Cumulative Impacts. Generally, native plant communities of the San Luis Valley and of the park have been affected by over a century of livestock grazing and the effects are sometimes intensified by periods of drought. Depending on the local environment, grazing effects can range from minor shifts of plant and animal species composition to more serious wind and water erosion (e.g., blowouts and gulying) and nonnative plant introductions. Cattle grazing was discontinued on the former Baca Ranch lands in 2004, and some past adverse livestock impacts may gradually be reversed in the future. Rehabilitation of main park roads and parking areas, which includes increasing the capacity of the dunes parking area by ~5%, would result in minor, long-term, localized, adverse impacts on vegetation. Introduction of nonnative landscape plants from adjacent developed lands would result in adverse effects to native plant communities. Some native plant communities have undergone historic disturbance during past land-use activities and are therefore subject to such nonnative plant species invasion. Contributions of the NPS preferred alternative to vegetation impacts would be from increased visitation (especially in certain areas), elimination of bison grazing, new facilities (trailheads and trails), and management of nonnative, invasive plant species. Combined with past, present, and reasonably foreseeable future actions, the NPS preferred alternative would have long-term, negligible to moderate, adverse impacts, and minor to moderately beneficial impacts on plant communities.

Conclusion. Increased visitation; new access points; new trails, roads, and parking areas; and improvements to existing infrastructure would have long-term,

negligible to moderate, adverse impacts on plant communities. Cessation of managed bison grazing on Medano Ranch, carrying capacity monitoring and actions, and control of nonnative plant species would have long-term, minor to moderate, beneficial impacts on plant community species composition and habitat quality. There would be *no impairment* of vegetation from this alternative (see specific definition of impairment in the “Impairment of National Park Resources” section).

ECOLOGICALLY CRITICAL AREAS

Visitation in the frontcountry and dunes play management zone would increase over time (see “Visitor Use and Experience” section for projections). Thus, the dune-fields in this management zone, which comprise a portion of the Great Sand Dunes ecologically critical area, would experience more use and the seven rare sand sheet and dunefield plant communities, rare plant species (James cryptanth and slender spider-flower), and rare wildlife (insects and small mammals) would experience increased trampling, wind erosion, and landslide effects. New trails and trail links to adjacent lands (some would be located near the park’s perimeter) would result in adverse effects from construction, social trail establishment, and the potential for nonnative plant species establishment. In general, impacts would be tempered by monitoring and management actions associated with a carrying capacity approach. Providing guided hiking and equestrian trails in the guided learning zone located within the San Luis Lakes / Sand Creek ecologically critical area would provide beneficial impacts to the rare plant communities present. Rare wetlands and aquatic plant associations and the slender spider-flower areas could be avoided by directing and carefully monitoring use. The

overall result would be short- and long-term, minor to moderate, adverse impacts, and short- and long-term, minor, beneficial impacts to ecologically critical areas whose boundaries include the sabkha, sand sheet, and dunefield life zones.

Relocation of the nonhistoric entrance station adjacent to the park entrance, addition of bicycle lanes to the main entrance road (from the park boundary to the dunes parking area), and constructing a hiking/biking path to connect the Pinyon Flats campground to the visitor center would result in short- and long-term, minor to moderate, adverse impacts to a portion of the Great Sand Dunes ecologically critical area due to grading and placement of runoff control structures (disturbance and potential for nonnative plant species invasion) and paving (burial). Similar impacts to ecologically critical areas would be expected during and following construction of any cooperative or joint facilities (access routes, trailheads, ranger stations, etc.) with private partners and/or neighboring management agencies; the specific impacts would depend on location and details.

A parking area/trailhead (and access route) for hiker and equestrian access to the northern park backcountry, sited on an existing primitive road 0.5 mile or more north of Deadman Creek, would have beneficial effects to the sand sheet plant communities of the Deadman Creek ecologically critical area. Most hikers and horseback riders would likely travel in a north-to-south pattern along Liberty Road from the proposed parking area and up the various drainages to the east, rather than along the riparian corridors located west of Liberty Road. The existing two-track road near Deadman Creek would be eliminated and revegetated/rehabilitated. Extending the recommended wilderness boundary to include the approximately 0.25-mile-wide

area within which Cow Camp Road would be rehabilitated would create a more consistent buffer to the Deadman Creek riparian corridor, further protecting the Deadman Creek ecologically critical area. The narrowleaf cottonwood groves along the banks of Deadman Creek would likely attract some hikers and horseback riders for resting, watering animals, and other passive pursuits that could result in streambank and vegetation impacts. Most visitors would likely remain on designated trails (e.g., east of Liberty Road), which would avoid this riparian corridor for natural resource reasons. Locating the trailhead and parking area 0.5 mile or more north of Deadman Creek would mean most direct impacts to the Deadman Creek ecologically critical area would be avoided. The overall result would be short- and long-term, minor to moderate, beneficial impacts to ecologically critical areas in the northern portion of the park.

If The Nature Conservancy were to transfer Medano Ranch lands to the National Park Service, managed bison grazing would be discontinued, and local plant communities would recover over time from associated streambank erosion, impacts from selective consumption of more palatable plants, etc. The end result would be long-term, minor, beneficial impacts on Medano Ranch portions of the San Luis Lakes / Sand Creek ecologically critical area plant communities and wildlife habitat.

The park would identify and manage nonnative plant populations, reducing their effect on native plant communities or possibly eliminating some stands from the landscape resulting in short- and long-term, minor to moderate, beneficial impacts on the species composition of plant communities and their habitat quality.

Cumulative Impacts. Generally, ecologically critical areas within the park have been affected by over a century of livestock grazing and the effect is sometimes intensified by periods of drought. Depending on the local environment, grazing effects can range from minor shifts of plant and animal species composition to more serious wind and water erosion (e.g., blowouts and gulying) and nonnative plant introductions. Cattle grazing was discontinued on the former Baca Ranch lands in 2004, and some past adverse livestock impacts may gradually be reversed in the future. Some native plant communities have undergone historic disturbance during past land-use activities and are therefore subject to nonnative plant species invasion. Contributions of the NPS preferred alternative to ecologically critical area impacts would be from increased visitation (especially in certain areas), elimination of managed bison grazing, new facilities (access routes, trailheads, and trails); and management of nonnative, invasive plant species. Combined with past, present, and reasonably foreseeable future actions, the NPS preferred alternative would have long-term, negligible to moderate, adverse, and minor to moderate beneficial effects on ecologically critical areas.

Conclusion. Increased use levels over time, use in new areas, and limited new facilities (access routes, trailheads, and trails) would mean greater potential for introduction of nonnative plant species, trampling of vegetation, and establishment of social trails. The end result would be long-term, minor to moderate, adverse impacts on three ecologically critical areas. Cessation of bison grazing, control of nonnative plant species, and management zone-related carrying capacity actions would have long-term, minor to moderate, beneficial impacts on ecologically critical areas. There would be *no impairment* of ecologically critical areas from this alternative (see

specific definition of impairment in the “Impairment of National Park Resources” section).

FEDERAL THREATENED AND ENDANGERED SPECIES

Under the NPS preferred alternative, most of the anticipated increase in park visitation would be focused in the frontcountry and dunes play zones. Dispersed day and overnight use across the remainder of the national park and preserve is projected to nearly double from about 26,000 visitors per year under current conditions and 37,000 under the no-action alternative, to over 52,000 with the NPS preferred alternative. Most of that increase would occur in the backcountry access and backcountry adventure zones in the northwest portion of the park, and around Medano Ranch in the southwest portion of the park. Backcountry use in the preserve is projected to grow over time, although the Mosca, Music, and Medano passes access points would remain relatively isolated from substantial levels of nearby development and associated population growth. A backcountry access road, trailhead, and trails would be constructed in the northern portion of the park.

The numbers of visitors to the preserve would remain relatively low and would decrease with elevation and topographic complexity. Given the difficulty of accessing much of the elevated reaches of the preserve, visitor use of the preserve is not anticipated to have detectable or measurable impacts on Mexican spotted owls or Canada lynx moving through or attempting to take up residence in those areas. Increased visitor use in the frontcountry areas adjacent to the parking area is not anticipated to impact southwestern willow flycatchers or yellow-billed cuckoos because although potential habitat

exists near the parking area, no individuals of either species have ever been recorded in this area and the level of activity inherent to this area is not conducive to the establishment of either species. Increased visitor use in the western portion of the park, north of the guided learning zone, is anticipated to decrease with distance from access points, thereby limiting potential impacts to southwestern willow flycatchers, yellow-billed cuckoos, or bald eagles that may try to establish residency in the habitat patches in this area. Further, management of the guided learning zone would follow recommended buffer zones and seasonal restrictions for Colorado raptors to avoid visitor impacts to potentially roosting bald eagles. Construction of a backcountry access road, trailhead, and associated parking area in the northwestern portion of the park would be sited well north of the Deadman Creek corridor and are thus not anticipated to impact habitat for listed species. Trails leading from this access point would lead straight to the mountain front, thus greatly reducing the potential for increased use of the Deadman Creek corridor. While some slight increase in use of the Deadman Creek corridor may still occur, that use would be anticipated to decrease with distance from the new access area. Assuming standard monitoring and remediation of habitat conditions, such impacts would be anticipated to be negligibly adverse. Therefore, impacts of increased visitor use under this alternative are anticipated to range from none to negligibly adverse.

Under the NPS preferred alternative, unleashed dogs used for hunting, and leashed dogs not used for hunting would continue to be allowed in the preserve, as allowed by law and regulated by CDOW. Thus, in this alternative, both leashed and unleashed dogs would be allowed in the preserve; a continuation of the current condition. Therefore, impacts to potential

Canada lynx or their habitat due to dogs in the preserve would be the same as those for the no-action alternative: no to negligible, short- and long-term, adverse effects.

Under the NPS preferred alternative, livestock watering ponds and structures would be removed and irrigation on Medano Ranch may cease. Cessation of irrigation may increase or decrease riparian flows and wetlands. A detailed study of the potential changes to the hydrologic regime of the park and surrounding area would be conducted before irrigation of wet meadows was eliminated. The park will reinitiate consultation with the USFWS if the analysis indicates that impacts to riparian habitats may occur as a result of this action. Therefore, these actions would be anticipated to have the potential for no to negligible adverse or beneficial impacts on the southwestern willow flycatcher, yellow-billed cuckoo, and bald eagle.

Cumulative Impacts. Past, present, and reasonably foreseeable actions that might affect potential individuals or populations of or habitat for the addressed species within the park include general growth of the human population surrounding the park, oil and gas exploration on former Baca Ranch lands, wilderness restoration efforts in the South Colony Lakes basin area (north of the national preserve), and a potential elk herd reduction in the future. Population growth is anticipated to be a contributor to modest increases in visitation within the preserve. Oil and gas exploration is underway on the adjacent Baca National Wildlife Refuge, which may impact lowland habitats outside the park boundaries for riparian and wetlands-associated species such as the southwestern willow flycatcher, yellow-billed cuckoo, and bald eagle. Oil and gas exploration within the park is possible due to privately held mineral rights, but would require additional compliance with NEPA. Wilder-

ness restoration efforts north of the preserve may increase the potential habitat for the Mexican spotted owl and Canada lynx along the range. Reduction of elk would avoid or reduce the impacts that overly large populations of this native ungulate can have on a range of habitats and the food chains based on those habitats. Taken in combination with these cumulative impacts, the NPS preferred alternative is anticipated to have no to negligible, adverse impacts on potential lynx presence within the park.

Mitigation. Mitigation measures are undertaken to reduce potential impacts to federally listed or candidate species, and are described for all action alternatives in chapter two. These measures include following specific guidelines regarding habitats of Canada lynx and bald eagles, and conducting surveys prior to the implementation of any activity near potential habitat for southwestern willow flycatcher, yellow-billed cuckoo, bald eagle nests, bald eagle winter roosts, and Mexican spotted owls. Additional consultation with the USFWS may be required, as indicated by the results of these surveys. Renewed discussions and additional section 7 consultation with the USFWS would focus on development of specific conservation measures to reduce potential impacts on these species. Such conservation measures would be based on recommendations provided by the current USFWS recovery plan or further coordination with the USFWS for the relevant species.

Conclusion. Impacts on potential Mexican spotted owls or Canada lynx within the park due to increased visitation over time would be moderated or reduced with the increase in elevation and ruggedness of the terrain such that only no to negligible, short- and long-term, adverse impacts on these species or their habitat in the park are

anticipated. Construction of a backcountry access road, trailhead, and associated parking in the northwestern portion of the park would be sited well north of the Deadman Creek corridor and are thus not anticipated to impact habitat for listed species. Similarly, impacts on potential southwestern willow flycatchers, yellow-billed cuckoos, and bald eagles within the western reaches of the park due to increased visitation would be reduced with increased distance from access points such that only no to negligible, short- and long-term, adverse impacts on these species or their habitats in the park are anticipated. The continued presence of unleashed hunting dogs, as well as leashed non-hunting dogs in the national preserve, is anticipated to continue to have no to negligible, adverse effects on Canada lynx passing through or trying to establish ranges within the national preserve in the short and long terms. Under the preferred alternative, these impacts correlate to a determination of “*may affect—not likely to adversely affect*” for the southwestern willow flycatcher, yellow-billed cuckoo, bald eagle, Mexican spotted owl, and Canada lynx. There would be *no impairment* of federal threatened and endangered species from this alternative (see specific definition of impairment in the “Impairment of National Park Resources” section).

WILDLIFE, INCLUDING COLORADO STATE-LISTED SPECIES

Species Associated with Riparian Corridors

Visitation in the frontcountry and dunes play management zones would increase over time (see “Visitor Use and Experience” section for projections), so Medano Creek wetlands in these zones would experience more use. Use levels in the

northern portion of the national preserve (backcountry adventure zone) would similarly increase due to population increases and improved access. Increased use over time could result in impacts to riparian corridors (e.g., Sand, Castle, Medano, Little Medano, and Cold creeks), both directly from use and from construction of trails, a backcountry access road, and trailhead parking. This could result in decreased water quality due to increased sedimentation, introduction of pollutants, and introduction of nonnative species or diseases. The overall result would be minor to moderate adverse impacts to species associated with these riparian corridors such as the Rio Grande sucker, Rio Grande chub, and the Rio Grande cutthroat trout.

New trails in the backcountry adventure and guided learning zones have the potential to disturb or displace wildlife, or cause areas to be avoided by wildlife—some species are more sensitive than others. Adverse effects could be mitigated by considering potential impacts on wildlife when siting new trails (Trails and Wildlife Task Force 1998). Assuming trails were carefully sited with wildlife in mind, impacts would be short and long term, localized, minor to moderate, and adverse.

A parking area and trailhead would encourage more hiker and equestrian use in the northern backcountry portion of the national park. The mature narrowleaf cottonwood groves on the banks of Deadman Creek would likely attract some hikers and horseback riders for resting, watering animals, and other passive pursuits. However, most visitors would likely keep to designated trails, which would avoid this riparian corridor for natural resource reasons. Improved hiking access to the mountain front might lead to increased use in the upper (USFS) portion of Deadman Creek, which includes a designated research natural area (high

elevation wetlands that currently receives little visitation). The wildlife issue for consideration in Deadman Creek is the potential impacts of increased use on Townsend's big-eared bats. These bats often forage along riparian corridors in the western United States and are moth specialists (Schmidt 2003). Degradation of the Deadman Creek corridor could potentially result in a decrease in the prey base for this species if the woody vegetation, some of which likely serves as host plants for moths, is affected. Assuming standard monitoring and remediation of habitat conditions, such impacts would be anticipated to be negligible to minor and adverse.

Wetlands-Associated Species

Under the NPS preferred alternative, livestock watering ponds and structures would be removed and irrigation on Medano ranch would cease, resulting in long-term, negligible to minor, adverse impacts (from drying) on species associated with introduced wetlands in the immediate area. When watering ponds and structures are removed and irrigation is ended, natural flows could be reintroduced to other areas. Expansion or reestablishment of wetlands plant communities in those areas may have long-term, negligible to minor, beneficial impacts on wetlands-associated species (such as the greater sandhill crane). The result of this scenario would be a combination of negligible to minor, adverse impacts on wetlands-associated species within the park, and negligible to minor, beneficial impacts to the same species outside (downstream of) the park. A detailed study of the potential changes to the hydrologic regime of the park and surrounding area would be conducted before irrigation of wet meadows was eliminated.

Ungulate Herd Numbers and Health

The NPS preferred alternative provides for future consideration of potential access routes to the park via the USFS, USFWS, and county/local planning processes. Under this alternative, as under the other two action alternatives, a route or routes across NPS lands in the north would be designated (via the Superintendent's Compendium) for hunter access to USFS lands where hunting is permitted. According to the *Code of Federal Regulations*, provision for such access may be provided when other access is impracticable; hunters must stay on designated routes and firearms must be broken down or disassembled to prevent their ready use.

Eventual development of public vehicle access to and/or through the north portion of the park could help alleviate adverse impacts to ungulates resulting from continued limited hunting access to USFS lands near the park's north area. Continued limited hunting pressure on elk in this area may aggravate rapid population increases that may be linked to declines of other native ungulate populations (bighorn sheep and mule deer), and to habitat degradation in the Sangre de Cristo Wilderness. Estimated numbers of elk hunters who may want access to the preserve and adjacent USFS lands via a northern access route through the park, range from 20 to 30 for each of the three five-day seasons; equating to 60 to 90 hunters annually (CDOW, R. Rivale, pers. comm., April 28, 2005). The preserve and adjacent USFS lands are in CDOW game management unit 82; an area approximately twice the size of the park. According to the CDOW Web site, the total elk harvest in 2005 across all of game management unit 82 was 164 elk. The number of bulls was 107. The ongoing elk research project data suggest that a declining recruitment rate, coupled with

the successful recreational hunting harvest, have driven an overall herd decline in the past four to five years. Based on a total hunter number of 1,729, this represented a harvest rate of 19%. Therefore, the potential number of elk not harvested from the park, preserve, and adjacent USFS lands is estimated at approximately 9 to 10 cows, and 5 to 6 bull elk.

While the current estimate of 4,000 elk is substantially fewer than the previously estimated herd size of nearly 6,000 elk in the San Luis Valley herd, this herd is still more than twice the 1,500-animal goal established by CDOW. Removal or nonremoval of 9 to 10 cow elk and 5 to 6 bull elk would not make a substantial difference in efforts to reduce the size of the herd. Furthermore, review of historic harvest records for game management unit 82 show no major decline in the number of elk harvested relative to years prior to park expansion. Therefore, while providing public vehicle access to the northern portion of the park might facilitate hunting of elk in the preserve and on adjacent USFS lands, this beneficial impact is expected to be negligible to minor.

Bighorn Sheep

Under the NPS preferred alternative, unleashed dogs used for hunting would continue to be allowed in the preserve. Leashed dogs not used for hunting would also continue to be allowed in the preserve (see chapter three section, “Health and Safety—Dogs” for details). Thus, anticipated impacts of the NPS preferred alternative on viability and persistence of bighorn sheep within the park would be the same as for the no-action alternative. Leashed dogs allowed in the preserve are anticipated to contribute minor to moderate adverse impacts to bighorn sheep populations within the park.

Cumulative Impacts. Cumulative actions contributing to impacts on riparian-associated species as described above include growth of the human population in the area surrounding the park, oil and gas exploration on former Baca Ranch lands, and elk herd reduction. The first two of these would contribute adverse impacts, while elk herd reduction would contribute beneficial impacts, specifically to riparian corridor habitats. In combination with these cumulative actions, the NPS preferred alternative is anticipated to contribute minor to moderate adverse impacts.

Cumulative actions contributing to ungulate herd numbers and health include enabling legislation for the expanded park (negative impacts from elk hunting not being permitted in expansion areas of the national park), but also beneficial impacts from increased protection for habitats and species (from conservation-based NPS management). Also contributing to ungulate herd numbers and health would be the interagency fire management plan, which should provide beneficial impacts through habitat management and enhancement. Finally, the elk herd reduction tentatively planned for the future, pending justification stemming from ongoing research and appropriate NEPA analysis, would most likely provide beneficial impacts to elk by reducing numbers to levels closer to the predicted carrying capacity of the area, and reducing the risk of diseases often associated with high herd densities. Beneficial impacts to other ungulates (mule deer and bighorn sheep) would stem from reduced elk impacts on shared habitats and reduced likelihood of exposure to diseases. Combined with past, present, and reasonably foreseeable future actions, the NPS preferred alternative would be anticipated to contribute negligible to minor beneficial impacts to ungulate herd numbers and health.

Cumulative actions contributing to impacts on bighorn sheep would include growth of the human population in the area surrounding the park, and elk herd reduction. The first of these would contribute adverse impacts as this would be anticipated to increase the number of leashed dogs in the preserve, while elk herd reduction would contribute beneficial impacts by reducing competition from, habitat impacts due to, and the threat of diseases from, elk. In combination with these cumulative actions, the NPS preferred alternative is anticipated to contribute minor adverse impacts and negligible to minor beneficial impacts on bighorn sheep within the park.

Conclusion. The NPS preferred alternative would have minor to moderate adverse impacts on species associated with riparian corridors due to increased recreational use; negligible to minor adverse impacts on wetlands-associated species within the park due to removal of artificial water sources, and cessation of surface irrigation; and negligible to minor beneficial impacts to the same species inside and outside (downstream of) the park due to possible increase of downstream waters; negligible to minor beneficial impacts on ungulate herd numbers and health due to facilitation of elk hunting; and minor to moderate adverse impacts on bighorn sheep populations within the park due to the presence of leashed dogs in the national preserve. There would be *no impairment* of wildlife from this alternative (see specific definition of impairment in the “Impairment of National Park Resources” section).

SOILS AND GEOLOGIC RESOURCES

In the NPS preferred alternative, construction of new trails in the backcountry adventure zone would cause site-specific soil disturbance and compaction. Nonethe-

less, provision of such trails would help direct visitor foot traffic, which would mean fewer social trails (and fewer associated soil effects) compared with the no-action alternative. The backcountry access zone in the north part of the park would eventually include a public vehicle access route and small trailhead. Disturbed sites for these facilities would be used as much as possible, but where that is not possible, there is potential for localized soil disturbance and compaction. Thus, these actions would have long-term, minor to moderate, site-specific, adverse impacts, and localized minor beneficial impacts.

In the frontcountry zone, the modest shuttle system would reduce the incidence of visitor vehicles parking alongside roads. Adding bicycle lanes and relocating the nonhistoric entrance station to the main park road would disturb and destroy soils within the narrow corridor adjacent to the road. The proposed hiking/biking path between Pinyon Flats campground and the dunes parking area and visitor center would also disturb soils within the path corridor, but the result of directing use along this path would be fewer social trails (and fewer associated soil effects) compared to the no-action alternative. These actions would result in long-term, minor to moderate, site-specific, adverse impacts, and localized minor beneficial impacts.

Cumulative Impacts. Establishment of a water right to fulfill the purpose of the national park and preserve would minimize further reduction of local groundwater levels or surface water flows, which could indirectly benefit sand recycling. Oil and gas exploration on lands that were formerly part of the Baca Ranch, but are now within the national park, has occurred and these activities could continue in the near future; however, any activities would be subject to 36 CFR 9B (*Nonfederal Oil and Gas Rights Regulations*), which require such activities

be conducted in a manner consistent with park purposes and preventing or minimizing damage to the environment. Minor expansion and reconfiguration of the dunes parking area and relocation of the horse loading area and RV dump station would also cause localized soil disturbance and destruction. The NPS preferred alternative would contribute both beneficial and adverse, localized impacts to soils and geologic resources. Combined with past, present, and reasonably foreseeable future actions, the no-action alternative would have long-term, minor to moderate, mostly localized beneficial and adverse impacts on soils and geologic resources.

Conclusion. Construction of new trails would cause localized soil disturbance and compaction. Provision of trails would mean fewer social trails (and fewer associated soil effects). Limited proposed facilities (vehicle access route and small trailhead) in the north part of the park could cause site-specific soil disturbance and compaction, especially where it is not possible to use already disturbed sites. Impacts to soils would be long term, minor to moderate, site specific, and adverse, and long term, localized, minor, beneficial. Frontcountry zone actions (modest shuttle system, bicycle lanes along the main park road, and a hiking/biking path) would have long-term, minor to moderate, site-specific, adverse impacts and localized minor beneficial impacts. There would be *no impairment* of soils and geologic resources from the NPS preferred alternative (see specific definition of impairment in the “Impairment of National Park Resources” section).

WETLANDS

Under the NPS preferred alternative, visitation in the frontcountry and dunes play management zones would increase

over time, so Medano Creek wetlands in these zones would experience more use. Providing guided hiking and equestrian trails in the guided learning management zone would direct use around sensitive wetlands areas and prevent or minimize most direct wetlands impacts in this area. In general, however, visitation increases and visitor use (including horse use) in new park areas could increase the incidence of trampling, encourage establishment of nonnative species, and compact wetlands soils and streambanks. Natural chemical and biological processes and wetlands species composition could be affected. The overall result would be minor to moderate adverse impacts to wetlands resources.

A parking area and trailhead would encourage more hiking and equestrian use in the northern backcountry portion of the national park. The mature narrowleaf cottonwood groves on the banks of Deadman Creek would likely attract some hikers and horseback riders for resting, watering animals, and other passive pursuits. However, most visitors would likely hike along designated trails and Liberty Road (outside the Deadman Creek corridor). Improved hiking access to the mountain front might lead to increased use in the upper (USFS) portion of Deadman Creek, which includes a USFS-designated research natural area; it includes high elevation wetlands and currently receives little visitation. Visitation increases and visitor use (including equestrian use) in new areas could increase trampling, introduce nonnative plant species, and compact wetland soils and streambanks. Natural chemical and biological processes and wetlands species composition could be affected. Effects would be long term, minor to moderate, and adverse.

Assuming Medano Ranch is eventually transferred to NPS management, hay meadow irrigation for bison forage in this

area would be discontinued. Wetlands that are not supported by natural surface and groundwater flows (e.g., introduced or artificial wetlands) would be adversely affected by drying. Natural flows in Sand, Big Spring, and Little Spring creeks would increase, at least seasonally, when irrigation is discontinued, and other wetlands types (e.g., ephemeral ponds, playas, mudflats, etc.) would expand and/or become reestablished. Also, more water would likely be delivered to San Luis and Head lakes in San Luis Lakes State Park and Wildlife Area, stabilizing water levels and providing wetlands support in those areas. Overall, anticipated wetlands impacts would be long term, moderate to major, beneficial, and long term, moderate, and adverse. A future study would examine expected impacts in more detail.

Eliminating bison grazing from Medano Ranch lands within the park would benefit some wetlands plant species, particularly the most palatable grasses. Some areas of channel and streambank erosion might gradually stabilize, improving wetlands structure and function. Livestock watering ponds and structures would be removed; some introduced wetlands would likely dry up, but other naturally occurring wetlands would be re-established or expand from restoration of natural flows. The park would identify and manage nonnative plant populations in new park areas, reducing their effects on native wetlands communities or possibly eliminating some nonnative stands from the landscape. Wetlands species composition and habitat quality would improve as a result. Overall, these actions would have long-term, minor to moderate, beneficial, and negligible to minor, adverse impacts on wetlands.

Cumulative Impacts. Livestock grazing typically adversely affects wetlands and riparian resources by causing shifts in species composition, erosion of stream-

banks and bottoms, and browsing of wetland grasses, shrubs, and tree seedlings. Cattle grazing was discontinued on the former Baca Ranch lands in 2004, and some past adverse livestock impacts may gradually be reversed in the future. Under the NPS preferred alternative, beneficial and adverse wetlands impacts would result from increased use, new trails and trail-heads, establishment of the guided learning zone, removal of livestock-related water-control structures, control of nonnative noxious plant populations, and discontinuation of bison grazing and hay meadow irrigation. Combined with past, present, and reasonably foreseeable future actions, the NPS preferred alternative would have long-term, moderate, beneficial impacts, and minor to moderate adverse effects on wetlands resources.

Conclusion. Visitation increases in new areas would affect chemical and biological processes and wetlands species composition, resulting in long-term, minor to moderate, adverse impacts to wetlands resources. Discontinuing irrigation of wet meadows on Medano Ranch is expected to have long-term, moderate to major, beneficial, and long-term, moderate, adverse impacts on wetlands. Eliminating bison grazing, removing livestock watering ponds and structures, and managing nonnative plants in new areas would have long-term, minor to moderate, beneficial, and negligible to minor adverse impacts on wetlands. There would be *no impairment* of wetlands from this alternative (see specific definition of impairment in the “Impairment of National Park Resources” section).

According to the procedural manual for Director’s Order – 77-1: *Wetland Protection*, “a draft EIS that identifies a preferred alternative that would have adverse impacts on wetlands must be accompanied by a separately identifiable draft “statement of findings” that explains

why an alternative with such impacts was chosen.” Thus, a draft statement of findings for wetlands is required and is attached to this document (appendix J).

WATER RESOURCES

Under the NPS preferred alternative, visitation would generally increase over time, and it would increase proportionally in certain areas (e.g., in the north portion of the park and in the guided learning zone). Increased use over time would mean more potential for trash and human, dog, and horse waste to be washed into streams and lakes, thus degrading water quality. However, within the national park, leashed dogs would be allowed only within the front-country, dunes play, and backcountry access zones, and the Liberty Road administrative zone, which would improve water quality in the remaining areas. Also, providing designated trails in backcountry adventure zones and in the guided learning zone would serve to minimize social trails, direct use away from sensitive areas, and restrict impacts to localized areas. Backcountry toilets would be installed if/when visitor use reaches the level where human waste disposal and sanitation becomes a concern. The end result of these actions would be long-term, negligible, localized, adverse impacts, and long-term, minor, beneficial impacts to surface water and potentially to shallow groundwater quality.

If and when The Nature Conservancy transferred Medano Ranch lands to the National Park Service, surface irrigation of hay meadows for bison forage would be discontinued. Nondiverted creek flows would be allowed to remain within their natural drainages (e.g., Sand, Big Spring, and Little Spring creeks) rather than being redirected to meadow areas. Thus, discontinuation of meadow irrigation would affect surface water flow and possibly

groundwater levels, but additional research would be needed to determine the nature (scope, direction, intensity, etc.) of these impacts. Prior to discontinuing irrigation, a study would be conducted to provide more information about possible effects of this action.

Cumulative Impacts. Establishment of a water right to fulfill the purposes of the park would minimize additional reduction of local groundwater levels. Oil and gas exploration activities on lands that were formerly part of the Baca Ranch (but are now within the national park) are reasonably foreseeable in the near future; however, any such activities are subject to 36 CFR 9B, which requires that such activities be conducted in a manner that is consistent with protection of water resources (among other resources). The NPS preferred alternative would have both beneficial and adverse effects on water resources, as discussed above. Combined with past, present, and reasonably foreseeable future actions, the impact of the no-action alternative on water resources would be long term, minor to moderate, and adverse.

Conclusion. Increased use levels would result in increased waste and sediment in certain surface waters. However, providing designated trails would help to limit social trails, direct use, and restrict impacts to local areas. Restricting dogs to certain areas within the national park and providing backcountry toilets would improve water quality. These actions would have long-term, negligible, localized, adverse impacts, and long-term, minor, beneficial impacts to surface water and potentially to shallow groundwater quality. Discontinuing surface irrigation of hay meadows on Medano Ranch would affect surface water hydrology and possibly groundwater levels, but research would be needed to determine the nature of these impacts. There would be no impairment of water resources from this

alternative (see specific definition of impairment in the “Impairment of National Park Resources” section).

Annual visitor use at Great Sand Dunes under the preferred alternative is projected at 427,100 by 2025. As for the no-action alternative, the principal factor driving increases in visitor use is population growth in the San Luis Valley and the state of Colorado. That level of use represents an increase of 136,100 annual visitors over the 2004 adjusted total and more than 52,000 additional visitors, or 14%, compared to the no-action alternative (table 23).

VISITOR USE AND EXPERIENCE

Visitor Use Projections

**TABLE 23. CURRENT AND PROJECTED ANNUAL VISITORS IN 2005
NPS PREFERRED ALTERNATIVE**

2004 (recorded)	2004 (adjusted baseline)	No-Action Alternative	NPS Preferred Alternative
268,400	291,000	374,800	427,100
<u>Increases over 2004 (adjusted)</u>			
Annual Visits (number)		+85,320	+136,100
Annual Visits (percent)		+29%	+47%
<u>Increases over the no-action alternative</u>			
Annual Visits (number)		NA	+52,300
Annual Visits (percent)		NA	+14%

Factors contributing to incremental increases in annual visitor use include the following: enhanced recreation and education opportunities available at Medano Ranch, if and when the ranch is acquired from The Nature Conservancy, and in the guided learning zone:

- addition of bicycle lanes along the main entrance road and a hiking/ biking path between the campground and dunes parking area
- wilderness recommendation for most of the area added to the national park

- provision of backcountry access and a trailhead in the northwest portion of the park
- additional foot and horseback access into the natural/wild and backcountry adventure zones provided through cooperative opportunities such as San Luis Lake State Park and the Oasis area near the main park entrance

By 2025, visitation during the three-month summer period is projected to increase by more than 30,000 visitors, or 14% over the 221,300 visitors projected for the summer months under the no-action alternative. Most of the increase would be focused in the frontcountry and dunes play zones,

with an anticipated increase of about 11,000 visitors during July. That increase could translate into as many as 500 to 600 more visitors per day on weekends. Over time, the rise in visitation at peak periods would be expected to encourage others to visit earlier or later in the year—that is, the shoulder seasons.

Dispersed day and overnight use across the remainder of the national park is projected to nearly double from about 26,000 visitors per year under current conditions and 37,000 under the no-action alternative, to over 52,000 with the preferred alternative. Most of that increase would occur in the backcountry access and adventure zone in the northwest portion of the park and the Medano Ranch and San Luis Lake State Park entries in the southwest portion of the park. Backcountry use in the preserve is projected to increase over time, although the Mosca, Music, and Medano passes access points would remain relatively isolated from substantial levels of nearby development and associated population growth.

Visitor Experience

The area of heaviest visitor use would remain at and near the eastern part of the dunefield. However, new access points, trails, and other opportunities would disperse use in the park compared to the no-action alternative. Medano Ranch headquarters would serve as an administrative zone, but the area would be opened for scheduled, guided activities and would serve as the western entry point to the guided learning zone located west of the dunefield. The Oasis area, located near the park's main entrance, could serve as a base for hiking and horseback trips into the guided learning zone from the east.

The new trailhead located in the national park's north part would provide improved hiking and horseback access to new park lands, the mountain front, and the north part of the national preserve. With more options for loop trips and longer “through trips,” the Sand Creek and Sand Ramp trails would probably receive substantially more hiking and equestrian use. Such new options would allow more diverse visitor experiences and increase the average length of stay in the park.

Interpretation, information, and education activities would be concentrated primarily in the area east of the dunefield (visitor center, amphitheater, dunes area, day-use trails, etc.), but scheduled programs and tours would also be available, especially for groups at Medano Ranch headquarters and in the guided learning zone. Having two “bases” for interpretation (and possibly a third cooperative base) would likely permit increased diversity of visitor programs and services, including environmental education for school groups.

The bicycle lanes from the park boundary and the hiking/biking path from the campground, both of which would lead to the dunes play zone, would provide another recreational and access option for visitors. These options would also reduce the number of pedestrians and cyclists using the main park road, which would benefit drivers.

Opportunities to see and enjoy wildlife in the park would be increased by expanded access to new areas. More hunters might be drawn to the national preserve and nearby USFS lands where hunting is allowed because the north-end trailhead would provide better hiking, equestrian, and vehicle access to certain hunting lands. Numbers of hunters would also depend, of course, on how CDOW manages hunting in the area.

The new access points, new recreational opportunities, and increased diversity of visitor programs and services discussed in the preceding paragraphs, taken together, would result in long-term, moderate, beneficial impacts on visitor experience.

Summertime visitors would experience increased congestion in the visitor center and dunes parking areas, and the campground would fill more often and earlier in the day. Such conditions could prompt activation of a modest shuttle bus system for transporting visitors, on a voluntary basis, to the visitor center and dunes access points. A visitor shuttle system would reduce some of the frustrations visitors experience when the dunes parking areas fill during the peak visitor season. When the shuttle runs, visitors would not have to park along road shoulders, nor walk in the road to reach the dunes play zone. Nor would drivers have to maneuver around visitors (including families with small children) who are using the road as a walkway. The shuttle system would also funnel more visitors into the visitor center, picnic area, and dunes play zone. This would increase visitor encounter rates, which could lead to localized crowding, especially in the visitor center and picnic area. The dunes play zone, on the other hand, has the capacity to absorb a relatively large number of visitors without many undesired social consequences. A visitor shuttle system would have long-term, moderate, beneficial, and minor adverse impacts.

The NPS preferred alternative would offer positive wilderness experiences within existing park wilderness areas. However, new access points would result in some wilderness areas becoming less remote. Increasing visitor numbers could detract from wilderness values (opportunities for solitude, evidence of human use, etc.) over time, especially in portions of the wilder-

ness served by new visitor access points (e.g., the Sand Creek drainage). Diminished wilderness values in portions of existing wilderness areas would have a long-term, minor, adverse impact on visitor experience. This alternative would provide new wilderness opportunities due to the wilderness recommendation for most lands added to the national park in 2000. Most of the recommended wilderness is in the sand sheet and sabkha life zones, which provide a setting unlike that in adjacent dunes and forest wilderness areas. This alternative would make it possible to hike or ride on horseback around the massive dunefield while remaining almost entirely within designated wilderness. New wilderness opportunities would result in long-term, major, beneficial impacts to visitor experience.

Visitors who like to travel and/or recreate with their dogs would have less freedom to do so compared to the no-action alternative—dogs (on leashes) would be restricted to the frontcountry, dunes play, and backcountry access zones, and the Liberty Road administrative zone within the national park. This might discourage some dog lovers from visiting the park. Visitor complaints and concerns about dogs would undoubtedly continue, as problems most often occur within the frontcountry and dunes play zones. However, some visitors would appreciate that certain areas of the national park would prohibit dogs. New policies regarding dogs in the park would have long-term, minor, adverse, beneficial impacts on visitor experience.

Cumulative Impacts. Rehabilitation of main park roads and parking areas, which includes increasing the capacity of the dunes lot by ~5%, is planned for the near future and would modestly improve pedestrian and vehicle traffic flow in the immediate area. The modest shuttle system in the NPS preferred alternative addresses

the larger issue of crowding and frustrations related to vehicle and pedestrian circulation in this area. Ongoing wilderness restoration efforts in the South Colony Lakes basin area are improving wilderness values in the Sangre de Cristo Wilderness. The NPS preferred alternative would result in some diminishment of wilderness experiences in some portions of the Sangre de Cristo Wilderness that lies within the Great Sand Dunes. However, this alternative would also provide additional wilderness opportunities due to a wilderness recommendation for most new park lands. Renovations to the Great Sand Dunes visitor center have improved the visitor experience by enlarging indoor space available for information, education, and interpretive services. In the NPS preferred alternative, diversified services and programs (from actions at Medano Ranch headquarters and the guided learning zone) would also provide benefits. Combined with past, present, and reasonably foreseeable future actions, the NPS preferred alternative would have minor adverse and major beneficial effects on visitor experience.

Conclusion. New access points, new recreational opportunities, and increased diversity of visitor programs and services would result in long-term, moderate, beneficial impacts on visitor experience. A visitor shuttle system would have long-term, moderate, beneficial, and minor adverse impacts. Diminished wilderness experiences in portions of existing wilderness areas would have a long-term, minor, adverse impact on visitor experience. New wilderness opportunities (from new areas recommended for wilderness designation) would result in long-term, major, beneficial impacts. New policies regarding dogs in the park would have long-term, minor, adverse, beneficial impacts on visitor experience.

SCENIC RESOURCES AND VISUAL QUALITY

Under the NPS preferred alternative, there would be no new human-made structures or vehicle areas in the national preserve that would affect scenic quality. However, in the frontcountry and dunes play zones, bicycle lanes would be added to the main park road, a new multiuse path would connect the campground and dunes parking area, and a new entrance station would be added near the park entrance. These projects would be relatively small in scale and would have negligible to minor, long-term, localized, adverse impacts to scenery.

The NPS preferred alternative would also introduce limited new human-made facilities and human activities on park expansion lands. A small trailhead parking area would be added in the northwest portion of the park to enhance backcountry access. Medano Ranch headquarters would be adaptively used for administrative and scheduled public purposes, and a new structure or two may be needed to accomplish this. Such new facilities and activities would mean more frequent vehicle use and localized concentrations of passenger vehicles. Because sunlight often reflects off of vehicle windshields, concentrations of vehicles may be visible from some elevated vantage points in and around the national park and preserve (e.g., mountain slopes and portions of the dunefield).

Increased vehicle activity associated with the backcountry access zone in the north (access road(s) and trailhead) and at Medano Ranch (access road and headquarters area) would mean increased road, at least during dry periods. Once airborne, dust particles tend to linger in the air for short periods, affecting both scenic quality and visibility. Overall, limited new facilities

and activities in park expansion areas would have short- and long-term, localized, negligible to minor impacts on scenery and visibility.

New sources of outdoor lighting at Medano Ranch would be minimal; public activities would generally be scheduled for daylight hours, and any new lighting needed for administrative purposes would be shielded. Nighttime vehicle traffic would be minimal at Medano Ranch and in the northern backcountry zone, so this light source would also be minimized. Impacts on the night sky from the NPS preferred alternative would be negligible to minor, long term, and adverse.

Cumulative Impacts. Rehabilitation of main park roads and parking areas, which includes increasing the capacity of the dunes parking area by ~5%, would result in a negligible, long-term, localized, adverse impact on scenic resources. Prescribed burns (fire management) would have short-term, minor, adverse, localized impacts on scenery and visibility. Continued residential growth of the Baca Grande subdivision would mean that more homes, retreat centers, commercial structures, and vehicles would be visible in this area in the future. Expanded residential development could also bring more road dust and wood smoke. The private land parcel that is for sale near the park entrance could be rezoned to commercial and developed. Overall, such new development would intrude on the area's natural scenery (at least from some vantage points), affect visibility, and introduce new light sources into the night sky. Regional population growth and development would also continue to introduce additional light into the night sky. The NPS preferred alternative would contribute negligible to minor, short- and long-term, localized, adverse impacts to scenery, visibility, and the night sky. Combined with other past,

present, and reasonably foreseeable future actions, impacts of the NPS preferred alternative would be long term, minor to moderate, and adverse.

Mitigation. Parking areas would be designed and constructed to help avoid or mitigate impacts to visual and scenic resources. The natural and built landscape would be used to help shield reflections and glare from vehicles. Environmentally friendly dust binders would be used as needed to help control dust on park roads.

Conclusion. The NPS preferred alternative would have negligible to minor, short- and long-term, localized, adverse impacts on scenery, visibility, and the night sky. There would be *no impairment* of scenic resources and visual quality from this alternative (see specific definition of impairment in the "Impairment of National Park Resources" section).

SOCIOECONOMICS

Implementing the NPS preferred alternative would occur against the same backdrop of economic, demographic, and social changes across the San Luis Valley described under the no-action alternative. The economic and social effects of the NPS preferred alternative would add to those changes, but not fundamentally change the area's economic and demographic outlook.

Visitor-Related Economic Impacts

Under the NPS preferred alternative, annual visitor use at the park is projected to reach 427,100 recreation visits by 2025; most of this increase would be associated with population growth in the San Luis Valley and the state of Colorado. Recreation visits are projected to be 47% more than in 2004, and 52,300 visits above

projected use under the no-action alternative. Peak visitation of 91,900 visitors would occur in July 2025, as compared to about 80,800 with the no-action alternative. Visitors to the park from outside the Valley are expected to account for the majority of future visits, although the number of visits by residents of the region would also increase.

Future visitor use under the NPS preferred alternative would result in 220,820 party-days of use, 28,160 more party-days than that estimated for the no-action alternative. Retail, lodging, and other tourism spending would accompany the increased use with expenditures projected to reach \$21.18 million per year, \$8.05 million more than in 2004, and \$2.75 million per year more than for the no-action alternative. The park would collect more in entry fees and sales of various passes and the Western National Parks Association would sell more merchandise at the visitor center.

Economic spin-offs of visitor spending include personal income of \$6.61 million per year and a total of 543 jobs in Alamosa and Saguache counties. Those levels would be \$0.87 million more in annual income and 71 more jobs compared to the economic contributions of park visitors in 2025 under the no-action alternative. The visitor-related impacts would be long term and moderate relative to current employment and personal income in the two counties. The guided learning zone opportunities and a modest shuttle system may create opportunities for private concession or incidental business activities and educational partnerships that would not exist under the no-action alternative. This alternative could create more economic boost for stores, overnight lodging, or trail and other recreational services in the Crestone/Baca Grande community than would the no-action alternative.

The state and local governments would collect more in sales tax from the increased visitor spending and property taxes on new development than under the no-action alternative. Impacts on property taxes and PILT receipts for Saguache and Alamosa counties would be about the same as under the no-action alternative.

The visitor-related economic impacts would be beneficial, but negligible in the short term and minor and beneficial over the long term.

Economic Impacts Related to GMP Implementation and Park Operations

The NPS preferred alternative would result in \$21.2 million in future capital spending by 2025, along with \$7.7 million in other major maintenance spending. General operating and maintenance expenditures would also be at increased levels. The spending would provide an economic boost across the regional economy. More staff would be needed to maintain current service levels, but when more staff would be hired depends on increases in the park's base funding. A total of eight FTEs of additional staffing at an annual cost of approximately \$415,000 over the current budget and \$155,000 more than for the no-action alternative would be needed during the life of this GMP under the NPS preferred alternative.

Planned capital and major maintenance spending would create short-term economic impacts, supporting local construction and related businesses. The specific timing of this spending is not known because it is dependent upon when Congress budgets the funds, along with allocations within the National Park Service, and future entry and camping fees that can support such projects. The annual

payroll and other operating spending by the park would create long-term benefits to local jobs, business sales, household income, and other related measures. The economic effects tied to these economic stimuli include:

- capital construction (short term): 328 job-years of employment and \$9.45 million in personal income over time, between 2006 and 2025
- nonannual recurring (short term): 126 job-years of employment and \$3.49 million in personal income over time, between 2006 and 2025
- park operations (long term): 47 jobs, including 36 FTEs of direct NPS staffing, and \$2.13 million per year in annual income

Of these economic effects, only the short-term jobs and income impacts associated with the capital construction program—328 job-years (NPS preferred alternative) compared to 122 job-years (no action)—would be much different than those under the no-action alternative. The differences reflect \$14.4 million in increased spending for buildings, trails and paths, and other facilities under the NPS preferred alternative. The short-term impacts on jobs associated with major maintenance spending for the NPS preferred alternative are only 4% more than with the no-action alternative, and the long-term impacts include four additional jobs and \$180,000 in additional personal income in the region.

The long-term economic benefits from park operations from the NPS preferred alternative could be offset, in part, by reduced benefits associated with discontinuation of the bison operation of Medano Ranch—reduced revenue from livestock sales, a loss of farm employment, and fewer purchases of goods and services by the

ranch from local businesses. If and when the reductions would occur depends on when the federal government completes acquisition of the ranch and a decision by The Nature Conservancy to stop its bison operations. These events determine when full NPS management of the ranch facilities and structures, including some reuse, would occur.

The end of the bison operation on Medano Ranch would also mark a transition in land use from agriculture to a more natural setting. Fencing would be removed, and other vestiges of active agricultural operations would be removed or become less noticeable as natural processes are allowed to re-establish themselves.

The economic effects associated with the park's operations would be beneficial, but negligible to minor in the short term and beneficial and minor over the long term.

Community Services

Demands on community services and facilities would result from the growing number of visitors and staff at the park. These demands would grow over time, mirroring the growth in visitors. Local utility infrastructure such as water and wastewater systems would be the most direct impacts due to more people traveling through the area and staying the night. However, facility expansions and additional staff would not be needed to meet these demands because the number of visitors would be relatively small in comparison to the resident population and overall number of visitors and travelers being served and because the demands would be seasonal and dispersed across several communities.

Effects on community services under the NPS preferred alternative would be

indeterminate and negligible over the short and long term.

Traffic and Emergency Services

Traffic impacts of the NPS preferred alternative on the highways and roads that serve the park would be similar to, but slightly more than under the no-action alternative. Most of the additional traffic would be concentrated on SH 150 and Alamosa County 6N, the primary access roads to the park's main entrance. During summer, some travelers might have to wait longer to turn at the SH 17/County Road 6N and SH 150/SH 160 intersections, but most travelers would possibly notice a slight change in travel conditions due to the NPS preferred alternative. Even with increased traffic, future traffic volumes would still be well below the design capacity of the roads and would not dramatically increase the need for road maintenance.

A new public vehicle access point would be provided in the north part of the national park (backcountry access zone), assuming a feasible route for getting there is identified by the involved entities. This new access would lead to a traffic increase (from park visitors) on some local roads, including Saguache County Road T. Traffic increases would be greatest on summer weekends and holidays, and would increase over time as park visitor levels grow. If the new access route uses Saguache County roads within the Baca Grande subdivision, traffic would increase on those county roads. However, with the only real destination within the backcountry access zone a small trailhead (capacity 10 to 15 vehicles), the traffic increase would be minor, especially when considered against the backdrop of expected traffic increases from residential and spiritual retreat growth in Crestone and the Baca Grande subdivision.

Assuming there were signs to direct visitors along the preferred route, the traffic increases would be limited primarily to that route. Nonetheless, some park visitors might explore other subdivision roads while they were in the area. In contrast to the no-action alternative, there would be little localized traffic congestion from visitors parked along roads within the subdivision near the park boundary. Instead, visitors would travel along the designated route, enter the national park, and proceed to the backcountry access zone trailhead.

Impacts on the number of traffic accidents and demands on first responders would be about 10% more than those under the no-action alternative. The scale of demands associated with the NPS preferred alternative is such that they would not require additional law enforcement or emergency response staffing, although increases in the number of "call outs" would burden many area first response agencies because they are staffed by volunteers.

The effects of the NPS preferred alternative on traffic and emergency services would be adverse, but negligible over the short and long term across most of the region. Impacts to traffic north of the park (Crestone/Baca Grande area) would be long term, minor, and adverse.

Attitudes and Lifestyles

The NPS preferred alternative establishes future management direction for the park reflecting the diversity of public input, fundamental park resources and values, the foundation established by management of the former national monument, and weighing concerns and perspectives of those nearest to the park and the broader virtual community. In terms of attitudes, some individuals may view this alternative

with dismay because certain aspects (e.g., application of the natural/wild zone, or provision of public access) do not go far enough to achieve their individual preferences. As such, this alternative could be characterized as offering something for many to appreciate and something for many to disfavor.

The recreation, conservation, and resource management opportunities associated with the NPS preferred alternative would have both direct and indirect lifestyle consequences, with the direct consequences most apparent to neighbors and visitors to the park. For example, future visitors would have access to a broader range of experiences and options, including wilderness of a different character than existing wilderness at the park, reduced dependency on personal motor vehicles for travel in the park, and enhanced access for backcountry opportunities in the northern portion of the park. The latter would be spurned by some in the Crestone/Baca Grande community as it would be seen as encouraging more use and traffic near and through their community, compromising individual and collective lifestyles and some of the fundamental qualities that underlie their decisions to live and/or provide services in the community.

Cumulative Effects. Cumulative social and economic effects arising from the NPS preferred alternative are of the same type, but somewhat greater than those occurring under the no-action alternative. The cumulative effects include slightly increased traffic on Saguache County Road T and in the Crestone/Baca Grande community, increased spending by visitors that would bolster tourism-oriented businesses across the Valley, and additional tax revenues to fund public services and facilities. The incremental effects on traffic would be small compared to traffic created by area residents, commercial vehicles, and other

travelers passing through the area. More visitors to the park under the NPS preferred alternative would enhance the commercial development potential for private lands near the park's main entrance. Any sales and subsequent development of those lands would have economic implications, as well as changing visitor experience. The incremental effects of the NPS preferred alternative would be negligible to minor in the short term and minor in the long term, and generally beneficial, as compared to other social or economic effects resulting from the cumulative actions.

Conclusion. The economic effects of the NPS preferred alternative include negligible to minor short-term and minor long-term economic benefits, the latter due to increased visitation (primarily from population growth) tied to this alternative. Long-term social consequences include a negligible to minor contribution to demands on community infrastructure and services. Short- and long-term lifestyles and attitudes are indeterminate, as some interested parties support the alternative, but others would be disappointed in one or more aspects of the alternative.

HEALTH AND SAFETY

The NPS preferred alternative would not change management practices or safety risks related to fires in or around the park. The proposed modest shuttle system would reduce vehicle numbers and traffic congestion around the main park road and turnouts and at the visitor center and dunes parking area. This would aid in limiting the anticipated rise in traffic accidents in these busy visitor areas as visitation increases over time. Adding bicycle lanes along the main park road means that cyclists would no longer have to share the road with passenger vehicles and RVs. This would

provide an increased measure of safety for cyclists, particularly as numbers of vehicles increase with time. The proposed hiking/biking path linking the campground, dunes parking area, and visitor center would help reduce the number of short vehicle trips to and from the campground and to separate pedestrians and cyclists from vehicle traffic along these road sections. However, some pedestrian/ bicycle accidents could result from mixing pedestrians and cyclists on the same path. Compared to the no-action alternative, the NPS preferred alternative is expected to have a long-term, minor, beneficial impact on safety from these actions.

Most park land that was once part of Baca Ranch would remain relatively remote. Emergency response times to this area would be longer compared with the no-action alternative due to limited access and the wilderness recommendation. Thus, visitors would assume some additional risk in visiting this area. In contrast, guides would accompany visitors in the guided learning zone, and there would be a NPS presence at Medano Ranch. Thus, emergency response to this area of the park would be relatively efficient. Bison would no longer graze within the park, so this negligible risk to visitor safety would be eliminated. In sum, these actions would have long-term, localized, minor, adverse impacts, and negligible to minor beneficial impacts.

Cumulative Impacts. Relocation of the horse loading area east of the dunes is planned for the near future. This would include providing a dirt surface, allowing surer footing for horses and reduced accident risk. The *Greater Sand Dunes Interagency Fire Management Plan* (2005) includes measures for safely and efficiently managing wildland fires within the park, the Baca National Wildlife Refuge, and The Nature Conservancy's Medano Zapata

Ranch. The dunes parking lot within the national park is planned for minor expansion (~5%) and reconfiguration to improve vehicle circulation and increased capacity. Although the incidence of traffic accidents in the dunes parking area is very low (that is, two accidents in the past five years despite nearly a million visitors to the park), this action would likely provide some small measure of increased safety as visitor use increases over time. The NPS preferred alternative would contribute minor adverse and negligible to minor beneficial impacts on visitor safety. Combined with other past, present, and reasonably foreseeable future actions, the NPS preferred alternative would have a long-term, negligible to minor, beneficial effect on safety.

Conclusion. The NPS preferred alternative would provide negligible to minor beneficial safety impacts from the proposed modest shuttle system, bicycle lanes on the main park road, a local hiking/biking path, elimination of bison from the park, and from NPS and guide presence around Medano Ranch and the guided learning zone. Long-term, minor, negative impacts would accrue from reduced administrative access and from the wilderness recommendation.

NATIONAL PARK SERVICE OPERATIONS

Limited new or improved facilities are proposed as part of the NPS preferred alternative. Examples include a new access road and trailhead in the north part of the national park, new trails and trail connections in several areas, bicycle lanes along the main park road, and a new entrance station located near the main entrance. Assuming The Nature Conservancy eventually transferred Medano Ranch to the National Park Service, facilities there

would be improved to allow for administrative and scheduled public uses, and maintenance of the area would become the responsibility of the National Park Service. The NPS preferred alternative is conservative in terms of new facilities, especially considering that the park is four times larger than it was before the Great Sand Dunes Act of 2000 was passed. Nonetheless, these limited new facilities must be maintained, and this would be an additional burden on maintenance staff. Maintenance of additional facilities would have a moderate, long-term, adverse impact on park operations. If funds for modest improvements at Medano Ranch are not forthcoming and if partnerships do not adequately support the limited administrative and public uses proposed, the long-term maintenance backlog of the park will grow.

Other activities that would require more NPS planning, coordination, and management include: administering scheduled public activities at Medano Ranch, managing public use of the guided learning zone, managing a modest visitor shuttle system, patrolling the northern access/trailhead, patrolling new trails, and managing nonnative invasive species. Most of the park expansion area would be recommended for wilderness. Thus, certain activities (including activities by the National Park Service, other resource management agencies, and researchers) would require a wilderness minimum requirements analysis, which would take staff time to conduct. Plus, if the minimum requirements analysis indicated that an activity should be conducted using non-motorized/mechanized travel and techniques, the time required to conduct (or support) such an activity could substantially increase. New or expanded management responsibilities and wilderness stipulations would have long-term,

moderate, adverse impacts on park operations.

Cumulative Impacts. Expansion of nearby communities, fire management responsibilities, elk herd reduction, pursuing a NPS water right, management of oil and gas exploration activities, and similar management needs would require time and attention by senior NPS staff. Cooperation and coordination with neighboring agencies and entities regarding planning, proposals near the park, etc., also require substantial amounts of staff time. The NPS preferred alternative would place an additional burden on NPS staff, but this burden would be lessened if the park were adequately staffed. Combined with past, present, and reasonably foreseeable future impacts, the NPS preferred alternative would have moderate, long-term, adverse impacts on NPS operations.

Conclusion. Maintenance of limited additional facilities (frontcountry zone, Medano Ranch, and northern part of the national park) would have moderate, long-term, adverse impacts on park operations. New or expanded management responsibilities and wilderness stipulations would also have long-term, moderate, adverse impacts on park operations.

OPERATIONS OF OTHER ENTITIES AND MANAGEMENT AGENCIES

Public Vehicle Access To/Through North Portion of Park

Under this alternative, as under the other two action alternatives, a northern route or routes across NPS land would be designated via the Superintendent's Compendium for hunter access to USFS lands where hunting is permitted. According to the *Code of Federal Regulations*, provision

for such access may be provided when other access is impracticable; hunters must stay on designated routes and firearms must be broken down or disassembled so as to prevent their ready use. Administrative access via Liberty Road would be permitted under this alternative, as it is under all alternatives.

The NPS preferred alternative provides the direction and flexibility to consider potential routes for public vehicle access to the backcountry access zone in the north part of the national park. Limited numbers of visitor vehicles could enter the national park via a public county road (e.g., Camino Real) from the Baca Grande subdivision. (This option would likely require a connector road to join the county road to the national park's backcountry access zone.) This option would be studied by the National Park Service in cooperation with Saguache County and the Baca Grande Property Owners Association. It is also possible that some intermediate or combination solution could be found. In any event, consideration by the Baca Grande/Crestone communities of potential access routes to the northern portion of the national park would unavoidably create additional responsibility during the comprehensive planning processes. This additional responsibility would be anticipated to add to the duration, complexity, and cost of the planning process. As such, this component of the alternative would have a short- and long-term, moderately adverse impact on the management actions of other entities.

Two additional (subsequent) public vehicle access options could be considered in a separate future joint NPS/USFS public planning and environmental analysis process if USFS planning indicated that such access was needed. These options are: (1) an eastward extension of a route through the park to the mountain front to

connect with Liberty Road (to allow public vehicle access to the portion of Liberty Road that is administered by the USFS), and (2) the 0.7 mile segment of Liberty Road within the national park could be converted to a backcountry access zone for the same purpose. Either would permit public vehicle access to the new national forest lands, an option that the USFS would like to preserve. Environmental impacts of these options would be addressed by a future study; they are not addressed in this GMP.

Should an acceptable route through the northern portion of the park to USFS lands be identified, concerns of the USFS relative to public vehicle access closer to the mountain front for general recreation would be appeased. Such a route would also provide public vehicle access closer to private in-holdings in Liberty, Short, and Pole creeks. Finally, public vehicle access into the northern portion of the park would help address CDOW and USFS concerns about limited hunter harvest of elk in adjacent USFS lands due to lack of vehicle access. This specific concern is also addressed by this alternative in the form of hunter access provided through use of the Superintendent's Compendium. Therefore, this component of the NPS preferred alternative is anticipated to have minor, long-term, beneficial impacts on other agencies.

Increased visitor use and anthropogenic impacts to natural resources, particularly ecologically sensitive resources on affected USFS lands, may translate to a decrease in rare, near-pristine conditions and an increase in remediation expenses on USFS land. This would result in short- and long-term, minor to moderate, adverse impacts to the USFS.

Designation of Additional Wilderness Areas within the Park

The NPS preferred alternative would recommend additional areas of the park be designated as wilderness. Agencies with monitoring or management responsibilities in and surrounding the park, such as Colorado Division of Water Resources for water quality monitoring and CDOW for elk management, as well as organizations such as The Nature Conservancy and Lexam, would be required to conduct their activities accordingly. Wilderness designation does not necessarily preclude the use of ATVs or other vehicles or equipment to carry out necessary actions. The “minimum requirement” concept and “minimum tool” and “primitive tool” procedures, as specified in the Wilderness Act (1964), NPS *Management Policies* (NPS 2001), NPS *Reference Manual 41*, and *Minimum Requirement Decision Guide*, could be applied for water quality monitoring, elk management, and other activities within designated and recommended wilderness areas. The needs and protocols for water quality monitoring are well-established at multiple levels. The need for active elk management, and the selection of strategies and tactics, would have to be clearly demonstrated and justified by the elk/bison study currently being conducted at the park. Monitoring and management activities such as these would be conducted using minimum impact tactics. Strategies and tactics would be selected commensurate with the resource and with park values to be protected, as well as to minimize long-term environmental impacts.

In summary, activities carried out within wilderness areas, whether carried out by the National Park Service or other land management agencies, must be conducted in such a way that wilderness values are

protected. Activities must adhere to NPS wilderness management policy through the minimum requirements process. Cooperation with the park in following the policies and processes associated with the additional wilderness areas would require more time and resources on the part of other agencies. The additional burden would be readily apparent, and would apply to management agencies or others needing to conduct activities in wilderness that normally would require structures, mechanized equipment, or motorized vehicles. The impact of this alternative on other management agencies, therefore, is expected to be short and long term, moderate, and adverse.

Cumulative Impacts. The most relevant past, present, and reasonably foreseeable future actions that may interact cumulatively with this alternative to affect other agencies are the Great Sand Dunes National Park and Preserve Act (2000), and expansion of communities near the park. Impacts of the act are exemplified by this GMP. Increased human habitation in the area would reduce options for wildlife and wildlife management activities, as well as complicating the logistics of mineral exploration, among other activities. Combined with past, present, and reasonably foreseeable future actions, the impact of the preferred alternative would have long-term, minor to moderately adverse impacts on other entities and agencies.

Conclusion. Provision for evaluation of potential access routes to and through the northern portion of the park places much of the onus of evaluating such routes on the USFWS and Baca Grande/Saguache counties—a short- and long-term, moderately adverse impact, depending on the duration of their respective planning processes. However, should an acceptable route be identified and implemented, it would partially address USFS and CDOW

concerns about public vehicle access to the mountain front and about hunter harvest of elk. As such, this alternative is also anticipated to have minor, long-term, beneficial impacts on other agencies. There would also be short- and long-term, minor to moderate, adverse impacts from increased planning, documentation, and remediation expenses required to carry out management activities in wilderness areas.

UNAVOIDABLE ADVERSE EFFECTS

Some impacts caused by human use (especially minor, inadvertent impacts to archeological sites, vegetation, soils, water resources, etc.) are essentially unavoidable because not allowing people in the park would be inconsistent with the NPS mission.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible impacts are permanent. An irretrievable commitment of resources refers to resources that, once removed, cannot be replaced. Archeological resources that are stolen or vandalized are irreversibly lost. Even moving or disturbing such resources constitutes an irreversible commitment of resources because information is lost if the context (location and condition) is changed, even inadvertently. Thus, there would be some irreversible loss or commitment of archeological resources from this alternative.

RELATIONSHIP OF SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

There would be no adverse effects on biological or economic productivity from implementation of this alternative.

IMPACTS OF THE DUNEFIELD FOCUS—MAXIMIZE WILDNESS ALTERNATIVE

ARCHEOLOGY

In the dunefield focus—maximize wildness alternative, visitor use would remain focused primarily in frontcountry areas and on established roads and trails. Areas with concentrations of archeological resources located in the frontcountry, along creeks, and along established trails would have impacts from trampling of sites, vandalism, and theft. Impacts under NEPA would be site specific, adverse, and would range from minor to moderate, depending on the site and type of impact activity.

The proposed multiuse trail from the park entrance to the visitor center, dunes parking area, and Pinyon Flats campground has the potential to disturb a specific archeological site (5AL397). If this site were not avoided, impacts would be adverse and could range from minor to moderate. If demand warranted, parking in the frontcountry zone located east of the dunes could also be expanded and additional restrooms provided. Depending on their location, such new facilities could also adversely affect archeological resources. Any impacts (from construction and increased localized visitor use) would be minor to moderate and adverse under NEPA.

Access to park expansion lands would be improved only via a new horse gate (or gates) on the northern park boundary. The incidence of unintentional or incidental damage would be slightly more than in the no-action alternative due to increased equestrian use. However, access in general would remain fairly limited. This would benefit archeological resources because access to sensitive cultural resources would remain limited. Assuming The Nature

Conservancy were to transfer Medano Ranch to the National Park Service, the ranch would be opened to general public use, although routes of public access would remain very limited. Nonetheless, determined individuals could access remote park areas containing sensitive archeological resources on foot or horseback without guides. The substantial wilderness recommendation in this alternative would help to protect resources in much of the park expansion area—it is much more difficult to gain access to remote areas if vehicles are not permitted, and any signs of vehicle use (e.g., dust, tire tracks, or headlights at night) would alert the National Park Service to possible illegal activity. There would be no regular presence at Medano Ranch (and generally reduced administrative access), so such sites would not be regularly monitored. Effects from vandalism and theft would be possible despite very low use levels in remote areas. Changes in public access, administrative access, management presence, and the wilderness recommendation would have long-term, minor, beneficial, and minor to moderate adverse impacts under NEPA.

Cumulative Impacts. Residential and spiritual retreat growth in the Crestone/Baca Grande area have undoubtedly adversely affected archeological resources. Additional, as yet undisturbed resources would likely be disturbed or destroyed in the future as this area continues to grow (from ground disturbance during construction and from looting and unintentional disturbance). The foreseeable development of private land near the park entrance could similarly affect archeological resources. Rehabilitation of main park roads and parking could have potential long-term, localized, minor to moderate, adverse impacts (under NEPA) to a NRHP-

eligible archeological site (5AL405) from construction activities and heavy equipment. The interagency fire management plan could have beneficial effects if areas identified for prescribed burns or fuel reduction are first surveyed for archeological resources (which, if evaluated as NRHP eligible, would require further planning to avoid, minimize, or mitigate the adverse effect as part of NPS compliance with 36 CFR 800). This would expand identification of and knowledge about regional archeological resources. The dunefield focus—maximize wildness alternative would contribute both adverse and beneficial effects on archeological resources, and these impacts would be confined within the park. Combined with past, present, and reasonably foreseeable future actions, the dunefield focus—maximize wildness alternative would have minor to moderate adverse impacts and minor beneficial effects on archeological resources under NEPA.

Mitigation. In general, the National Park Service will comply with section 106 of the NHPA in accordance with 36 CFR 800 when planning new facilities, areas of visitor use, and management actions to avoid or minimize adverse effects to archeological resources. Areas under consideration (e.g., trails, etc.) would be surveyed for archeological resources as part of the planning process. The National Park Service would consult with the Colorado SHPO and other parties to evaluate archeological sites for NRHP eligibility. If sites were determined to be NRHP eligible, the National Park Service would consult with the Colorado SHPO and other consulting parties to develop project alternatives to avoid, minimize, or mitigate adverse effects that, as necessary, would be outlined in a memorandum of agreement.

Conclusion. Several aspects of the dunefield focus—maximize wildness alternative would affect archeological resources, including visitor use increases, new facilities (limited), a wilderness recommendation, and changes in public and administrative access and management presence. Impacts would be adverse (long term, minor, beneficial, and minor to moderate) as analyzed under NEPA. There would be *no impairment* of archeological resources from this alternative under NEPA (see specific definition of impairment in the “Impairment of National Park Resources” section). In all cases, the National Park Service would comply with section 106 of the NHPA when planning management actions.

HISTORIC STRUCTURES

In the dunefield focus—maximize wildness alternative, Medano Ranch headquarters structures would be located within the natural/wild zone. Assuming management of Medano Ranch were transferred to the National Park Service, structures would be documented, but not maintained (or if safety concerns arose, the structures could be removed after documentation). Unrestricted visitor access would be allowed in the area of the ranch and monitoring would be relatively infrequent. The buildings could suffer increased rates of deterioration from vandalism and lack of maintenance. Impacts would be long term, moderate to major, and adverse under NEPA.

Management of large areas as wilderness would cause minor, long-term, localized, adverse impacts under NEPA to peripheral ranch elements due to removal of fences and lack of maintenance of other elements such as roads and ditches.

Cumulative Impacts. Localized adverse, long-term, cumulative impacts under NEPA could include the eventual disappearance of Medano Ranch and other historic structures over time due to vandalism and natural deterioration.

Mitigation. Mitigation measures would be undertaken to reduce potential impacts to cultural resources as determined through compliance with section 106 of the NHPA, in accordance with 36 CFR 800. Mitigation would occur in consultation with the Colorado SHPO and would likely include some form of documentation so that information about ranch headquarters structures is not lost. In all cases, the National Park Service would comply with section 106 of the NHPA.

Conclusion. Effects to Medano Ranch and other historic structures would be adverse (long term, minor to major) as analyzed under NEPA, due to deterioration from discontinued maintenance, possible vandalism, and possible building removal. Through compliance with section 106 of the NHPA, including consultation with the Colorado SHPO and mitigation, the severity of impacts can be reduced below the “major” threshold as described under NEPA analysis. There would be *no impairment* of historic structures from this alternative under NEPA (see specific definition of impairment in the “Impairment of National Park Resources” section). In all cases, the National Park Service would comply with section 106 of the NHPA.

CULTURAL LANDSCAPES

In the dunefield focus—maximize wildness alternative, Medano Ranch headquarters structures would be located within the natural/wild zone. Assuming management of Medano Ranch were transferred to the

National Park Service, structures would be documented, but not maintained (or if safety concerns arose, the structures would be removed after documentation). Unrestricted visitor access would be allowed in the area of the ranch and monitoring would be relatively infrequent. Deterioration of ranch features (buildings, roads, ditches, etc.) could occur from vandalism and lack of maintenance. If safety concerns arose, structures could be removed after documentation. Impacts to the Medano Ranch potential cultural landscape would be long term, moderate to major, and adverse under NEPA.

Management of large areas as wilderness would cause minor, long-term, localized, adverse impacts under NEPA to peripheral ranch landscape elements due to removal of fences and discontinued maintenance of other elements such as roads and ditches.

Cumulative Impacts. Localized adverse, long-term, cumulative, effects under NEPA could include the eventual disappearance of Medano Ranch over time due to vandalism and natural deterioration.

Mitigation. Mitigation measures are undertaken to reduce potential impacts to cultural resources. The National Park Service would comply with section 106 of the NHPA regarding management planning, including measures to avoid, minimize, or mitigate adverse effects. Mitigation would occur in consultation with the Colorado SHPO, and would likely include some form of documentation so that information about the ranch headquarters cultural landscape is not lost.

Conclusion. Effects to the Medano Ranch potential cultural landscape would be long term, moderate to major, and adverse under NEPA due to deterioration from discontinued maintenance, vandalism, and possible building removal. Through

compliance with section 106 of the NHPA, consultation with the Colorado SHPO and mitigation, the severity of impacts could be reduced below the “major” NEPA threshold. There would be *no impairment* of cultural landscapes from this alternative under NEPA (see specific definition of impairment in the “Impairment of National Park Resources” section). In all cases, the National Park Service will comply with section 106 of the NHPA as part of its planning for management practices and directions.

VEGETATION

In the dunefield focus—maximize wildness alternative, the frontcountry and dunes play management zones would be the focus of most visitor use, and visitor numbers would increase substantially over time (primarily due to population growth; see “Visitor Use and Experience” section for projections). Sparse dunefield plant communities would experience increased trampling, wind erosion, and landslide. Popular locales within the subalpine and tundra life zones could also experience increased use over time. A new multiuse hiking/biking trail would be constructed from the park boundary near the Oasis to the visitor center, dunes parking lot and picnic area, and to Pinyon Flats campground, which would affect sabkha and sand sheet plant communities occupying the trail’s footprint. Activities related to trail construction include grading, drainage-control structures, and surfacing that would remove vegetation, destroy soil structure and bury habitat, and provide disturbed sites for nonnative plant species invasion. Supplemental parking and restrooms could be provided in the frontcountry management zone and would affect plant communities by grading (disturbance and potential for nonnative plant species invasion) and paving (burial).

The overall result would be short- and long-term, negligible to moderate, adverse, and short- and long-term, minor, beneficial impacts to plant communities of the sand sheet and dunefield life zones.

A gate or gates would be installed on the northern park boundary to allow equestrian access for backcountry use. The mature narrowleaf cottonwood groves on the banks of Deadman Creek would be potentially attractive to hikers and horseback riders for resting, watering animals, and other passive pursuits. This activity could result in streambank erosion, vegetation trampling, grazing and browsing by horses, and potential introduction of nonnative plant species. The lack of established trails from the northern boundary would encourage proliferation of social trails and result in vegetation trampling and the potential for nonnative species introduction. In general, impacts to vegetation from increased use and use in new park areas (including horseback riding) would be tempered by monitoring and management actions tied to a management zone-based carrying capacity approach. Even so, impacts to plant communities of the sand sheet life zone would be short and long term and minor to moderately adverse.

If The Nature Conservancy were to transfer Medano Ranch lands to the National Park Service, managed bison grazing would be discontinued. Over time, plant communities in this area would recover from impacts of managed bison grazing (e.g., streambank trampling, shifts in species composition from selective consumption of more palatable species, etc.). This would have short- and long-term, minor, beneficial impacts on sabkha and sand sheet plant communities.

The park would identify and manage nonnative plant populations, reducing their effect on native plant communities or

possibly eliminating some stands from the landscape resulting in short- and long-term, minor to moderate, beneficial impacts on the species composition of plant communities and their habitat quality.

Cumulative Impacts. Generally, native plant communities of the San Luis Valley and of the park have been affected by over a century of livestock grazing and the effects are sometimes intensified by periods of drought. Depending on the local environment, grazing effects can range from minor shifts of plant and animal species composition to more serious wind and water erosion (e.g., blowouts and gullying) and nonnative plant introductions. Cattle grazing was discontinued on the former Baca Ranch lands in 2004, and some past adverse livestock impacts may gradually be reversed in the future. Rehabilitation of main park roads and parking areas, which includes increasing the capacity of the dunes parking lot by ~5%, would result in minor, long-term, localized, adverse impacts on vegetation. Introduction of nonnative landscape plants from adjacent developed lands would result in adverse effects to native plant communities. Some native plant communities have undergone historic disturbance during past land-use activities and are therefore subject to such nonnative plant species invasion. The dunefield focus—maximize wildness alternative would contribute to effects on vegetation from increased use and management of nonnative invasive plants. Combined with past, present, and reasonably foreseeable future actions, the dunefield focus—maximize wildness alternative would have long-term, minor to moderate, adverse, and moderate beneficial effects on plant communities.

Conclusion. Increased visitation and new access points, trails, roads, and parking

areas (all limited) would have long-term, negligible to moderate, adverse impacts on plant communities. Cessation of managed bison grazing on Medano Ranch, carrying capacity monitoring and actions, and control of nonnative plant species would have long-term, minor to moderate, beneficial impacts on plant community species composition and habitat quality. There would be *no impairment* of vegetation from this alternative (see specific definition of impairment in the “Impairment of National Park Resources” section).

ECOLOGICALLY CRITICAL AREAS

The frontcountry and dunes play management zones would be the focus of most visitor use in this alternative, and the number of visitors would increase over time (see “Visitor Use” section for projections). The dunefields in this area within the Great Sand Dunes ecologically critical area would experience more use, and the four sparse dunefield plant communities (which support the rare James catseye, rare insect species, and habitat for the rare silky pocket mouse subspecies) would experience increased trampling, wind erosion, and landslide. A new multiuse hiking/biking trail would be constructed from the park boundary near the Oasis to the visitor center, dunes parking lot and picnic area, and to Pinyon Flats campground, which would affect sand sheet plant communities occupying the trail’s footprint near the boundary of the Great Sand Dunes ecologically critical area. Activities related to trail construction include grading, drainage control structures, and paving that would remove vegetation, destroy soil structure and bury habitat, and provide disturbed sites for nonnative plant species invasion. Parking areas and restrooms could be expanded in the frontcountry management zone encompassed by the Great Sand Dunes

ecologically critical area, and would affect plant communities by grading (disturbance and potential for nonnative plant species invasion) and paving (burial). The overall result would be short- and long-term, negligible to moderate, adverse, and short- and long-term, minor, beneficial impacts to the Great Sand Dunes ecologically critical area.

A horse gate or gates would be installed on the northern park boundary, which would lead to increased equestrian activity in the northern part of the park. Lack of established trails in this area would likely encourage social trailing. Sand sheet plant communities in the watershed of the Deadman Creek ecologically critical area could be affected by social trailing, trampling, and nonnative plant species establishment. In particular, the matured nonhybridized narrowleaf cottonwoods on the banks of Deadman Creek could be attractive to hikers and horseback riders for resting, watering animals, and other passive pursuits. In addition to social trailing, this activity could result in vegetation trampling (including habitat for the rare canyon bog orchid), grazing and browsing of vegetation by horses, and introduction of nonnative plant species. Results of these actions would be short- and long-term, minor to moderate, adverse impacts to plant communities of the Deadman Creek ecologically critical area.

If The Nature Conservancy were to transfer Medano Ranch lands to the National Park Service, managed bison grazing would be discontinued. Local plant communities would recover over time from associated streambank erosion, impacts from selective consumption of more palatable plants, etc. The end result would be long-term, minor, beneficial impacts on Medano Ranch portions of the San Luis Lakes / Sand Creek ecologically critical

area plant communities and wildlife habitat.

The park would identify and manage nonnative plant populations, reducing their effect on native plant communities or possibly eliminating some stands from the landscape, resulting in short- and long-term, minor to moderate, beneficial impacts on the species composition of plant communities and their habitat quality.

Cumulative Impacts. Generally, ecologically critical areas within the park have been affected by over a century of livestock grazing and the effect is sometimes intensified by periods of drought. Depending on the local environment, grazing effects can range from minor shifts of plant and animal species composition to more serious wind and water erosion (e.g., blowouts and gullying) and nonnative plant introductions. Cattle grazing was discontinued on the former Baca Ranch lands in 2004, and some past adverse livestock impacts may gradually be reversed in the future. Some native plant communities have undergone historic disturbance during past land-use activities, and are therefore subject to such nonnative plant species invasion. Contributions of the dunefield focus—maximize wildness alternative to effects on ecologically critical areas would result from increased use, elimination of bison grazing, management of nonnative invasive plants, and new trails. Combined with past, present, and reasonably foreseeable future actions, the dunefield focus—maximize wildness alternative would have long-term, minor to moderate, adverse, and moderate beneficial effects on ecologically critical areas.

Conclusion. Increased visitation and limited new facilities (horse gate on north end, multiuse path, expanded parking in the frontcountry zone, etc.) would result in

long-term, minor to moderate, adverse impacts on plant communities. Cessation of managed bison grazing on Medano Ranch, carrying capacity monitoring and actions, control of nonnative plant species, and other actions would have long-term, minor to moderate, beneficial impacts on ecologically critical areas. There would be *no impairment* of ecologically critical areas from this alternative (see specific definition of impairment in the “Impairment of National Park Resources” section).

FEDERAL THREATENED AND ENDANGERED SPECIES

Under the dunefield focus—maximize wildness alternative, backcountry use in the preserve is projected to grow over time, although the Mosca, Music, and Medano passes access points would remain somewhat isolated from substantial levels of nearby development and associated population growth. The National Park Service would encourage the USFS not to improve the capacity or standard of the Music Pass trailhead parking or the standard of the four-wheel-drive access road on the east side of the Sangre de Cristo Mountains. This would help keep visitor numbers from growing in parts of the preserve, including the Upper Sand Creek drainage, as would managing much of the park under the conditions of the natural/wild zone. Given this alternative’s emphasis on wild conditions, there would likely be substantial interest in exploring backcountry areas on foot or horseback. However, this interest would be anticipated to decrease with elevation and topographic complexity along the mountain ranges, and with distance from access points across the lower elevations of northern and western portions of the park.

Given the difficulty of reaching much of the elevated reaches of the preserve, visitor

use is not anticipated to have detectable or measurable impacts on Mexican spotted owls or Canada lynx moving through or attempting to take up residence in those areas. Similarly, the remote nature of the scattered complexes of habitat patches for southwestern willow flycatcher, yellow-billed cuckoo, and bald eagle in the western portion of the park, would tend to reduce these species’ exposure to visitor impacts. As such, visitor use impacts to all of these species are anticipated to range from none to negligibly adverse.

Under this alternative, unleashed dogs used for hunting would still be allowed in the national preserve, as allowed by 1a and regulated by CDOW; however, leashed (nonhunting) dogs would be permitted only in parking areas, picnic areas, and car campgrounds in the rest of the park. This would reduce the number of dogs in the preserve and is anticipated to result in no to negligible beneficial impacts on potential Canada lynx in the preserve. The continued presence of unleashed hunting dogs in the national preserve is anticipated to continue to have no to negligible, adverse effects, in the short and long term, on Canada lynx passing through or trying to establish ranges within the national preserve.

Under the dunefield focus—maximize wildness alternative, livestock watering ponds and structures would be removed and irrigation on Medano Ranch may cease. Cessation of irrigation may increase or decrease riparian flows and wetlands. A detailed study of potential changes to the hydrologic regime of the park and surrounding area would be conducted before irrigation of wet meadows was eliminated. Therefore, these actions would be anticipated to have the potential for no to negligible adverse or beneficial impacts on the southwestern willow flycatcher, yellow-billed cuckoo, and bald eagle.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions that would affect individuals or populations of or habitat for the addressed species within the park under the dunefield focus—maximize wilderness alternative include growth of the human population surrounding the park, oil and gas exploration on former Baca Ranch lands, wilderness restoration efforts in the South Colony Lakes basin area (north of the national preserve), and a potential elk herd reduction in the future. Population growth is anticipated to be a contributor to modest increases in visitation within the preserve. Oil and gas exploration is underway on the adjacent Baca National Wildlife Refuge, which may impact lowland habitats outside park boundaries for riparian and wetlands-associated species such as the southwestern willow flycatcher, yellow-billed cuckoo, and bald eagle. Oil and gas exploration within the park is possible due to privately held mineral rights, but would require additional compliance with NEPA. Wilderness restoration efforts north of the preserve may increase potential habitat for the Mexican spotted owl and Canada lynx along the range. The reduction of elk would avoid or reduce the impacts that overly large populations of this native ungulate can have on a range of habitats and the food chains based on those habitats. Taken in combination with these cumulative impacts, the dunefield focus—maximize wilderness alternative is anticipated to have no to negligible adverse and no to negligible beneficial impacts on potential establishment of the southwestern willow flycatcher, yellow-billed cuckoo, bald eagle, Mexican spotted owl, and Canada lynx within the park.

Mitigation. Mitigation measures are undertaken to reduce potential impacts to federally listed or candidate species, and are described for all action alternatives in chapter two. These measures include

following specific guidelines regarding habitats of Canada lynx and bald eagles, and conducting surveys prior to the implementation of any activity near potential habitat for southwestern willow flycatcher, yellow-billed cuckoo, bald eagle nests, bald eagle winter roosts, and Mexican spotted owls. Additional consultation with the USFWS may be required, as indicated by the results of these surveys. Renewed discussions and additional section 7 consultation with the USFWS would focus on development of specific conservation measures to reduce potential impacts on these species. Such conservation measures would be based on recommendations provided by the current USFWS recovery plan or further coordination with the USFWS for the relevant species.

Conclusion. Impacts on potential Mexican spotted owls and Canada lynx within the park due to increased visitation over time would be moderated by restriction of access to backcountry zones within the preserve to narrow trail corridors, and would be anticipated to decrease with increased elevation and ruggedness of the terrain such that only no to negligible, short- and long-term, adverse impacts on potential individuals or populations of these species, or their habitat in the park are anticipated. Similarly, impacts on potential occurrences of southwestern willow flycatcher, yellow-billed cuckoo, and bald eagles within the western reaches of the park due to increased visitation would be moderated or reduced with increased distance from access points such that only no to negligible, short- and long-term, adverse impacts on these species or their habitats in the park are anticipated. The continued presence of unleashed hunting dogs in the national preserve is anticipated to continue to have no to negligible adverse effects in the short and long term on Canada lynx passing through

or trying to establish ranges within the national preserve. This may be offset somewhat by the elimination of dogs in the preserve (except for hunting dogs), which is anticipated to have no to negligible, beneficial effects over the short and long term. These impacts correlate to a determination of “*may affect—not likely to adversely affect*” for the southwestern willow flycatcher, yellow-billed cuckoo, bald eagle, Mexican spotted owl, and Canada lynx for the dunefield focus—maximize wildness alternative. There would be *no impairment* of federal threatened and endangered species from this alternative (see specific definition of impairment in the “Impairment of National Park Resources” section).

WILDLIFE, INCLUDING COLORADO STATE-LISTED SPECIES

Species Associated with Riparian Corridors

The frontcountry and dunes play management zones would be the focus of most visitor use in this alternative, and the number of visitors would increase over time (see “Visitor Use” section for projections). Medano Creek wetlands within these zones would therefore experience considerably more use. Increased use over time could result in impacts to riparian corridors (e.g., Sand Creek, Castle Creek, Little Medano Creek, and Cold Creek) such as decreased water quality from increased sedimentation, introduction of pollutants, and introduction of nonnative species or diseases. This would have minor to moderate adverse effects on species associated with these riparian habitats such as the Rio Grande sucker, Rio Grande chub, and the Rio Grande cutthroat trout.

Day use would increase in the vicinity of Deadman Creek near the northern park boundary. A gate or gates for equestrian access on the northern park boundary would encourage more off-trail equestrian use (natural/wild zone) in the northern portion of the national park. The mature narrowleaf cottonwood groves along the Deadman Creek banks would likely attract hikers and horseback riders for resting, watering animals, and other passive pursuits. As with the no-action alternative, there would be no trails to direct hikers and equestrians away from this area, so the Deadman Creek corridor might become the preferred route of east-west hiking and horseback travel in this portion of the park. Adverse effects from humans and horses might be concentrated along this corridor. The wildlife issue for consideration in Deadman Creek is the potential impacts of increased use on Townsend’s big-eared bats, which often forage along riparian corridors in the western United States and are moth specialists (Schmidt 2003). Degradation of the Deadman Creek corridor could potentially result in a decrease in the prey base for this species, if woody vegetation, some of which likely serves as host plants for moths, is affected. Assuming standard monitoring and remediation of habitat conditions, such impacts are anticipated to be negligible to minor and adverse.

Wetlands-Associated Species

Under the dunefield focus—maximize wildness alternative, livestock watering ponds and structures would be removed, and irrigation on Medano ranch would cease, resulting in long-term, negligible to minor, adverse impacts (from drying) on species associated with introduced wetlands in the immediate area. When watering ponds and structures are removed and irrigation is ended, natural flows could

be reintroduced to other areas. Expansion or reestablishment of wetlands plant communities in those areas may have long-term, negligible to minor, beneficial impacts on wetlands-associated species (such as the greater sandhill crane). The result of this scenario would be a combination of negligible to minor, adverse impacts on wetlands-associated species within the park, and negligible to minor, beneficial impacts to the same species outside (downstream of) the park. A detailed study of the potential changes to the hydrologic regime of the park and surrounding area would be conducted before alteration of water sources within the park.

Ungulate Herd Numbers and Health

A gate for horse access would be provided on the north boundary of the park. Access across the northern boundary of the park would be limited to pedestrian and equestrian traffic. The dunefield focus—maximize wildness alternative does not provide for possible future evaluation of public vehicle access routes to the mountain front.

Adverse impacts to ungulates could result from continued limited hunting on USFS lands adjacent to the northern boundary of the park. Continued limited hunting pressure on elk in this area may exacerbate rapid population increases that may be linked to declines of other native ungulate populations (bighorn sheep and mule deer), and to habitat degradation in the Sangre de Cristo Wilderness. Estimated numbers of elk hunters who may want to access the preserve and adjacent USFS lands via a northern route through the park range from 20 to 30 for each of the three five-day seasons; equating to 60 to 90 hunters annually (CDOW, R. Rivale, pers. comm., April 28, 2005). The preserve and adjacent USFS lands are in CDOW game

management unit 82; an area approximately twice the size of the park. According to the CDOW Web site, the total elk harvest in 2005 across all of game management unit 82 was 164 elk. The number of bulls was 107. The ongoing elk research project data suggest that a declining recruitment rate, coupled with successful recreational hunting harvest, have driven an overall decline in the past four or five years. A harvest rate of 19% is based on a total hunter number of 1,729. Therefore, based on the potential number of elk not harvested from the park, preserve, and adjacent USFS lands is estimated at approximately 9 to 10 cows and 5 to 6 bull elk. While the current estimate of 4,000 elk is substantially fewer than the previously estimated herd size of nearly 6,000 elk in the San Luis Valley herd, this herd is still more than twice the 1,500-animal goal established by CDOW. Removal or nonremoval of 9 to 10 cow elk and 5 to 6 bull elk would not make a substantial difference in efforts to reduce the size of the herd. Furthermore, review of historic harvest records for game management unit 82 show no major decline in the number of elk harvested relative to years prior to park expansion. Therefore, this aspect of the alternative is expected to have only minor adverse impacts on ungulate herd numbers and health.

Bighorn Sheep

Under the dunefield focus—maximize wildness alternative, unleashed dogs used for hunting would continue to be allowed in the preserve. Leashed dogs would be allowed only in parking areas, picnic areas, and car campgrounds. Bighorn sheep, as prey animals, are anticipated to react negatively to dogs, whether on-leash or off. MacArthur et al. (1982) conducted human-disturbance trials on bighorn sheep that were already partially habituated to

humans. In this study, a person approached a group of sheep from a road, from a road accompanied by a dog on-leash, and from a ridge away from the road. The strongest negative reactions in the sheep were recorded when a human with a leashed dog approached (MacArthur, Geist, and Johnston 1982). Furthermore, no reduction in heart-rate response was observed with repeated trials; instead, heart-rate response actually increased successively with each leashed-dog trial. In earlier studies, these same authors demonstrated that free-ranging dogs and coyotes evoked the maximum heart-rate responses (MacArthur, Geist, and Johnston 1979). In their later study, MacArthur, Geist, and Johnston (1982) concluded that, among all the stimuli they studied, “The presence of dogs on sheep range should be discouraged.” The mere presence of dogs, which wild prey animals do not distinguish from other predators, can cause stress in prey species (Simes 1999). While the sight and sound of dogs are obvious direct cues, the scent of dogs and the wastes they leave behind have a much longer impact on prey species, potentially preventing such species from approaching and using essential resources such as watering holes or cover for a period of time.

The presence of unleashed hunting dogs in the preserve is a component of all alternatives proposed for this GMP, and would be a continuation of the current condition. What is being evaluated is the differences among the alternatives relative to leashed dogs in the preserve. If only leashed dogs were allowed in the preserve, the impacts attributable to their presence/absence would be larger. However, given that unleashed hunting dogs would be free to roam the preserve within the limits established by their handlers and hunting regulations, the presence or absence of leashed dogs in the preserve is not anticipated to significantly increase or decrease

dog-related stresses. As such, the restriction of leashed dogs to specific areas outside the preserve is not anticipated to contribute more than a negligible beneficial impact on bighorn sheep in the park.

Cumulative Impacts. Cumulative actions contributing to impacts on riparian-associated species as described above include growth of the human population in the area surrounding the park, oil and gas exploration on former Baca Ranch lands, and elk herd reduction. The first two of these would contribute adverse impacts, while elk herd reduction would contribute beneficial impacts, specifically to the riparian corridor habitats. In combination with these cumulative actions, the dunefield focus—maximize wildness alternative is anticipated to contribute negligible to minor adverse impacts.

Cumulative actions contributing to ungulate herd numbers and health include the enabling legislation for the expanded park and preserve (negative impacts from not permitting elk hunting in expansion areas of the national park), but also beneficial impacts from increased protection for habitats and species (from conservation-based NPS management). Also contributing to ungulate herd numbers and health would be the interagency fire management plan, which should provide beneficial impacts to ungulates through habitat management and enhancement. Finally, the elk herd reduction tentatively planned for the future, pending justification stemming from ongoing research and appropriate NEPA analysis, would most likely provide beneficial impacts to the elk by reducing numbers to a level closer to the predicted carrying capacity of the area, and reducing the risk of diseases often associated with excessive herd densities. Combined with past, present, and reasonably foreseeable future actions, the dunefield focus—maximize wildness alternative would be

anticipated to contribute minor adverse impacts to ungulate herd numbers and health.

Cumulative actions contributing to impacts on bighorn sheep would include growth of the human population in the area surrounding the park and elk herd reduction. The first of these would contribute adverse impacts, as it would be anticipated to increase the number of leashed (and potentially feral) dogs in the park, while elk herd reduction would contribute beneficial impacts by reducing competition from, habitat impacts due to, and the threat of diseases from, elk. In combination with these cumulative actions, the dunefield focus—maximize wildness alternative is anticipated to contribute negligible to minor beneficial impacts on bighorn sheep within the park.

Conclusion. The dunefield focus alternative would have minor to moderate adverse impacts on species associated with riparian corridors due to increased recreational use; negligible to minor adverse impacts on wetlands-associated species within the park due to removal of artificial water sources, and cessation of surface irrigation; and negligible to minor beneficial impacts to the same species outside (downstream of) the park due to possible increase of downstream waters; minor adverse impacts on ungulate herd numbers and health due to continued limited access for elk hunting; and negligible beneficial impacts on bighorn sheep populations within the park due to the absence of leashed dogs in the national preserve. There would be *no impairment* of wildlife from this alternative (see specific definition of impairment in the “Impairment of National Park Resources” section).

SOILS AND GEOLOGIC RESOURCES

Under the dunefield focus—maximize wildness alternative, increased day-use hiking and equestrian use in the northern portion of the national park (the latter a result of a horse gate or gates) would result in social trails in that part of the park. Because this area would be zoned natural/wild in this alternative, installation of trails to mitigate this problem is not an option. The result would be long-term, mostly localized, minor to moderate, adverse impacts to soil resources.

In the frontcountry zone, expansion of parking and related support facilities such as restrooms could be expanded if demand warranted. Soils would be disturbed and destroyed in these localized areas, but the soils effects from visitor vehicles parking along road shoulders would be diminished compared to the no-action alternative. Adding a multiuse path (from the park boundary to the visitor center and dunes lot) would destroy and disturb soils in and immediately adjacent to the trail corridor. These actions would have long-term, localized, minor to moderate, adverse impacts, and minor beneficial impacts.

In keeping with the concept of the dunefield focus—maximize wildness alternative, many roads and “two-tracks” would be abandoned. Medano Ranch headquarters area would be zoned and managed as natural/wild. Disturbed soils in these areas would gradually revert to more natural conditions. This would be a long-term, localized, moderate, beneficial impact on soil resources.

Cumulative Impacts. Establishment of a water right to fulfill the purpose of the national park and preserve would minimize further lowering of local groundwater levels or surface water flows, which could

indirectly benefit sand recycling. Oil and gas exploration on lands that were formerly part of the Baca Ranch but are now within the national park has occurred and these activities could continue in the near future; however, any activities would be subject to 36 CFR 9B (*Nonfederal Oil and Gas Rights Regulations*), which require such activities be conducted in a manner consistent with park purposes and preventing or minimizing damage to the environment. Minor expansion and reconfiguration of the dunes parking area and relocation of the horse loading area and RV dump station would also cause localized soil disturbance and destruction. The dunefield focus—maximize wildness alternative would contribute both beneficial and adverse localized impacts to soils and geologic resources. Combined with past, present, and reasonably foreseeable future actions, this alternative would have long-term, minor to moderate, mostly localized, beneficial, and adverse impacts on soils and geologic resources.

Conclusion. Increased day-use hiking and equestrian use in certain areas would cause localized soil disturbance, compaction, and social trailing. Expanded parking and restrooms, and a new multiuse path in the frontcountry zone would disturb and destroy soils in site-specific areas. However, expanded parking would mean reduced impacts (compared to the no-action alternative) from visitor vehicles parking along roadways. Some beneficial soils impacts would also be realized from restoration of the Medano Ranch headquarters site to more natural conditions. Overall, this alternative would have long-term, mostly localized, minor to moderate, adverse impacts, and long-term, mostly localized, minor to moderate, beneficial impacts. There would be *no impairment* of soils and geological processes from this alternative (see specific definition of

impairment in the “Impairment of National Park Resources” section).

WETLANDS

The frontcountry and dunes play management zones would be the focus of most visitor use in this alternative, and the number of visitors would increase over time (see “Visitor Use” section for projections). Medano Creek wetlands within these zones would experience more use, which would mean more potential for incidental trampling of wetland soils and vegetation. This would result in long-term, negligible to minor, adverse effects on creek-associated wetlands and riparian habitats.

Day use would increase in the vicinity of Deadman Creek near the northern park boundary. A gate or gates for equestrian access on the northern park boundary would encourage more off-trail equestrian use (natural/wild zone) in the northern portion of the national park. The mature narrowleaf cottonwood groves along the Deadman Creek banks would likely attract hikers and horseback riders for resting, watering animals, and other passive pursuits. There would be no trails to direct use away from this area (same as for the no-action alternative), so the Deadman Creek corridor might become the preferred route of east-west hiking and horseback travel in this portion of the park. Adverse wetlands effects from incidental trampling, compaction of wetland soils and streambanks, and introduction of nonnative species might be concentrated along this corridor. Chemical and biological processes and wetlands species composition could be affected. Effects would be long term, minor to moderate, and adverse.

Assuming Medano Ranch is eventually transferred to NPS management, irrigation

of hay meadows for bison forage in this area would be discontinued. Wetlands that are not supported by natural surface and groundwater flows (e.g., introduced or artificial wetlands) would be adversely affected by drying. Natural flows in Sand, Big Spring, and Little Spring creeks would increase, at least seasonally, when irrigation is discontinued, and other wetlands types (e.g., ephemeral ponds, playas, mudflats, etc.) would expand and/or become reestablished. Also, more water would likely be delivered to San Luis and Head lakes in San Luis Lakes State Park and Wildlife Area, stabilizing water levels and providing wetlands support in those areas. Overall, anticipated wetlands impacts would be long term, moderate to major, beneficial, and long term, moderate, adverse. A future study would examine expected impacts in more detail.

Eliminating bison grazing from Medano Ranch lands within the park would benefit some wetlands plant species, particularly the most palatable grasses. Some areas of channel and streambank erosion might gradually stabilize, improving wetlands structure and function. Livestock watering ponds and structures would be removed; some introduced wetlands would likely dry up, but other naturally occurring wetlands would be re-established or expand from restoration of natural flows. The park would identify and manage nonnative plant populations in new park areas, reducing their effects on native wetlands communities or possibly eliminating some nonnative stands from the landscape. Wetlands species composition and habitat quality would improve as a result. Overall, these actions would have long-term, minor to moderate, beneficial, and negligible to minor, adverse impacts on wetlands.

Cumulative Impacts. Livestock grazing typically adversely affects wetlands and riparian resources by causing shifts in

species composition, erosion of stream-banks and bottoms, and browsing of wetland grasses, shrubs, and tree seedlings. Cattle grazing was discontinued on the former Baca Ranch lands in 2004, and some past adverse livestock impacts may gradually be reversed in the future. Under the dunefield focus—maximize wildness alternative, beneficial and adverse wetlands impacts would result from increased use (especially in certain areas), removal of livestock-related water control structures, control of nonnative noxious plant populations, and discontinuation of bison grazing and hay meadow irrigation. Combined with past, present, and reasonably foreseeable future actions, the no-action alternative would have long-term, moderate, beneficial impacts, and minor to moderate adverse impacts on wetlands resources.

Conclusion. Increased use in a few key areas would mean a greater potential for incidental trampling of wetland soils and vegetation; impacts on creek-associated wetlands and riparian habitats would be long term, adverse, and range from negligible to moderate. Discontinuing irrigation of wet meadows on Medano Ranch is expected to have long-term, moderate to major, beneficial, and long-term, moderate, adverse impacts on wetlands. Eliminating bison grazing, removing livestock watering ponds and structures, and managing nonnative plants in new areas would have long-term, minor to moderate, beneficial, and negligible to minor adverse impacts on wetlands. There would be *no impairment* of wetlands from this alternative (see specific definition of impairment in the “Impairment of National Park Resources” section).

WATER RESOURCES

Under the dunefield focus—maximize wildness alternative, visitation would generally increase over time, and it would increase proportionally in certain areas (e.g., in the north portion of the park). Increased use over time would mean a greater potential for trash and human, horse, and dog waste to be washed into streams and lakes, thus degrading water quality. However, within the national park, dogs would be restricted to parking lots, campgrounds, and picnic areas, which would improve water quality in most of the national park (including the popular Medano Creek area within the dunes play zone). Backcountry toilets would be installed if/when visitor use levels become high enough that human waste disposal and sanitation is a concern. The natural/wild zone would cover most of the national park and preserve, so there would be no allowance for new trails that could otherwise direct use away from sensitive areas (e.g., Deadman Creek, Lower Sand Creek, and Big Spring Creek). Thus, social trails (including those from horses) could also be a problem, causing streambank erosion that would contribute to stream sedimentation. The end result of these actions would be long-term, minor, adverse impacts, and long-term, minor, beneficial impacts to surface water and potentially to shallow groundwater quality.

If and when The Nature Conservancy transferred Medano Ranch lands to the National Park Service, surface irrigation of hay meadows for bison forage would be discontinued. Nondiverted creek flows would be allowed to remain within their natural drainages (e.g., Sand, Big Spring, and Little Spring creeks) rather than being redirected to meadow areas. Thus, discontinuation of meadow irrigation would affect surface water flows and possibly

groundwater levels, but additional research would be needed to determine the nature (scope, direction, intensity, etc.) of these impacts. Prior to discontinuing irrigation, a study would be conducted to provide more information about possible effects of this action.

Cumulative Impacts. Establishment of a water right to fulfill the purposes of the park would minimize additional decline of local groundwater levels. Oil and gas exploration activities on lands that were formerly part of the Baca Ranch (but are now within the national park) are reasonably foreseeable in the near future; however, any such activities are subject to 36 CFR 9B, which requires that such activities be conducted in a manner that is consistent with protection of water resources (among other resources). The dunefield focus—maximize wildness alternative would have both beneficial and adverse effects on water resources, as discussed above. Combined with past, present, and reasonably foreseeable future actions, the impact of the no-action alternative on water resources would be long term, minor to moderate, and adverse.

Conclusion. Increased use would result in increased wastes and sediments in certain surface waters. Restricting dogs to limited areas within the national park and providing backcountry toilets would improve water quality. Social trails could cause streambank erosion and stream sedimentation in the several stream corridors (e.g., Deadman Creek, Big Spring Creek, and Lower Sand Creek). These actions would have long-term, minor, adverse impacts, and long-term, minor, beneficial impacts to surface water and potentially to shallow groundwater quality. Discontinuing surface irrigation of hay meadows on Medano Ranch would affect surface water hydrology and possibly groundwater levels, but research would be needed to determine the

nature of these impacts. There would be no impairment of water resources from this alternative (see specific definition of impairment in the “Impairment of National Park Resources” section).

VISITOR USE AND EXPERIENCE

Visitor Use Projections

Projected annual visitor use at Great Sand Dunes for the dunefield focus—maximize wildness alternative would be 397,100 by 2025, the least amount of the three draft GMP action alternatives. That level of use represents an increase of more than 106,000 annual visitors over the 2004 adjusted total, and 22,300 (6%) more visitors than the no-action alternative (table 24). As for the no-action alternative, the principal factor that would drive increased visitor use is population growth in the San Luis Valley and the state of Colorado. Annual use in 2025, under this alternative, would be about 30,000 fewer visitors than under the NPS preferred alternative.

Key elements of the dunefield focus—maximize wildness alternative that would influence future use include the following:

- management emphasis maintaining most of the Great Sand Dunes in primitive and undeveloped conditions, and recommendation of most eligible land for wilderness

- expansion of parking and related support facilities in the front-country zone as the frequency of filled parking areas and congestion increases
- restricting dogs to parking areas, campgrounds, and picnic areas
- the long-term return of Medano Ranch to natural and wild conditions, if the National Park Service acquires the property from The Nature Conservancy

By 2025, projected visitation during the three-month summer peak would reach nearly 235,000 visitors, about 13,000 more than the 221,300 visitors projected under the no-action alternative for the summer months. Most of the increase would be focused in the frontcountry and dunes play zones, with an anticipated increase of about 5,000 visitors during July. Over time, the rise in visitation at peak periods could encourage visitors to arrive earlier or later in the year, that is, during the shoulder seasons.

Projected annual dispersed day and overnight use across the remainder of the park would reach 40,300 visitors under the dunefield focus—maximize wildness alternative, about 3,500 more than under the no-action alternative, and about 12,000 fewer than with the NPS preferred alternative. Under this alternative, recreation use in much of the natural zone west of the dunefield, which would also be recommended for wilderness, would be very low.

**TABLE 24. CURRENT AND PROJECTED ANNUAL VISITORS IN 2025
DUNEFIELD FOCUS—MAXIMIZE WILDNESSE ALTERNATIVE**

2004 (recorded)	2004 (adjusted baseline)	No-Action Alternative	NPS Preferred Alternative	Dunefield Focus Alternative
268,400	291,000	374,800	427,100	397,100
Increases over 2004 (adjusted)				
Annual Visits (number)		+83,800	+136,100	+106,100
Annual Visits (percent)		+29%	+47%	+36%
Increases over the No-Action Alternative				
Annual Visits (number)		AA	+52,300	+22,300
Annual Visits (percent)		N/A	+14%	+6%

Visitor Experience

Most visitor use would remain focused in the eastern part of the dunefield. Parking and related support facilities in this area could be expanded to respond to increased demand as the frequency of filled parking areas and levels of congestion warrant. Visitor opportunities would be diversified by: (1) easier access to localized areas of the dunes and Medano Creek (from expanded parking), and (2) the new multiuse trail, which would allow visitors to see the park from a different perspective.

Backcountry use in the preserve is projected to grow over time, although the Mosca, Music, and Medano passes access points would remain relatively isolated from substantial levels of nearby development and associated population growth. Due to available access points, backcountry use would remain focused around upper Sand Creek, Medano Pass primitive road, the Mosca Pass corridor, and the northernmost portion of the national park. However, given this alternative’s emphasis on wild conditions, there would likely be substantial interest in exploring backcountry areas on foot or horseback. People seeking wilderness experiences would

probably visit specifically to explore the park’s more remote areas.

A new horse gate on the park’s northern boundary would encourage equestrian users to access and explore new park areas (i.e., former Baca Ranch lands) that are currently difficult to reach. The gate would also make it possible to access the Sand Creek drainage from the west, which has terrain well-suited for equestrian use.

The frontcountry parking expansion, new multiuse trail and horse gate, and emphasis on wild conditions in most of the park, discussed in the preceding paragraphs, would have long-term, moderate, beneficial impacts on visitor experience.

Expansion of parking and related support facilities in the frontcountry zone means that frustrations related to vehicle and pedestrian circulation would be largely avoided, at least for the present time. However, visitors would encounter more people and congestion in the following areas: in the frontcountry zone, in the dunes play zone, on the Medano Pass primitive road, and on trails in the national park and in the preserve. The campground would likely fill more often and earlier in the day. Rather than deal with crowded conditions on the Medano Pass primitive

road, some visitors would undoubtedly seek out other options outside the park. Localized crowding and congestion in frontcountry and backcountry access zones would have minor adverse impacts on visitor experience.

As in the no-action alternative, information, education, and interpretation activities would be concentrated in the area east of the dunefield; there would be little change with respect to these services and opportunities.

Visitors who like to travel and/or recreate with their dogs would have much less freedom to do so compared with the no-action alternative—dogs would be allowed only in parking areas, picnic areas, and car campgrounds. This would likely discourage some dog lovers from visiting the park. Other visitors would be pleased; this policy would virtually eliminate concerns and complaints related to aggressive dogs and dog waste in the dunes play zone, where considerable recreational activity occurs. The new policy regarding dogs in the park would have long-term, minor, adverse, and beneficial impacts on visitor experience.

The dunefield focus—maximize wilderness alternative would offer ample opportunities to experience wilderness conditions within existing wilderness areas. The horse gate on the northern boundary would be the only new access point, so remote areas would remain so. However, in less remote parts of the wilderness, increasing visitor numbers over time could affect wilderness values (opportunities for solitude, evidence of human use, etc.). The larger, busier frontcountry zone could have “spillover” effects, degrading wilderness conditions in adjacent wilderness areas. Eventually, day-use backcountry permits might be required to maintain desired conditions in the natural/wild zone. Diminished wilderness values in less remote portions of existing

wilderness areas would have a long-term, minor, adverse impact on visitor experience. A wilderness recommendation for most new park lands means that new wilderness experiences would be offered. The sand sheet and sabkha life zones present a different wilderness setting from that available in the dunes and forest. Like the NPS preferred alternative, this one would allow visitors to hike or ride horses around the massive dunefield, almost entirely within designated wilderness. New wilderness opportunities would result in long-term, major, beneficial impacts to visitor experience.

Cumulative Impacts. Rehabilitation of main park roads and parking areas, which includes increasing the capacity of the dunes lot by ~5%, is planned for the near future and would modestly improve pedestrian and vehicle traffic flow in the immediate area. The dunefield focus—maximize wilderness alternative provides for more substantial expansion of frontcountry parking, which would relieve frustrations from vehicle and pedestrian circulation in this area, at least temporarily. Ongoing wilderness restoration efforts in the South Colony Lakes basin area are improving wilderness values in the Sangre de Cristo Wilderness. This alternative would lead to diminished wilderness experiences in less remote areas, and maintain wilderness experiences in more remote areas of the Sangre de Cristo Wilderness within the park. It would also provide new, different wilderness opportunities via a wilderness recommendation for most new park lands. Combined with past, present, and reasonably foreseeable future actions, the dunefield focus—maximize wilderness alternative would have minor adverse and minor to major beneficial effects on visitor experience.

Conclusion. The frontcountry parking expansion, new multiuse trail and horse

gate, and emphasis on wild conditions in most of the park would have long-term, moderate, beneficial impacts on visitor experience. Localized crowding and congestion (frontcountry and backcountry access zones) would have minor adverse impacts on visitor experience. The new policy regarding dogs in the park would have long-term, minor, adverse, and beneficial impacts on visitor experience. Diminished wilderness values in less remote portions of existing wilderness areas would have a long-term, minor, adverse impact on visitor experience. New wilderness opportunities would result in long-term, major, beneficial impacts on visitor experience.

SCENIC RESOURCES AND VISUAL QUALITY

Under the dunefield focus—maximize wildness alternative, there would be no new human-made structures or vehicle areas in the national preserve that would affect scenic quality. However, in the frontcountry and dunefield focus—maximize wildness zone, additional parking and comfort stations would be provided if demand warranted, and a multiuse path from the park boundary to the visitor center would be constructed east of the main park road. These human-made features would be at least partially visible from some key vantage points (e.g., the high dunes and mountain slopes) and would have minor to moderate, long-term, localized, adverse impacts to scenery.

A horse gate (or gates) would be provided on the northern boundary, where the national park adjoins the Baca Grande subdivision. With nowhere to park in the north part of the national park, many hikers and equestrians would park their vehicles, including horse trailers, on county roads within the subdivision to gain access

to the park. As in the no-action alternative, scenic views would be affected locally by vehicles parked near the edge of the subdivision. In this case, however, parked vehicles would also include horse trailers due to the new horse gate or gates on the northern boundary. Impacts on scenic views would be short and long term, adverse, and minor to moderate in intensity.

Structures at Medano Ranch headquarters would be documented but not maintained, or they would be removed after documentation. Medano Ranch corrals, fences, and utilities would also eventually be removed. No new facilities such as structures, roads, or trailheads would be provided in the park expansion area. The natural landscape in the park expansion area would be maintained and would eventually appear even more natural and wild. Impacts on scenery from these actions would be long term, minor, and beneficial.

Outdoor lights and vehicle traffic in the vicinity of Medano Ranch headquarters would eventually be phased out. No new sources of vehicle-induced dust and no new light sources would be introduced. Impacts on visibility and the night sky would be negligible to minor, long term, and beneficial.

Cumulative Impacts. Rehabilitation of main park roads and parking areas, which includes increasing the capacity of the dunes parking area by ~5%, would result in a negligible, long-term, localized, adverse impact on scenic resources. Prescribed burns (fire management) would have short-term, minor, adverse, localized impacts on scenery and visibility. Continued residential growth of the Baca Grande subdivision would mean that more homes, retreat centers, commercial structures, and vehicles would be visible in this area in the future. Expanded residential development

could also increase dust and wood smoke levels. The private land parcel that is for sale near the park entrance could be rezoned to commercial and developed. Overall, such new development would intrude upon the area's natural scenery (at least from some vantage points), affect visibility, and introduce new light sources into the night sky. Regional population growth and development would also continue to introduce additional light into the night sky. The dunefield focus—maximize wildness alternative would contribute minor to moderate adverse impacts and negligible to minor beneficial impacts on scenic resources and visual quality. Combined with other past, present, and reasonably foreseeable future impacts, this alternative would have short- and long-term, moderate, adverse effects, and negligible beneficial effects on scenic resources and visual quality.

Mitigation. No mitigation is proposed for this alternative.

Conclusion. The dunefield focus—maximize wildness alternative would have short- and long-term, minor to moderate, adverse impacts on scenery. It would also have long-term, negligible to minor, beneficial impacts on scenery, visibility, and the night sky. There would be *no impairment* of scenic resources and visual quality from this alternative (see specific definition of impairment in the “Impairment of National Park Resources” section).

SOCIOECONOMICS

Implementing the dunefield focus—maximize wildness alternative would occur against the same backdrop of economic, demographic, and social changes across the San Luis Valley described under the no-action alternative. The economic and social effects of the dunefield focus—maximize

wildness alternative would add to those changes, but not fundamentally change the area's economic and demographic outlook.

Visitor-Related Economic Impacts

By 2025, annual visitor use at the park is projected to reach 397,100 recreation visits, which is 106,100 visits or 36% more than visitation in 2004, and 22,300 more than under the no-action alternative. As under the no-action alternative, visitor use under the dunefield focus—maximize wildness alternative is expected to increase over time, but with some periods of faster or slower growth, or even some year-to-year declines. Peak monthly visitation of 85,700 visitors is projected in July 2025, as compared to about 80,800 under the no-action alternative.

Visitors to the park from outside the Valley are expected to account for the majority of future visits, although the number of visits by residents of the region would also increase.

Projected visitation under the dunefield focus—maximize wildness alternative would result in 204,810 party-days of visitor use, an increase of 12,150 party-days over that estimated for the no-action alternative. Retail, lodging, and other tourism-type spending across the region would reach \$19.61 million per year in 2025, \$1.18 million more than in 2004, and \$2.72 million per year more than for the no-action alternative. The increased visitor spending would benefit private businesses, as well as increasing the sales tax receipts for local governments. The park would collect increased entry fees and sales of various passes, and the Western National Parks Association would see increased merchandise sales.

Economic spin-offs from visitor spending include \$6.12 million per year in personal income and 503 jobs. Those levels represent \$0.37 million more in annual income and 31 more jobs than would occur in 2025 under the no-action alternative. The visitor-related impacts would be long term, but minor relative to overall employment and personal income in the two directly affected counties.

The effects on state and local governments under this alternative would be comparable to those under the no-action alternative; increased sales tax receipts due to increased visitor spending, property taxes on new development, and PILT receipts for Saguache and Alamosa counties due to population growth and increases in federal ownership.

The visitor-related economic impacts would be beneficial, but negligible in the short term and minor and beneficial over the long term.

Economic Impacts Related to GMP Implementation and Park Operations

The economic stimulus associated with implementation of the dunefield focus—maximize wildness alternative would include \$10.6 million in future capital spending, \$7.4 million in nonannual recurring costs, and increased nonpayroll operating and maintenance expenditures. Increased staff would be required at the park over time to maintain current service levels, although any such increases are contingent upon additional base funding. The incremental staff need is estimated at five FTEs, at an annual cost of approximately \$260,000 over the current budget, but equivalent to that for the no-action alternative.

Short-term economic impacts associated with future capital and nonannual recurring outlays would support the local construction trades and related industries. As with the other alternatives, the timing of these infusions is uncertain because they are subject to congressional appropriations, allocations within the National Park Service, and future entry and camping fees collected at the park that are used to support maintenance and construction projects. Recurring operating expenditures for the park would yield long-term impacts on employment, business sales, income, and other related measures. The economic effects tied to these economic stimuli include:

- capital construction (short term): 158 job-years of employment and \$4.62 million in personal income over time, between 2006 and 2025
- nonannual recurring (short term): 122 job-years of employment and \$3.39 million in personal income over time, between 2006 and 2025
- park operations (long term): 43 jobs, including 33 FTEs of direct NPS staffing, and \$1.95 million per year in annual income

The economic effects of the dunefield focus—maximize wildness alternative are almost the same as those under the no-action alternative. The one area of minor differences reflects the \$3.8 million in increased capital outlays for the dunefield focus.

With the dunefield focus—maximize wildness alternative, the long-term gains in economic benefits associated with park operations could be offset, in part, by losses in the economic benefits associated with The Nature Conservancy's operation of Medano Ranch. If and when that happens

would depend on the timing of federal acquisition of the ranch and a decision by The Nature Conservancy to stop its bison operations on the ranch. At that time, full implementation of the proposed management zoning would proceed.

The end of the bison operation on Medano Ranch would also mark a transition in land use from agricultural to a more natural setting. Fencing would be removed and other vestiges of active agricultural operations would be removed or become less noticeable as natural processes are allowed to re-establish themselves. The economic effects associated with park operations would be beneficial, but negligible to minor in the short term and beneficial and minor over the long term.

Community Services

Impacts on community services associated with the dunefield focus—maximize wildness alternative would be comparable to those under the no-action alternative. The limited scale, seasonal nature, and spatial dispersion of such demands across the region are such that facility expansions and additional staffing would not be required.

Effects on community services under this alternative would be indeterminate and negligible over the short term and long term.

Traffic and Emergency Services

Traffic impacts of the dunefield focus—maximize wildness alternative on highways and roads providing access to the park would be comparable to those under the no-action alternative. Most of the additional traffic would be concentrated on SH 150 and Alamosa County 6N, the primary

access roads to the park's main entrance. Most travelers would notice little change in travel conditions under the dunefield focus—maximize wildness alternative. Even with the increases in traffic, future traffic levels would be well within the design capacity of the roads, and they would not substantially increase the need for highway maintenance.

As in the no-action alternative, traffic volume north of the park would increase, especially on Saguache County Road T between SH 17 and Crestone/Baca Grande, and on roads within the Baca Grande subdivision. This would occur because although this alternative does not provide for public vehicle access into the north part of the park, traveling through the subdivision would remain the easiest way to get to that portion of the park. Thus, visitors to the north part of the park would continue to travel and park on county roads that terminate near the park's northern boundary. From there, they would walk or ride a horse (through a new horse gate) into the park. While in the area, some visitors might drive around the subdivision to explore alternate routes of approach to the park or adjacent national forest, visit spiritual retreats, or consider properties for sale. Traffic on subdivision roads would increase, and there would be localized problems from vehicles parking near the terminus of certain roads. This localized congestion would be greater than in the no-action alternative because it would include vehicles pulling horse trailers. Effects would be greatest on summer weekends and holidays and would likely intensify as (1) the park visitor population grows over time, and (2) as word spreads about access points to public lands. Given expected traffic increases from residential and spiritual retreat growth in Crestone and the Baca Grande subdivision, the contribution of park visitor-related traffic would be minor. However, vehicle congestion from

visitors parking (or trying to park) near the terminus of county roads could be problematic, especially for those who live nearby.

Impacts on the number of traffic accidents and demands on first responders would be similar to those under the no-action alternative. The demands associated with the dunefield focus—maximize wildness alternative would not require additional law enforcement or emergency response staffing, although the increases in the number of “call outs” would burden area first response agencies because they are staffed by volunteers.

More road traffic would cause more accidents and demands on local law enforcement, emergency medical, and fire protection agencies. The scale of changes associated with the no-action alternative would not require law enforcement agencies to hire more staff, although they could contribute to overall needs for additional staff. While the frequency of incidents would remain relatively low, the distances and response times involved and the fact that many emergency medical and fire protection agencies in the area are staffed by volunteers, would impose a burden on these providers.

The effects of the dunefield focus—maximize wildness alternative on traffic and emergency services would be long term, adverse, and minor to moderate in intensity.

Attitudes and Lifestyles

The dunefield focus—maximize wildness alternative establishes future management direction for the park that also reflects public input, park fundamental resources and values, and the foundation established by management of the former national

monument. However, its focus on maintaining the wild and undeveloped character of much of the newly acquired lands would tend to polarize opinions and attitudes more so than either the no-action or NPS preferred alternatives. Those favoring solitude, wilderness, adventure characterized by self-reliance and limited access to the new areas may tend to support this alternative. Those who viewed the park expansion and its opportunities more from a potential economic development perspective may be disappointed.

Like the no-action alternative, the management direction for this alternative would result in relatively few direct lifestyle consequences because the influences of the park would generally be consistent with those resulting from the no-action alternative. Compared to the other action alternatives, the dunefield focus—maximize wildness alternative may be the most desirable in terms of conditions that affect the Crestone/Baca Grande community and fundamental qualities that underlie their decisions to live and/or provide services in the community.

Cumulative Effects. Cumulative social and economic effects arising from the dunefield focus—maximize wildness alternative are of the same type and scale as those under the no-action alternative. The cumulative effects include slightly more traffic on Saguache County Road T and in the Crestone/Baca Grande community, increased spending by visitors that would bolster tourism-oriented businesses across the Valley, and additional tax revenues to fund public services and facilities. The incremental effects on traffic would be small in relationship to traffic created by area residents, commercial vehicles, and other travelers passing through the area. Increases in park visitation would enhance the commercial development potential for private lands near the park’s main entrance.

Any sales and subsequent development of those lands would change the visitor experience as well as have economic implications. The incremental effects of the dunefield focus—maximize wildness alternative would be negligible to minor in the short term and minor in the long term, and generally beneficial, as compared to other social or economic effects resulting from the cumulative actions.

Conclusion. The economic and social effects of the dunefield focus—maximum wildness alternative include negligible to minor short-term and moderate long-term economic benefits comparable to those under the no-action alternative. Long-term social consequences include a negligible to minor contribution to long-term population growth and demands on community infrastructure and services. Short- and long-term lifestyles and attitudes are indeterminate.

HEALTH AND SAFETY

In the dunefield focus—maximize wildness alternative, Medano Ranch headquarters structures would not be adaptively used if/when The Nature Conservancy transfers the property to the National Park Service. Instead, after documentation, these structures would be removed or left unmaintained. Visitors would have access to the Medano Ranch headquarters area, so there would be some risk of structural fire, either accidental or intentional. If a structural fire started, windy conditions could fan the fire into adjacent park areas. Prevailing winds would most likely fan fires eastward into the park, in which case the dune mass would probably act as an eventual natural barrier. Thus, the risk of fire spreading to areas of focused visitor use or to residential areas outside the park would be low. In the dunefield focus—maximize wildness alternative, public

vehicle access would remain the same as in the no-action alternative. However, parking could be expanded in the front-country zone, which would locally reduce vehicle congestion and help keep the incidence of traffic accidents from rising as visitation increases over time. The proposed multiuse (hiking/biking) path from the main park entrance to the visitor center, dunes parking area, and campground would separate pedestrian and bicycle traffic from vehicle traffic along the main park road. This would provide a measure of increased safety for cyclists and pedestrians, particularly as numbers of vehicles increase with time. Some pedestrian/bicycle accidents could result from allowing pedestrians and cyclists on the same path, however. Compared to the no-action alternative, the dunefield focus—maximize wildness alternative is expected to have a long-term, negligible to minor, beneficial impact on safety from these actions.

Park lands that were once part of Baca Ranch would remain remote. Due to limited access and the wilderness recommendation for this alternative, visitors would assume some additional risk in visiting this area. The same would be true for the Medano Ranch area. Emergency response times to these areas would be longer compared with the no-action alternative. Bison would no longer graze within the park, so this minimal risk to visitor safety would be eliminated. In sum, these actions would have long-term, minor, adverse impacts, and negligible to minor beneficial impacts.

Cumulative Impacts. Relocation of the horse loading area east of the dunes is planned for the near future. This would include providing a dirt surface, allowing surer footing for horses and a reduced risk of accidents. The *Greater Sand Dunes Interagency Fire Management Plan* (2005)

includes measures for safely and efficiently managing wildland fires within the park, the Baca National Wildlife Refuge, and The Nature Conservancy's Medano Zapata Ranch. The dunes parking area within the national park is planned for minor expansion (~5%) and reconfiguration to improve vehicle circulation and increase capacity. Although the incidence of traffic accidents in the dunes parking area is very low, this action would probably provide some small measure of increased safety as visitor use increases with time. The dunefield focus—maximize wildness alternative would contribute minor adverse and negligible to minor beneficial impacts on visitor safety. Combined with other past, present, and reasonably foreseeable future actions, the dunefield focus—maximize wildness alternative would have a long-term, negligible to minor, beneficial effect on safety.

Conclusion. The dunefield focus—maximize wildness alternative would provide negligible to minor beneficial safety impacts from expanded frontcountry parking, a hiking/biking path, and elimination of bison from the park. Long-term, minor, negative impacts would accrue from reduced administrative access and from the wilderness recommendation.

NATIONAL PARK SERVICE OPERATIONS

Under the dunefield focus—maximize wildness alternative, new facilities that would add to the National Park Service maintenance load would be very limited and would be focused in the frontcountry zone. Parking and restrooms there would be expanded if demand warranted, and a multiuse path would be provided from the park entrance to main visitor facilities. Assuming The Nature Conservancy eventually transfers Medano Ranch to the

National Park Service, facilities there would become the responsibility of the National Park Service; in keeping with this alternative's concept, these facilities would be documented but not maintained, or they would be removed. Limited new facilities would be an additional burden on maintenance staff. Maintenance of additional facilities would have a minor, long-term, adverse impact on park operations.

Activities that would require more staff time in this alternative include patrolling the frontcountry multiuse path, patrolling remote backcountry areas, and providing emergency response services in remote areas. Compared to the no-action alternative, administrative access would be severely limited, so activities in the backcountry would require more time to plan and conduct. Most of the park expansion area would be recommended for wilderness. Thus, certain activities (including activities by the National Park Service, other resource management agencies, and researchers) would require a wilderness minimum requirements analysis, which would take staff time to conduct. If the minimum requirements analysis indicated that an activity should be conducted using nonmotorized/mechanized travel and techniques, the time required to conduct (or support) such an activity could be much greater than with no wilderness. Changes in management responsibilities, limited administrative access, and new wilderness stipulations would have long-term, moderate, adverse impacts on park operations.

Cumulative Impacts. Expansion of nearby communities, fire management responsibilities, elk herd reduction, pursuing a National Park Service water right, management of oil and gas exploration activities, and similar management needs would require time and attention by senior NPS staff. Cooperation and coordination with neighboring agencies and entities regarding

planning, proposals near the park, etc., also require substantial amounts of staff time. The dunefield focus—maximize wildness alternative would place an additional burden on NPS staff, but this burden would be lessened if the park were staffed appropriately. Combined with past, present, and reasonably foreseeable future impacts, the dunefield focus—maximize wildness alternative would have moderate, long-term, adverse impacts on NPS operations.

Conclusion. Maintenance of additional facilities (limited) in the frontcountry zone would have a minor, long-term, adverse impact on park operations. Changes in management responsibilities, limited administrative access, and new wilderness stipulations would have long-term, moderate, adverse impacts on park operations. If the park were to eventually achieve full staffing, the impact would be long term, minor, and beneficial.

OPERATIONS OF OTHER ENTITIES AND MANAGEMENT AGENCIES

Public Vehicle Access To/Through North Portion of the Park

Under the dunefield focus—maximize wildness alternative, park access points would remain as they currently exist, except that a formalized gate (or gates) for equestrian access would be provided on the north boundary of the national park. Access across the northern boundary of the national park would be limited to pedestrian and equestrian traffic. There would be no public motorized vehicle access to the national forest. The dunefield focus—maximize wildness alternative does not provide for possible future evaluation of a public vehicle access route to the mountain front. Administrative access via Liberty Road would be permitted under this

alternative, as it is under all alternatives. Impacts of the dunefield focus—maximize wildness alternative on other management agencies would be similar to those for the no-action alternative associated with planning and remediation expense.

Designation of Additional Wilderness Areas Within the Park

The dunefield focus—maximize wildness alternative would recommend additional wilderness, as in the NPS preferred alternative. The consequences of this additional wilderness for other agencies would equate to those anticipated under the NPS preferred alternative (short and long term, moderate, adverse).

Cumulative Impacts. Cumulative impacts of this alternative with past, present, and reasonably foreseeable future actions would be the same for other agencies and organizations as those anticipated under the NPS preferred alternative. The dunefield focus—maximize wildness alternative would be anticipated to combine with these other cumulative actions and potentials to result in a moderately adverse impact on other management agencies and organizations.

Conclusion. The dunefield focus—maximize wildness alternative would be anticipated to have short- and long-term, minor to moderately adverse impacts on other management agencies and organizations. This impact would stem from lack of access to the mountain front (minor impact), and increased planning and documentation required to carry out management activities in wilderness areas (moderate impact).

UNAVOIDABLE ADVERSE EFFECTS

Some impacts caused by human use (especially minor inadvertent impacts to archeological sites, vegetation, soils, water resources, etc.) are essentially unavoidable because not allowing people in the park would be inconsistent with the National Park Service mission.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible impacts are permanent. An irretrievable commitment of resources refers to resources that, once removed, cannot be replaced. Archeological resources that are stolen or vandalized are irretrievably lost. Even moving or disturbing such resources constitutes an

irreversible commitment of resources because information is lost if the context (location and condition) is changed, even inadvertently. Removal or cessation of maintenance of historic structures results in the eventual irreversible loss of those structures, even though that loss can be partially mitigated (for example, through documentation). Thus, there would be some irreversible loss or commitment of archeological resources and historic structures (at Medano Ranch headquarters) from this alternative.

RELATIONSHIP OF SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

There would be no adverse effects on biological or economic productivity from implementation of this alternative.

IMPACTS OF THE THREE PUBLIC NODES ALTERNATIVE

ARCHEOLOGY

Under the three public nodes alternative, visitors would access the park primarily through three areas or nodes: the existing main entrance southeast of the dunes, the backcountry zone in the north portion of the national park, and Medano Ranch. As in the no-action alternative, there would be potential for archeological impacts in frontcountry areas, creek corridors, and along established trails (all areas with concentrations of archeological resources) from trampling of sites, vandalism, and theft. Impacts under NEPA would be adverse and minor to moderate in intensity.

The new backcountry access zone in the north part of the park would include an access road, trailhead, and small primitive campground (all to be located on previously disturbed ground, if possible). The new access route and the campground would encourage visitor access into the north portion of the national park and to other core park areas. Much of the park expansion area has not yet been surveyed for archeological resources because it has until recently been privately owned. However, based on archeological information that is available from other areas of the park, archeological resources are likely present. Other trails would be added in as yet undetermined locations in the northern portion of the national park and national preserve (backcountry adventure zone), so impacts could also occur from trail construction. Impacts from increased visitor use in the north and in core park areas, and from trail construction, would be site specific, adverse, and range from minor to moderate under NEPA.

Assuming The Nature Conservancy transferred management of Medano Ranch to the National Park Service, Medano Ranch headquarters would become a public day-use (frontcountry) area and would also be used for NPS administrative purposes. The adjacent guided learning zone would help protect archeological resources; visitors could not access this area without a guide, and use would be directed to prevent most inadvertent adverse effects. Also, guides would help monitor resources on a regular basis. Park staff would be regularly present in the general area of Medano Ranch, serving as a deterrent to those who might otherwise intentionally harm sensitive archeological resources. Closer monitoring and the guided learning management zone would provide long-term, minor, beneficial impacts under NEPA to archeological resources.

Cumulative Impacts. Residential and spiritual retreat growth in the Crestone/Baca Grande area have undoubtedly adversely affected archeological resources. Additional, as yet undisturbed resources would likely be disturbed or destroyed in the future as this area continues to grow (from ground disturbance during construction and from looting and unintentional disturbance). The foreseeable development of private land near the park entrance could similarly affect archeological resources. Rehabilitation of main park roads and parking could have potential long-term, localized, minor to moderate, adverse impacts to a NRHP-eligible archeological site (5AL405) from construction activities and heavy equipment. The interagency fire management plan could have beneficial effects if areas identified for prescribed burns or fuel reduction are first surveyed for archeological resources

(which, if identified and evaluated as NRHP eligible, would require further planning to avoid, minimize, or mitigate adverse effects as part of NPS compliance with section 106 of the NHPA, in accordance with 36 CFR 800). This would expand identification of and knowledge about regional archeological resources. The three public nodes would contribute both adverse and beneficial effects under NEPA on archeological resources, and these impacts would be confined within the park. Combined with past, present, and reasonably foreseeable future actions, the no-action alternative would have minor to moderate adverse impacts and minor beneficial effects on archeological resources.

Mitigation. In general, facilities and other management actions would be designed to not adversely affect archeological resources to the extent possible. Areas under consideration for new facilities (e.g., trails, primitive campground) or other actions would be surveyed for archeological resources as part of planning for those actions. Archeological sites would be evaluated for NRHP eligibility in consultation with the Colorado SHPO, federally recognized American Indian tribes, and others. The National Park Service would comply with section 106, in accordance with 36 CFR 800, regarding its management planning for facilities, including mitigation measures. There would be regular NPS presence in the northern portion of the park due to the primitive campground and potential for increased use (including overnight use) in the area. Having NPS staff there on a regular basis would improve monitoring of sites and serve as a deterrent to intentional damage.

Conclusion. Impacts from visitor use in existing areas, new vehicle access, and new trails would be site specific, adverse, and would range from minor to moderate.

Closer monitoring, the guided learning management zone, and NPS presence in more areas of the park would provide long-term, minor, beneficial impacts under NEPA to archeological resources. There would be *no impairment* of archeology from this alternative under NEPA (see specific definition of impairment in the “Impairment of National Park Resources” section).

HISTORIC STRUCTURES

Assuming management of Medano Ranch were transferred to the National Park Service, the headquarters complex would be used as a public day-use area (front-country zone) and also for administrative purposes. Such uses would require some initial restoration and renovation, as well as constant maintenance of the complex. This would prevent further deterioration of historic structures and constitute a minor, long-term, localized, beneficial impact under NEPA.

Opening the Medano Ranch headquarters area to public day use would result in substantially more vehicle and pedestrian access and traffic. There would be more potential for vandalism, although such activity would be discouraged by the presence of NPS staff. Also, depending on the type and exact location of public use, there could be increased wear and tear on historic structures. Impacts would be negligible to minor, long term, localized, and adverse under NEPA.

Adaptive reuse of these buildings would require modifications to the buildings, which, if not properly designed and implemented, could change character-defining historic features. Some buildings could be removed. Removing any significant historic buildings would constitute a major, long-term, localized, adverse

impact. Installation of new facilities (e.g., parking areas, restrooms, picnic areas) would also have to be conducted carefully or it could result in minor to major, long-term, localized, adverse impacts on historic structures under NEPA.

Cumulative Impacts. No cumulative effects would be anticipated.

Mitigation. Mitigation measures are undertaken to reduce potential impacts to cultural resources. The National Park Service would comply with section 106 of the NHPA, including consultation with the Colorado SHPO regarding restoration, rehabilitation, or removal of any historic structure, including Medano Ranch structures, or construction of any new facilities. Such consultation would ensure that the NRHP character-defining features of the ranch are not affected. In all cases, the National Park Service will comply with section 106 of the NHPA for all management practices and directions.

Conclusion. Potential effects to Medano Ranch would include minor, long-term, localized, beneficial impacts (from rehabilitation associated with adaptive use) and minor to major, long-term, localized, adverse impacts (from potential modifications to structures, public use, and vandalism) under NEPA. Through compliance with section 106 of the NHPA, consultation with the Colorado SHPO, and mitigation, the severity of impacts can be reduced below the “major” threshold under NEPA. There would be *no impairment* of historic structures from this alternative under NEPA (see specific definition of impairment in the “Impairment of National Park Resources” section). In all cases, the National Park Service would comply with section 106 of the NHPA for all management actions and projects.

CULTURAL LANDSCAPES

Assuming that management of Medano Ranch were transferred to the National Park Service, the headquarters complex would be used as a public day-use area (frontcountry zone) and also for administrative purposes. Such uses would require some initial restoration and renovation, as well as constant maintenance of the complex and surroundings. This would prevent deterioration of the potential cultural landscape and constitute a minor, long-term, localized, beneficial impact under NEPA.

Opening the Medano Ranch headquarters area to public day use would result in substantially more vehicle and pedestrian access and traffic. There would be the potential for more vandalism, although such activity would be discouraged by the presence of NPS staff. Impacts would be negligible to minor, long term, localized, and adverse under NEPA.

Adaptive reuse of Medano Ranch buildings would require modifications to the buildings, which, if not properly designed and implemented, could change potentially contributing elements of the cultural landscape. Some buildings could be removed. Removing any significant historic buildings could affect the integrity of the potential cultural landscape and would result in major, long-term, adverse impacts. Similarly, installation of new facilities (e.g., parking areas, restrooms, picnic areas) could also affect the historic character of the ranch and result in minor to moderate, long-term, localized, adverse impacts under NEPA.

Cumulative Impacts. No cumulative effects would be anticipated.

Mitigation. Mitigation measures are undertaken to reduce potential impacts to cultural resources if adverse effects cannot be avoided. In compliance with section 106 of the NHPA, the National Park Service would consult with the Colorado SHPO, federally recognized American Indian tribes, and others regarding restoration, rehabilitation, or removal of any Medano Ranch structure, or construction of any new facilities or other modifications. This would ensure that the NRHP historic character and integrity of the ranch are not affected. In any case, the National Park Service would comply with section 106 of the NHPA as part of its planning for the management of the Medano Ranch cultural landscape.

Conclusion. Effects to the Medano Ranch potential cultural landscape would include minor, long-term, localized, beneficial impacts under NEPA (from rehabilitation associated with adaptive use) and moderate to major, long-term, localized, adverse impacts under NEPA (from potential modifications to structures, public use, and vandalism). Through compliance with section 106 of the NHPA, consultation with the Colorado SHPO, and mitigation, the severity of impacts can be reduced below the “major” threshold under NEPA. There would be *no impairment* of cultural landscapes from this alternative under NEPA (see specific definition of impairment in the “Impairment of National Park Resources” section).

VEGETATION

Visitation in the public area (“node”) near the east part of the dunes (frontcountry and dunes play management zones) would increase fairly substantially over time; see the “Visitor Use and Experience” section for projections. The sparse dunefield plant communities would experience adverse

effects due to trampling, wind erosion, and landslide. Popular locales within the subalpine and tundra life zones could also experience increased use over time. Unspecified new trails in the backcountry adventure zone would result in adverse effects from construction, social trail establishment, and the potential for nonnative plant species establishment. A second public node at Medano Ranch headquarters (frontcountry zone) would encourage visitor use in this area and in the adjacent guided learning zone. New hiking and equestrian trails would originate at the Medano Ranch headquarters and extend into the guided learning management zone, where only guided access is permitted. Providing guided hiking and equestrian trails in the guided learning zone of Medano Ranch would direct visitor use around sensitive areas, benefiting plant communities. In general, impacts to vegetation from increased use and use in new park areas (including equestrian use) would be tempered by monitoring and management actions tied to a management zone-based carrying capacity approach (see chapter two, “Management Zones” section for details). Overall, impacts to plant communities of the sabkha, sand sheet, and dunefield life zones would be short and long term, minor to moderately adverse and short and long term, minor, beneficial.

A third public node would be provided in the northern part of the park. A public vehicle access route would follow Cow Camp Road to the point where existing improvements end. A parking area for 15 to 20 vehicles (sited approximately 0.5 mile north of the existing access), a primitive campground consisting of up to 10 sites, and a trailhead would encourage considerably more hiker and equestrian use in the northern backcountry portion of the park. Disturbed sites would be used as much as possible, but there would be effects to plant communities from grading, drainage

configuration and control structures, and gravel overlay. Effects could include removal of or disturbance to vegetation, burial of habitat, and increasing disturbed sites where nonnative plant species could become established. The mature narrow-leaf cottonwood groves along the banks of Deadman Creek would likely attract some hikers and horseback riders for resting, watering animals, and other passive pursuits that could result in streambank and vegetation impacts. Most visitors would probably travel in a north-to-south pattern along Liberty Road from the proposed parking area and up the various drainages to the east, rather than along the riparian corridors located west of Liberty Road. Improved hiking access to the mountain front might lead to increased use in the upper (USFS) portion of Deadman Creek, which includes a USFS-designated research natural area that currently receives little visitation. Overall, visitation increases and visitor use (including equestrian activities) in the northern portion of the park could result in incidental vegetation trampling and introduction of nonnative species. Impacts to sand sheet, dunefield, foothill, and montane plant communities would be short and long term, minor to moderate, and adverse.

If The Nature Conservancy were to transfer Medano Ranch lands to the National Park Service, managed bison grazing would be discontinued. Over time, plant communities in this area would recover from impacts of managed bison grazing (e.g., streambank trampling, shifts in species composition from selective consumption of more palatable species, etc.). This would have short- and long-term, minor, beneficial impacts on sabkha and sand sheet plant communities.

The park would identify and manage nonnative plant populations, reducing their effect on native plant communities or

possibly eliminating some stands from the landscape, resulting in short- and long-term, minor to moderate, beneficial impacts on the species composition of plant communities and their habitat quality.

Cumulative Impacts. Generally, native plant communities of the San Luis Valley and of the park have been affected by over a century of livestock grazing and the effects are sometimes intensified by periods of drought. Depending on the local environment, grazing effects can range from minor shifts of plant and animal species composition to more serious wind and water erosion (e.g., blowouts and gulying) and nonnative plant introductions. Cattle grazing was discontinued on the former Baca Ranch lands in 2004, and some past adverse livestock impacts may gradually be reversed in the future. Rehabilitation of main park roads and parking areas, which includes increasing the capacity of the dunes parking area by ~5%, would result in minor, long-term, localized, adverse impacts on vegetation. Introduction of nonnative landscape plants from adjacent developed lands would result in adverse effects to native plant communities. Introduction of nonnative landscape plants from adjacent developed lands would result in adverse effects to native plant communities. Some native plant communities have undergone historic disturbance during past land-use activities and are therefore subject to such nonnative plant species invasion. Under the three public nodes alternative, beneficial and adverse impacts to plant communities would result from increased use, new trails and trailheads, a primitive campground, establishment of the guided learning zone, removal of structures related to grazing livestock, discontinued bison grazing, and control of nonnative plant populations. Combined with past, present, and reasonably foreseeable future actions, the

three public nodes alternative would have long-term, minor to major, adverse, and moderate beneficial effects on plant communities.

Conclusion. Increased visitation, construction of limited new facilities (new trailhead, primitive campground, trails, and improvements to existing infrastructure) would have long-term, minor to moderate, adverse impacts on plant communities. Impacts would likely diminish with increasing distance from each “public node.” Cessation of managed bison grazing on Medano Ranch, carrying capacity monitoring and actions, and control of nonnative plant species would have long-term, minor to moderate, beneficial impacts on plant community species composition and habitat quality. There would be *no impairment* of vegetation from this alternative (see specific definition of impairment in the “Impairment of National Park Resources” section).

ECOLOGICALLY CRITICAL AREAS

Visitation in the public area (“node”) near the east part of the dunes (frontcountry and dunes play zones) would increase substantially over time. The dunefields in this management zone, which comprise a portion of the Great Sand Dunes ecologically critical area, would experience more use and the seven rare sand sheet and dunefield plant communities, rare plant species (James cryptanth and slender spider-flower), and rare wildlife (insects and small mammals) would be subject to increased trampling, wind erosion, and landslide effects.

A second public node at the Medano Ranch headquarters (frontcountry zone) would encourage visitor use in this area and in the adjacent guided learning zone within the San Luis Lakes / Sand Creek

ecologically critical area. Although new trails would have adverse effects on this ecological critical area (from trail construction and the potential for nonnative plant species establishment), impacts would be tempered by monitoring and management actions associated with a carrying capacity approach. Providing guided hiking and equestrian trails in the guided learning zone, located within the San Luis Lakes / Sand Creek ecologically critical area, would provide beneficial impacts to rare plant communities; rare wetlands and aquatic plant associations and the slender spider-flower areas could be avoided by directing and carefully monitoring use. Overall, impacts to the Great Sand Dunes and San Luis Lakes / Sand Creek ecologically critical areas from these actions would be short and long term, minor to moderate, adverse, and short and long term, minor, and beneficial.

A third public node would be provided in the northern part of the park. A new public vehicle access route, trailhead parking area for 15 to 20 vehicles, and a primitive campground would encourage considerably more hiker and equestrian use in the northern backcountry portion of the park. Disturbed sites would be used as much as possible, but there still could be effects to plant communities from grading, drainage configuration and control structures, and gravel overlay. Effects could include removal of or disturbance to vegetation, burial of habitat, and an increase of disturbed sites where nonnative plant species could become established. The groves of mature, nonhybridized narrow-leaf cottonwoods along the banks of Deadman Creek would likely attract some hikers and horseback riders for resting, watering animals, and other passive pursuits. This activity could result in vegetation trampling (including habitat for the rare canyon bog orchid), grazing and browsing vegetation by horses, and potential introduction of

nonnative plant species. However, most visitors would probably travel in a north-to-south pattern along Liberty Road from the proposed parking area and up the various drainages to the east, rather than along the riparian corridors located west of Liberty Road, which would avoid this reach of the riparian corridor within the park for natural resource reasons; this would help moderate impacts. Further updrainage and adverse impacts could occur to the rare quaking aspen / Rocky Mountain maple forest that has become established along Deadman Creek. Improved hiking access to the mountain front might lead to increased use in the upper (USFS) portion of Deadman Creek, which includes a USFS-designated research natural area that currently receives little visitation. Effects associated with the northern public node on sand sheet, dunefield, foothill, and montane plant communities of the Deadman Creek ecologically critical area would be short and long term, minor to moderate, and adverse.

If The Nature Conservancy were to transfer Medano Ranch lands to the National Park Service, managed bison grazing would be discontinued, and local plant communities would recover over time from associated streambank erosion, impacts from selective consumption of more palatable plants, etc. The end result would be long term, minor, beneficial impacts on Medano Ranch portions of the San Luis Lakes / Sand Creek ecologically critical area plant communities and wildlife habitat.

The park would identify and manage nonnative plant populations, reducing their effect on native plant communities or possibly eliminating some stands from the landscape resulting in short- and long-term, minor to moderate, beneficial impacts on the species composition of

plant communities and their habitat quality.

Cumulative Impacts. Generally, ecologically critical areas within the park have been affected by over a century of livestock grazing and the effect is sometimes intensified by periods of drought. Depending on the local environment, grazing effects can range from minor shifts of plant and animal species composition to more serious wind and water erosion (e.g., blowouts and gullying) and nonnative plant introductions. Cattle grazing was discontinued on the former Baca Ranch lands in 2004, and some past adverse livestock impacts may gradually be reversed in the future. Some native plant communities have undergone historic disturbance during past land-use activities and are therefore subject to such nonnative plant species invasion. Under the three public nodes alternative, beneficial and adverse impacts to plant communities of the three ecologically critical areas would result from increased use, a new road segment, new trails and trailheads, a primitive campground, establishment of the guided learning zone, removal of structures related to grazing livestock, discontinuation of bison grazing, and control of nonnative plant populations. Combined with past, present, and reasonably foreseeable future actions, the three public nodes alternative would have long-term, minor to major, adverse, and moderate beneficial effects on ecologically critical areas.

Conclusion. Increased use over time, use in new areas, and limited new facilities (access routes, trailheads, trails, and a new campground) would mean more potential for introduction of nonnative plant species, trampling of vegetation, and establishment of social trails. Plant communities throughout the park could be affected, but less so with increasing distance from each “public node.” The end result would be long-term,

minor to moderate, adverse impacts on three ecologically critical areas. Cessation of managed bison grazing, control of nonnative plant species, and management zone-related carrying capacity actions would have long-term, minor to moderate, beneficial impacts on ecologically critical areas. There would be *no impairment* of ecologically critical areas from this alternative (see specific definition of impairment in the “Impairment of National Park Resources” section).

FEDERAL THREATENED AND ENDANGERED SPECIES

In the three public nodes alternative, one of the three public nodes would be in the northern part of the national park. A new parking area, trailhead, and primitive campground would encourage considerably more hiker and equestrian use in the northern backcountry portion of the national park. Construction of these facilities would be sited well north of the Deadman Creek corridor and are thus not anticipated to impact habitat for listed species. Trails leading from this access point would lead straight to the mountain front, thus greatly reducing the potential for increased use of the Deadman Creek corridor. While some slight increase in use of the Deadman Creek corridor may still occur, that use would be anticipated to decrease with distance from the new access area. Assuming standard monitoring and remediation of habitat conditions, such impacts would be anticipated to be negligibly adverse. The backcountry adventure zone within the national preserve would still be confined to trail corridors, as in the dunefield focus alternative. Visitor-related impacts of this alternative on potential southwestern willow flycatcher, yellow-billed cuckoo, bald eagle, Mexican spotted owl, and Canada lynx individuals, populations, or

habitat within the park would be the same as those for the preferred alternative, which range from none to negligibly adverse.

Under this alternative, livestock watering ponds and structures would be removed and irrigation on Medano Ranch may cease. Cessation of irrigation may increase or decrease riparian flows and wetlands. A detailed study of potential changes to the hydrologic regime of the park and surrounding area would be conducted before irrigation of wet meadows was eliminated. Therefore, these actions would be anticipated to have the potential for not to negligible adverse or beneficial impacts on the southwestern willow flycatcher, yellow-billed cuckoo, and bald eagle.

Cumulative Impacts. Past, present, and reasonably foreseeable actions that might affect potential Canada lynx or Canada lynx habitat within the park include general growth of the human population surrounding the park, oil and gas exploration on former Baca Ranch lands, wilderness restoration efforts in the South Colony Lakes basin area (north of the national preserve), and a potential elk herd reduction in the future. Population growth is anticipated to be a contributor to modest increases in visitation within the preserve. Oil and gas exploration is underway on the adjacent Baca National Wildlife Refuge, which may impact lowland habitats outside the park boundaries for riparian and wetlands-associated species such as the southwestern willow flycatcher, yellow-billed cuckoo, and bald eagle. Oil and gas exploration within the park is possible due to privately held mineral rights, but would require additional compliance with NEPA. Wilderness restoration efforts north of the preserve may increase the potential habitat for Canada lynx along the range, and reduction of elk would avoid or reduce the impacts that overly large populations of this native ungulate can have on a range of

habitats and the food chains based on those habitats. Taken in combination with these cumulative impacts, the three public nodes alternative is anticipated to have no to negligible adverse and no to negligible beneficial impacts on potential establishment of southwestern willow flycatcher, yellow-billed cuckoo, bald eagle, Mexican spotted owl, and Canada lynx within the park.

Mitigation. Mitigation measures are undertaken to reduce potential impacts to federally listed or candidate species, and are described for all action alternatives in chapter two. These measures include following specific guidelines regarding habitats of Canada lynx and bald eagles, and conducting surveys prior to the implementation of any activity near potential habitat for southwestern willow flycatcher, yellow-billed cuckoo, bald eagle nests, bald eagle winter roosts, and Mexican spotted owls. Additional consultation with the USFWS may be required, as indicated by the results of these surveys. Renewed discussions and additional section 7 consultation with the USFWS would focus on development of specific conservation measures to reduce potential impacts on these species. Such conservation measures would be based on recommendations provided by the current USFWS recovery plan or further coordination with the USFWS for the relevant species.

Conclusion. Impacts on potential individuals, populations, or habitats of the addressed species within the park due to increased visitation over time would be moderated by restriction of the backcountry adventure zones within the park and preserve to narrow trail corridors, and would be anticipated to decrease with an increase in elevation and ruggedness of the terrain and distance from access points, such that only no to negligible, short- and

long-term, adverse impacts on these species or their habitats in the park are anticipated. Construction of a backcountry access road, trailhead, and associated parking in the northwestern portion of the park would be sited well north of the Deadman Creek corridor and are thus not anticipated to impact habitat for listed species. The continued presence of unleashed hunting dogs in the national preserve is anticipated to continue to have no to negligible adverse effects in the short and long term, on Canada lynx passing through or trying to establish ranges within the national preserve. This may be offset somewhat by the elimination of leashed (nonhunting) dogs in natural resource sensitive areas, which could be anticipated to have no to negligible beneficial effects over the short and long term on potential Canada lynx within the park. These impacts correlate to a determination of “*may affect—not likely to adversely affect*” for the southwestern willow flycatcher, yellow-billed cuckoo, bald eagle, Mexican spotted owl, and Canada lynx for the three public nodes alternative. There would be *no impairment* of federal threatened and endangered species from this alternative (see specific definition of impairment in the “Impairment of National Park Resources” section).

WILDLIFE, INCLUDING COLORADO STATE-LISTED SPECIES

Species Associated with Riparian Corridors

Visitation in the public area (“node”) near the east part of the dunes (frontcountry and dunes play zones) would increase substantially over time. Use levels in the northern portion of the national preserve (backcountry adventure zone) would similarly increase due to population

increases and improved access. Increased use over time could result in impacts to riparian corridors (e.g., Sand, Castle, Medano, Little Medano, and Cold creeks), both directly from use and from the construction of trails, backcountry access road, and trailhead parking. This could cause decreased water quality due to increased sedimentation, introduction of pollutants, and introduction of nonnative species or diseases. This would result in minor to moderate adverse effects on species associated with these riparian habitats such as the Rio Grande sucker, Rio Grande chub, and the Rio Grande cutthroat trout.

New trails in backcountry adventure and guided learning zones have the potential to disturb or displace wildlife, or cause areas to be avoided by wildlife—some species are more sensitive than others. Adverse effects could be mitigated by considering potential impacts on wildlife when siting new trails (Trails and Wildlife Task Force 1998). Assuming trails were carefully sited with wildlife in mind, impacts would be short and long term, localized, minor to moderate, and adverse.

A third public node would be provided in the northern part of the national park. A new parking area, trailhead, and primitive campground would encourage considerably more hiker and equestrian use in the northern backcountry portion of the national park. The mature narrowleaf cottonwood groves along the banks of Deadman Creek would likely attract some hikers and horseback riders for resting, watering animals, and other passive pursuits. However, most visitors would probably keep to designated trails (e.g., Cow Camp Road), which would avoid this riparian corridor for natural resource reasons. Improved hiking access to the mountain front might lead to increased use in the upper (USFS) portion of Deadman

Creek, which includes a designated research natural area. The wildlife issue for consideration in Deadman Creek is the potential impacts of increased use on Townsend's big-eared bats. These bats often forage along riparian corridors in the western United States and are moth specialists (Schmidt 2003). Degradation of the Deadman Creek corridor could potentially result in a decrease in the prey base for this species if the woody vegetation, some of which probably serves as host plants for moths, is affected. Assuming standard monitoring and remediation of habitat conditions, such impacts would be anticipated to be minor to moderate and adverse.

Wetlands-Associated Species

Under the three public nodes alternative, livestock watering ponds and structures would be removed, and irrigation on Medano ranch would cease, resulting in long-term, negligible to minor, adverse impacts (from drying) on species associated with introduced wetlands in the immediate area. When watering ponds and structures are removed and irrigation is ended, natural flows could be reintroduced to other areas. Expansion or reestablishment of wetlands plant communities in those areas may have long-term, negligible to minor, beneficial impacts on wetlands-associated species (such as the greater sandhill crane). The result of this scenario would be a combination of negligible to minor adverse impacts on wetlands-associated species within the park, and negligible to minor beneficial impacts to the same species inside and outside (downstream of) the park. A detailed study of the potential changes to the hydrologic regime of the park and surrounding area would be conducted before irrigation is discontinued within the park.

Ungulate Herd Numbers and Health

The three public nodes alternative provides for future consideration of potential access routes to the park via the USFS, USFWS, and county/local planning processes. Under this alternative, as under the other two action alternatives, a northern route or routes across NPS land would be designated (via the Superintendent's Compendium) for hunter access to the national preserve and USFS lands where hunting is permitted. According to the *Code of Federal Regulations*, provision for such access may be provided when other access is impracticable; hunters must stay on the designated routes and firearms must be broken down or disassembled so as to prevent their ready use.

Eventual development of public vehicle access to and/or through the northern portion of the park could help ameliorate adverse impacts to ungulates from continued limited hunting on USFS lands adjacent to the northern boundaries of the park. Continued limited hunting pressure on elk in this area may exacerbate rapid population increases that may be linked to declines of other native ungulate populations (bighorn sheep and mule deer), and to habitat degradation in the Sangre de Cristo Wilderness. Estimated numbers of elk hunters who might want to access the preserve and adjacent USFS lands via a northern access route through the park range from 20 to 30 for each of the three five-day seasons, equating to 60 to 90 hunters annually (CDOW, R. Rivale, pers. comm., April 28, 2005). The preserve and adjacent USFS lands are in CDOW game management unit 82; an area approximately twice the size of the park. According to the CDOW Web site, the total elk harvest in 2005, across all of game management unit 82, was 164 elk. The number of bulls was 107. The ongoing elk research project data

suggest that a declining recruitment rate, coupled with successful recreational hunting harvest, have driven an overall herd decline in the past four or five years. Based on a total hunter number of 1,729, this represented a harvest rate of 19%. Therefore, the potential number of elk not harvested from the park, preserve, and adjacent USFS lands is estimated at approximately 9 to 10 cows and 5 to 6 bull elk.

While the current estimate of 4,000 elk is substantially fewer than the previously estimated herd size of nearly 6,000 elk in the San Luis Valley herd, this herd is still more than twice the 1,500-animal goal established by CDOW. Removal or nonremoval of 9 to 10 cow elk and 5 to 6 bull elk would not make a substantial difference in efforts to reduce the size of the herd. Furthermore, review of historic harvest records for game management unit 82 show no major decline in the number of elk harvested relative to years prior to park expansion. Therefore, while providing public vehicle access to the northern portion of the park might facilitate hunting of elk in the preserve and on adjacent USFS lands, this beneficial impact is expected to be only negligible to minor.

Bighorn Sheep

Under the three public nodes alternative, unleashed dogs used for hunting would continue to be allowed in the preserve. Leashed dogs would not be allowed in areas where there is a high potential for, or a history of, conflicts with natural resources such as bighorn sheep.

Bighorn sheep as prey animals are anticipated to react negatively to dogs, whether on-leash or off. In a study of bighorn sheep, MacArthur et al. (1982) conducted human-disturbance trials on bighorn sheep, which

were already partially habituated to humans. In this study, a person approached a group of sheep from a road, from a road accompanied by a dog on-leash, and from a ridge away from the road. The strongest negative reactions in the sheep were recorded when a human with a leashed dog approached (MacArthur, Geist, and Johnston 1982). Furthermore, no reduction in heart-rate response was observed with repeated trials; instead, heart-rate response actually increased successively with each leashed-dog trial. In earlier studies, these same authors demonstrated that free-ranging dogs and coyotes evoked the maximum heart-rate responses (MacArthur, Geist, and Johnston 1979). In their later study, MacArthur, Geist, and Johnston (1982) concluded that, among all the stimuli they studied, "The presence of dogs on sheep range should be discouraged."

The mere presence of dogs, which wild prey animals do not distinguish from other predators, can cause stress in prey species (Simes 1999). While sight and sound of the dogs are obvious direct cues, the scent of dogs and the wastes they leave behind have a much longer impact on prey species, potentially preventing such species from approaching and using essential resources such as watering holes or cover for a period of time.

The presence of unleashed hunting dogs in the preserve is a component of all alternatives proposed for this GMP, and would be a continuation of the current condition. What is being evaluated is the difference among the alternatives relative to leashed dogs in the preserve. If only leashed dogs were allowed in the preserve, the impacts attributable to their presence/absence would be larger. However, given that unleashed hunting dogs would be free to roam the preserve within the limits established by their handlers and hunting regulations, the presence or absence of

leashed dogs in the preserve is not anticipated to significantly increase or decrease dog-related stresses. As such, the restriction of leashed dogs from areas where bighorn sheep/dog conflicts might arise is not anticipated to contribute more than a negligible beneficial impact on bighorn sheep in the park.

Cumulative Impacts. Cumulative actions contributing to impacts on riparian-associated species as described above include growth of the human population in the area surrounding the park, oil and gas exploration on former Baca Ranch lands, and elk herd reduction. The first two of these would contribute adverse impacts, while elk herd reduction would contribute beneficial impacts, specifically to the riparian corridor habitats. In combination with these cumulative actions, the three public nodes alternative is anticipated to contribute minor to moderate, adverse impacts.

Cumulative actions contributing to ungulate herd numbers and health include the enabling legislation for the expanded park and preserve, which has negative impacts due to prohibited elk hunting in the expanded areas of the national park, but beneficial impacts due to different levels of protection for habitats and species in the preserve. Also contributing to ungulate herd numbers and health would be the interagency fire management plan, which should provide beneficial impacts to ungulates through habitat management and enhancement. Finally, the elk herd reduction tentatively planned for the future, pending justification stemming from ongoing research and appropriate NEPA analysis, would most likely provide beneficial impacts to the elk by reducing the numbers to a level closer to the predicted carrying capacity of the area, and reducing the risk of diseases often associated with high herd densities. Beneficial impacts to

other ungulates (mule deer and bighorn sheep) would stem from reduced elk impacts on shared habitats, and reduced likelihood of exposure to diseases. Combined with past, present, and reasonably foreseeable future actions, the three public nodes alternative would be anticipated to contribute negligible to minor beneficial impacts to ungulate herd numbers and health.

Cumulative actions contributing to impacts on bighorn sheep would include growth of the human population in the area surrounding the park and elk herd reduction. The former would contribute adverse impacts if the number of leashed and feral dogs in the park increased, and the latter would contribute beneficial impacts by reducing competition from, habitat impacts due to, and the threat of diseases from, elk. In combination with these cumulative actions, the three public nodes alternative is anticipated to contribute negligible to minor beneficial impacts on bighorn sheep within the park.

Conclusion. The three public nodes alternative would have minor to moderate, adverse impacts on species associated with riparian corridors due to increased recreational use; negligible to minor adverse impacts on wetlands-associated species within the park due to removal of artificial water sources and cessation of surface irrigation; and negligible to minor beneficial impacts to the same species outside (downstream of) the park due to possible increase of downstream waters; negligible to minor beneficial impacts on ungulate herd numbers and health due to facilitation of elk hunting; and negligible beneficial impacts on bighorn sheep populations within the park due to the restriction of leashed dogs from areas where these two species might interact. There would be *no impairment* of wildlife from this alternative (see specific definition of impairment in the

“Impairment of National Park Resources” section).

SOILS AND GEOLOGIC RESOURCES

In the three public nodes alternative, construction of new trails in the backcountry adventure zone would cause localized soil disturbance and compaction. Nonetheless, provision of such trails would help direct visitor foot traffic, which would mean fewer social trails (and fewer associated soil effects) compared with the no-action alternative. The backcountry access zone in the northern portion of the park would eventually include a public vehicle access route, small trailhead, and a primitive campground. Disturbed sites would be used as much as possible for these facilities, but where that is not possible, there is potential for localized soil disturbance and compaction. In the frontcountry zone, visitors would be directed to alternate park nodes when the main dunes parking area becomes full. This would reduce the incidence of visitor vehicles parking along the roadside (and attendant soil damage). The end result of these actions would be long-term, minor to moderate, site-specific, adverse impacts, and localized, minor, beneficial impacts.

Cumulative Impacts. Establishment of a water right to fulfill the purpose of the national park and preserve would minimize further decline of local groundwater levels or surface water flows, which could indirectly benefit sand recycling. Oil and gas exploration on lands that were formerly part of the Baca Ranch, but are now within the national park, has occurred and these activities could continue in the near future; however, any activities would be subject to 36 CFR 9B (*Nonfederal Oil and Gas Rights Regulations*), which require such activities be conducted in a manner consistent with park purposes and preventing or minimiz-

ing damage to the environment. Minor expansion and reconfiguration of the dunes parking area and relocation of the horse loading area and RV dump station would also cause localized soil disturbance and destruction. The three public nodes alternative would contribute both beneficial and adverse localized impacts to soils and geologic resources. Combined with past, present, and reasonably foreseeable future actions, the three public nodes alternative would have long-term, minor to moderate, mostly localized, beneficial, and adverse impacts on soils and geologic resources.

Conclusion. Construction of new trails would cause localized soil disturbance and compaction. Provision of such trails would mean fewer social trails, and fewer associated soil effects. Limited proposed facilities (vehicle access route, trailhead, and primitive campground) in the northern portion of the park could cause localized soil disturbance and compaction, especially where it is not possible to use already disturbed sites. In the frontcountry zone, there would be a lower incidence of vehicles parking along the roadside (and attendant soil damage). Impacts would be long term, minor to moderate, site-specific, adverse, and localized, minor, and beneficial. There would be *no impairment* of soils and geologic resources from this alternative (see specific definition of impairment in the “Impairment of National Park Resources” section).

WETLANDS

Visitation in the public area (“node”) near the eastern portion of the dunes (frontcountry and dunes play management zones) would increase substantially over time, so Medano Creek wetlands in these zones would experience more use. A second public node at Medano Ranch

headquarters (frontcountry zone) would encourage visitor use in this area, and in the adjacent guided learning zone. New hiking and equestrian trails would originate at the Medano Ranch headquarters and extend into the guided learning zone, where only escorted use is permitted. Providing guided hiking and equestrian trails in the guided learning management zone would direct use around sensitive wetlands areas and prevent or minimize most direct wetlands impacts in this area. In general, however, visitation increases and visitor use (including equestrian use) in new park areas could increase the incidence of trampling, introduce nonnative plant species, and compact wetland soils and streambanks. Chemical and biological processes and wetlands species composition could be affected. Overall, there would be long-term, minor to moderate, adverse impacts to wetlands resources.

A third public node would be provided in the northern part of the national park. A new road segment, parking area, trailhead, and primitive campground would encourage considerably more hiker and equestrian use in the northern backcountry portion of the national park. The mature narrowleaf cottonwood groves along the banks of Deadman Creek would likely attract some hikers and horseback riders for resting, watering animals, and other passive pursuits. However, most visitors would probably travel in a north-to-south pattern along Liberty Road from the proposed parking area and up the various drainages to the east, rather than along the riparian corridors located west of Liberty Road, which would avoid this riparian corridor for natural resource reasons. Improved hiking access to the mountain front might lead to increased use in the upper (USFS) portion of Deadman Creek, which includes a USFS designated research natural area; it includes high elevation wetlands and currently receives little visitation. Visitation

increases and visitor use (including equestrian use) in many new areas of the park could result in incidental trampling, compaction of wetland soils and streambanks, and introduction of nonnative species. Chemical and biological processes and wetlands species composition could be affected. Effects would be long term, minor to moderate, and adverse.

Assuming Medano Ranch is eventually transferred to the National Park Service, hay meadow irrigation for bison forage in this area would be discontinued. Wetlands that are not supported by natural surface and groundwater flows (e.g., introduced wetlands) would be adversely affected by drying. Natural flows in Sand, Big Spring, and Little Spring creeks would increase, at least seasonally, when irrigation is discontinued, and other wetlands types (e.g., ephemeral ponds, playas, mudflats, etc.) would expand and/or become reestablished. Also, more water would likely be delivered to San Luis and Head lakes in San Luis Lakes State Park and Wildlife Area, stabilizing water levels and providing wetlands support in these areas. Overall, impacts on wetlands would be long term, moderate to major, beneficial, and long term, moderate, adverse. A future study would examine expected impacts in more detail.

Eliminating bison grazing from Medano Ranch lands within the park would benefit wetlands plant species, particularly the most palatable grasses. Areas of channel and streambank erosion would gradually stabilize and plants would become reestablished, improving wetlands structure and function. Livestock watering ponds and structures would be removed; some introduced wetlands would probably dry up, but other naturally occurring wetlands would be re-established or would expand from restoration of natural flows. The park would identify and manage nonnative plant

populations in new park areas, reducing their effects on native wetlands communities or possibly eliminating some nonnative stands from the landscape. Wetlands species composition and habitat quality would improve as a result. Overall, these actions would have long-term, minor to moderate, beneficial, and negligible to minor adverse impacts on wetlands.

Cumulative Impacts. Livestock grazing typically adversely affects wetlands and riparian resources by causing shifts in species composition, erosion of streambanks and bottoms, and browsing of wetland grasses, shrubs, and tree seedlings. Cattle grazing was discontinued on the former Baca Ranch lands in 2004, and some past adverse livestock impacts may gradually be reversed over the long term. Under the three public nodes alternative, beneficial and adverse wetlands impacts would result from increased use, new trails and trailheads (and a primitive campground), establishment of the guided learning zone, removal of livestock-related water control structures, control of nonnative noxious plant populations, and discontinuation of bison grazing and hay meadow irrigation. Combined with past, present, and reasonably foreseeable future actions, the three public nodes alternative would have long-term, moderate, beneficial impacts, and minor to moderate adverse effects on wetlands resources.

Conclusion. Visitation increases and visitor use (including equestrian use) in several new park areas could increase the incidence of trampling, introduce nonnative plant species, and compact wetland soils and streambanks. Chemical and biological processes and wetlands species composition could be affected. Overall, there would be long-term, minor to moderate, adverse impacts to wetlands resources. Discontinuing the practice of irrigating hay meadows on Medano Ranch would have long-term,

moderate to major, beneficial, and long-term, moderate, adverse impacts. Other actions (eliminating bison from Medano Ranch, removing livestock ponds and structures, and managing native plants in new park areas) would have long-term, minor to moderate, beneficial, and negligible to minor adverse impacts on wetlands. There would be *no impairment* of wetlands from this alternative (see specific definition of impairment in the “Impairment of National Park Resources” section).

WATER RESOURCES

Under the three public nodes alternative, visitation would increase in general over time, and it would increase proportionally in certain areas (e.g., in the northern portion of the park and in the guided learning zone). Increased use over time would mean more potential for trash and human, dog, and horse waste to be washed into streams and lakes, thus degrading water quality. Also, providing designated trails in backcountry adventure zones and in the guided learning zone would serve to minimize social trails, direct use away from sensitive areas, and restrict impacts to localized areas. Backcountry toilets would be installed if/when visitor use levels become high enough that human waste disposal and sanitation is a concern. The end result of these actions would be long-term, negligible to minor, localized, adverse impacts, and long-term, minor, beneficial impacts to surface water and potentially to shallow groundwater quality.

If and when The Nature Conservancy transfers Medano Ranch lands to the National Park Service, surface irrigation of hay meadows for bison forage would be discontinued. Nondiverted creek flows would be allowed to remain within their natural drainages (e.g., Sand, Big Spring,

and Little Spring creeks) rather than being redirected to meadow areas. Thus, discontinuation of meadow irrigation would affect surface water flow and possibly groundwater levels, but additional research would be needed to determine the nature (scope, direction, intensity, etc.) of these impacts. Prior to discontinuing irrigation, a study would be conducted to provide more information about possible effects of this action.

Cumulative Impacts. Establishment of a water right to fulfill the purposes of the park would minimize additional decline of local groundwater levels. Oil and gas exploration activities on lands that were formerly part of the Baca Ranch (but are now within the national park) are reasonably foreseeable in the near future; however, such activities are subject to 36 CFR 9B, which requires that such activities be conducted in a manner that is consistent with protection of water resources (among other resources). The three public nodes alternative would have both beneficial and adverse effects on water resources, as discussed above. Combined with past, present, and reasonably foreseeable future actions, the impact of the three public nodes alternative on water resources would be long term, minor to moderate, and adverse.

Conclusion. Increased use would result in increased wastes and sediments in certain surface waters. However, providing designated trails would help to limit social trails, direct use, and restrict impacts to local areas. Providing backcountry toilets would improve water quality. These actions would have long-term, negligible to minor, localized, adverse impacts, and long-term, minor, beneficial impacts to surface water and potentially to shallow groundwater quality. Discontinuing surface irrigation of hay meadows on Medano Ranch would affect surface water hydrology and possibly

groundwater levels, but research would be needed to determine the nature of these impacts. There would be no impairment of water resources from this alternative (see specific definition of impairment in the “Impairment of National Park Resources” section).

VISITOR USE AND EXPERIENCE

Visitor Use Projections

Projected annual visitation would reach 441,000 by 2025, the highest of any GMP

alternative. As in the no-action alternative, the principal factor driving increases in visitor use would be population growth in the San Luis Valley and the state of Colorado. This represents an increase of 150,000 visitors per year over the 2004 adjusted total, and 66,200 (18%) more visitors than the no-action alternative (table 25). Annual use in 2025 is projected to be about 12,000 visitors more than for the NPS preferred alternative.

**TABLE 25. CURRENT AND PROJECTED ANNUAL VISITORS IN 2025
THREE PUBLIC NODES ALTERNATIVE**

2004 (recorded)	2004 (adjusted baseline)	No-Action Alternative	NPS Preferred Alternative	Three Public Nodes
268,400	291,000	374,800	427,100	441,000
Increases Over 2004 (adjusted)				
Annual Visits (number)		+85,320	+136,100	+150,000
Annual Visits (percent)		+29%	+47%	+52%
Increases Over the No-Action Alternative				
Annual Visits (number)		NA	+52,300	+66,200
Annual Visits (percent)		NA	+14%	+18%

Key elements of the three public nodes alternative that would influence future use include:

- creation of new public use nodes—a frontcountry zone at Medano Ranch headquarters, and a back-country access zone with trailhead and primitive campground in the northwest portion of the park
- no additional wilderness areas proposed
- expanded opportunities for new programs and experiences in the guided learning zone
- adaptive reuse of Medano Ranch headquarters structures

By 2025, projected visitation during the three-month summer period would increase to about 259,000 visitors, only about 9,000 fewer than total annual visitation to Great Sand Dunes National Monument prior to expansion and redesignation. Summertime visitation would be 38,000 and 7,600 visitors more

than the no-action and NPS preferred alternatives, respectively. The largest share of the increase would be focused in the new Medano Ranch frontcountry zone. Most use there and at the northern part of the backcountry access zone would occur during the traditional May to September high-use period. Projected dispersed backcountry day and overnight use across the Great Sand Dunes would approach 56,000 visitors per year.

Visitor Experience

More and different opportunities in different park areas would allow a wider range of visitor experience. The average length of time that visitors stay in the park would likely increase. Visitor use would probably be spread throughout more of the park compared to the no-action alternative.

Medano Ranch headquarters (frontcountry zone) would serve as a public day-use area, which would attract many visitors to the southwestern portion of the park. This area would also serve as an entry point to the guided learning zone west of the dunefield. There would be new options for interpretive and educational programs, picnicking, and guided hiking and horseback tours.

The trailhead and primitive campground, located in the backcountry access zone at the national park's northern section, would provide improved hiking and horseback access to new park lands, the mountain front, and the north part of the national preserve. The campground would serve both as a base for day use and as a "launch point" for multiday trips into the backcountry. Examples include loop trips and "through trips" to one of the frontcountry zones. The Sand Creek and Sand Ramp trails would probably receive substantially more hiking and equestrian use with the

northern trailhead and campground included in this alternative.

Opportunities to see and enjoy the wildlife of the park would be increased due to expanded access into new areas. More hunters might want to access the national preserve and adjacent USFS lands, where hunting is allowed, because the northern trailhead would provide better hiking, horseback, and vehicle access to certain hunting grounds. This would also depend on how CDOW managed hunting seasons and opportunities, however.

Interpretation, information, and education activities would be concentrated east of the dunefield (visitor center, amphitheater, dunes area, day-use trails, etc.), and at the Medano Ranch headquarters public day-use area. Having two bases for these activities might provide increased diversity of visitor programs and services, including environmental education for school groups.

Compared to the no-action alternative, more options for visitors with limited mobility would result from wheelchair-accessible public facilities at Medano Ranch and the new primitive campground.

Expanded access and new recreational and interpretive opportunities, as discussed in the preceding paragraphs, would have long-term, major, beneficial impacts on visitor experience.

This alternative would offer positive wilderness experiences within existing wilderness areas, although with new points of access, some areas that were once remote would be less so. Also, increasing visitor numbers over time could affect wilderness values (opportunities for solitude, evidence of human use, etc.), especially in portions of the wilderness served by new visitor access points (e.g.,

Sand Creek drainage). Diminished wilderness values in portions of existing wilderness areas would have a long-term, moderate, adverse impact on visitor experience. There would be no new wilderness opportunities because no new wilderness areas are proposed in this alternative (same as the no-action alternative).

Visitors who like to travel and/or recreate with their dogs would have less freedom to do so compared to the no-action alternative because dogs would not be permitted in areas where there is a high potential for or a history of problems. This might discourage some dog lovers from visiting the park. Other visitors would be pleased to see dogs allowed in fewer areas and relegated to a separate, downstream area of the dunes play zone. There would likely be fewer visitor concerns and complaints about aggressive dogs and dog waste as a result. The new policy regarding dogs in the park would have long-term, minor, adverse, beneficial impacts on visitor experience.

Visitors would be redirected at the entrance station to other areas of the park when the dunes parking lot fills, which typically occurs on six to eight weekends during the summer months. Assuming redirecting visitors could be successfully accomplished, this policy would have several consequences. First, areas accessible from the main park road (e.g., the frontcountry zone, dunes play zone, and Medano Pass primitive road) would not experience much more use (or crowding) in the future than they do now. Second, the Medano Ranch day-use area could become quite busy if visitors were redirected there instead. Third, visitors who came to the park specifically to enjoy the dunes play zone would undoubtedly be disappointed and frustrated if they were turned away. This could be mitigated by a comprehen-

sive information campaign (e.g., Web information, variable messaging at key highway intersections, etc.) that warned of this possibility, especially around busy weekends and holidays. The policy of denying entry at the entrance station and redirecting visitors elsewhere would have long-term, moderate, beneficial, and major adverse impacts on visitor experience.

Cumulative Impacts. Rehabilitation of main park roads and parking areas, which includes increasing the capacity of the dunes parking area by ~5%, is planned for the near future and would modestly improve pedestrian and vehicle traffic flow in the immediate area. This alternative's proposal to deny entry and redirect visitors when the dunes parking lot fills addresses the larger issue of crowding and frustrations related to vehicle and pedestrian circulation in the main frontcountry zone. On the other hand, visitors who were denied entry on the busiest weekends would be frustrated and disappointed. Ongoing wilderness restoration efforts in the South Colony Lakes basin area are improving wilderness values in the Sangre de Cristo Wilderness. The three public nodes alternative would result in some diminishment of wilderness values in some portions of the Sangre de Cristo Wilderness that lies within the Great Sand Dunes. Renovations to the Great Sand Dunes visitor center have improved the visitor experience by enlarging indoor space available for information, education, and interpretive services. In the three public nodes alternative, expanded services and programs (from a frontcountry day-use zone at Medano Ranch headquarters and the guided learning zone) would benefit visitors. Combined with past, present, and reasonably foreseeable future actions, the three public nodes alternative would have moderate adverse and major beneficial impacts on visitor experience.

Conclusion. Expanded visitor access, combined with new recreational and interpretive opportunities, would have long-term, major, beneficial impacts on visitor experience. Diminished wilderness values in portions of existing wilderness areas would have a long-term, moderate, adverse impact on visitor experience. The new policy regarding dogs in the park would have long-term, minor, adverse, and beneficial impacts on visitor experience. The policy of denying entry at the main entrance station and redirecting visitors elsewhere would have long-term, moderate, beneficial, and major adverse impacts on visitor experience.

SCENIC RESOURCES AND VISUAL QUALITY

Under the three public nodes alternative, there would be no new human-made structures or vehicle use areas in the national preserve that would affect scenic quality. However, some human-made facilities and human activities would be added on park expansion lands, which would affect scenery and visual quality. A small trailhead parking area and primitive campground would be added in the northwest portion of the park to enhance backcountry access. Medano Ranch headquarters would become a frontcountry public day-use area. Because sunlight reflects off of vehicle windshields, vehicles in the northern backcountry access zone and at Medano Ranch may be visible from elevated vantage points in and around the national park and preserve. Increased vehicle activity associated with these two areas would mean increased dust levels, at least during dry periods. Airborne dust can affect both scenic quality and visibility over the short term. Thus, new facilities and activities in park expansion areas would have short- and long-term, localized, minor

to moderate impacts on scenery and visibility.

There would probably be some shielded outdoor lights at the new primitive campground in the northern part of the park. At Medano Ranch, most public use would occur during the day, but operational support of such use could introduce some minimal outdoor lighting (shielded) in this area as well. Impacts on the night sky would be long term, minor, and adverse.

Cumulative Impacts. Rehabilitation of main park roads and parking areas, which includes increasing the capacity of the dunes lot by ~5%, would result in a negligible, long-term, localized, adverse impact on scenic resources. Prescribed burns (fire management plan) would have short-term, minor, adverse, localized impacts on scenery and visibility from wood smoke. Continued residential growth of the Baca Grande subdivision would mean that more homes, retreat centers, commercial structures, and vehicles would be visible in this area in the future. Expanded residential development could also bring more dust and wood smoke. The private land parcel that is for sale near the park entrance could be rezoned to commercial and developed. Overall, such new development would intrude upon the area's natural scenery (at least from some vantage points), affect visibility, and introduce new light sources into the night sky. Regional population growth and development would also continue to introduce additional light into the night sky. The three public nodes alternative would contribute short- and long-term, adverse impacts to scenery and visibility (negligible to moderate in intensity) and the night sky (minor in intensity). Combined with other past, present, and reasonably foreseeable future impacts, impacts would be long term, minor to moderate, and adverse.

Mitigation. Parking areas would be designed and constructed to help mitigate or avoid impacts to visual and scenic resources. The natural and built landscape would be used to help shield reflections and glare from vehicles. Environmentally friendly dust binders would be used as needed to help control dust on park roads.

Conclusion. Effects of the three public nodes alternative on scenery and visibility would be long term and adverse, and would range from minor to moderate. Impacts on the night sky would be long term, minor, and adverse. There would be no impairment of scenic resources and visual quality from this alternative (see specific definition of impairment in the “Impairment of National Park Resources” section).

SOCIOECONOMICS

Implementation of the three public nodes alternative would occur against the same backdrop of economic, demographic, and social changes across the San Luis Valley described under the no-action alternative. The economic and social effects of the three public nodes alternative would contribute to those changes, but not fundamentally alter the area’s economic and demographic outlook.

Visitor-Related Economic Impacts

Annual recreational use at the park with the three public nodes alternative would amount to 441,000 visits by 2025, an increase of more than 150,000 visits, or 52%, compared to 2004, and 66,200 visits more than projected under the no-action alternative. Visitor use under the three public nodes alternative would vary from year to year, perhaps even falling in some years. Visitor use would increase more than usual when Medano Ranch is opened to

the public for educational and recreational use. Peak monthly use would reach 94,500 visitors in July 2025, as compared to about 80,800 under the no-action alternative. Park visitors from outside the Valley are expected to account for the majority of future visits, although the number of visits by residents of the region would also increase.

Projected visitation under the three nodes alternative would result in 228,280 party-days of visitor use, an increase of 35,620 party-days, or 18% more than for the no-action alternative. Retail, lodging, and other tourism-type spending across the region would reach \$21.91 million per year in 2025, \$8.78 million more than in 2004, and \$3.48 million per year more than for the no-action alternative. The increased visitor spending would benefit private businesses, as well as increasing the sales tax receipts for local governments.

The park would collect approximately \$496,000 in receipts from entry, annual pass, and camping fees, with estimated annual merchandise sales of about \$450,000 for the Western National Parks Association’s operation at the visitor center, the largest among the alternatives. In part, the increased revenues would be due to the opening of Medano Ranch to public use.

Projected spin-offs of visitor spending include personal income of \$6.83 million per year and 561 jobs by 2025. Those levels are \$1.08 million in annual income and 89 more jobs than the economic benefits in 2025 under the no-action alternative. Of all the GMP alternatives, the three public nodes alternative would do the most to boost economic development in the region. The guided learning and recreation opportunities at Medano Ranch may create opportunities for private concession or incidental business activities and educa-

tional partnerships that would not exist under the other alternatives. This alternative would create a greater economic boost for stores, restaurants, overnight lodging, or trail and other recreational services in the Crestone/Baca Grande community than would the other alternatives. Some of this increase would be attributable to the primitive campground in the northern portion of the national park. For example, campers would purchase ice, supplies, or a meal. When the primitive campground in the northern part of the park fills, people may camp at other campgrounds in the area.

The visitor-related impacts would be long term, but minor relative to the overall employment and personal income in the two directly affected counties.

The state and local governments would collect more in sales tax from the increased visitor spending and property taxes on new development than under the alternatives. Impacts on property taxes and PILT receipts for Saguache and Alamosa counties would be slightly more than under the preferred alternative due to indirect effects on population and economic growth.

The visitor-related economic impacts would be beneficial, but negligible in the short term and minor to moderate and beneficial over the long term.

Economic Impacts Related to GMP Implementation and Park Operations

The economic benefits of the three public nodes alternative would include \$20.6 million in capital spending, \$7.7 million in other major maintenance projects, and increased operating and maintenance expenditures. Increased staffing levels would be needed to maintain current

service levels over time, although any such increases would depend on future increases in the park's base funding. The staffing need is estimated at 10 FTEs at an annual cost of approximately \$520,000 over the current budget, and \$260,000 over the no-action alternative.

Short-term economic impacts associated with future capital and major maintenance spending would support local construction and related industries. As with the other alternatives, the timing of the spending is uncertain. Recurrent operating expenditures for the park would yield long-term impacts on employment, business sales, income, and other related measures. The economic effects tied to these economic stimuli include:

- capital construction (short term): 314 job-years of employment and \$9.02 million in personal income over time, between 2006 and 2025
- nonannual recurring (short term): 123 job-years of employment and \$3.41 million in personal income over time, between 2006 and 2025
- park operations (long term): 49 jobs, including 38 FTEs of direct NPS staffing, and \$2.25 million per year in annual income

The short-term economic impacts associated with the capital construction program, 314 job-years (three public nodes alternative) compared to 122 job-years (no-action), would be substantially larger than those under the no-action alternative. The differences reflect \$13.8 million more in capital spending for the three public nodes alternative. Long-term economic impacts include six additional jobs and \$300,000 in additional personal income as compared to the no-action alternative.

With the three public nodes, gains in long-term economic stimulus associated with park operations could be offset, in part, by reductions in economic stimulus associated with The Nature Conservancy's operation of Medano Ranch. The extent to which that would happen depends on when federal acquisition of the ranch occurs and a decision by The Nature Conservancy to cease its bison operations because that is when full implementation of the proposed management zoning would proceed.

The end of the bison operation on Medano Ranch would also mark a transition in land use from active agriculture to a more passive setting in which some of the buildings and outbuildings remained, but their use would shift to guided learning and historical and environmental education. Some fencing would be removed and other vestiges of active agricultural operations would be removed or become less noticeable as natural processes are allowed to re-establish themselves.

The economic effects associated with park operations would be beneficial, but negligible to minor in the short term and beneficial and minor over the long term.

Community Services

Over time, more visitors to the park would indirectly result in added demands on community services and facilities across the region. The limited scale, seasonal nature, and spatial dispersion of such demands are such that facility expansion and additional staffing would not be required.

Effects on community services under this alternative would be indeterminate and negligible over the short term and long term.

Traffic and Emergency Services

Traffic impacts of the three public nodes on the highways and roads providing access to the park would be about 13% more than those under the no-action alternative. Even with the increases in traffic, estimated future traffic volumes would remain substantially below design capacity and not dramatically increase maintenance requirements.

As in the NPS preferred alternative, traffic would increase on Saguache County Road T because more visitor use would occur in the northern areas of the park. If access to the new backcountry access zone in the northern portion of the park utilizes Saguache County roads within the Baca Grande subdivision, traffic would increase on those roads. Assuming there were signs directing visitors along the preferred route, the traffic increases would be limited primarily to that route; nonetheless, some park visitors might explore along other subdivision roads while they were in the area. In contrast to the no-action alternative, there would be little localized traffic congestion from park visitor vehicles parked on roads within the subdivision near the park boundary. Instead, visitors would travel along the designated route, enter the national park, and proceed to the backcountry access zone trailhead. If, on the other hand, access were to come through the Baca National Wildlife Refuge, there would be little, if any, traffic increase on roads within the Baca Grande subdivision. Instead, eastbound visitor traffic on County Road T would divert southward through the refuge before it reached the subdivision. Traffic increases would be greatest on summer weekends and holidays, and would increase over time as the potential visitor population grows. The backcountry access zone would include both a small trailhead (space for 15 to 20

vehicles) and a primitive campground (10 or fewer sites) in this alternative—campers might make more than one trip into the campground per stay. Even so, the contribution of park visitor-related traffic would be minor, especially when considered against the backdrop of expected traffic increases from residential and spiritual retreat growth in the Baca Grande subdivision.

Impacts of the number of traffic accidents and demands on first responders would be similar to those under the no-action alternative. Demands associated with this alternative would not require additional law enforcement or emergency response staffing, although the increases in the number of “call outs” would burden area first response agencies because they are staffed by volunteers.

The effects of the three public nodes alternative on traffic and emergency services across most of the region would be adverse, but negligible over the short term and long term. Long-term traffic impacts would be adverse and minor in the Crestone/Baca Grande community.

Attitudes and Lifestyles

This alternative establishes future management direction for the park that also reflects public input, the park’s fundamental resources and values, and the foundation established by management of the former national monument, but with more emphasis on providing supplemental recreational and educational opportunities. That focus, like the dunefield focus—maximize wildness alternative, would tend to polarize opinions and attitudes more so than either the no-action or preferred alternatives. Those favoring solitude, wilderness, adventure characterized by self-reliance, and limited access to the new

areas, may have a sense of dismay with this alternative. Those who view the park expansion and its opportunities from a potential economic development perspective may be inclined to favor this alternative.

This alternative would likely result in the most direct lifestyle consequences, as it recasts many park influences. For example, it might encourage limited commercial development adjacent to the park on the south and in the Crestone/Baca Grande community. Compared to the other action alternatives, the three public nodes alternative may be the least favorable in terms of conditions that affect the Crestone/Baca Grande community and fundamental qualities that underlie their decisions to live and/or provide services in the community.

Cumulative Effects. Cumulative social and economic effects arising from the three public nodes alternative are of the same type, but somewhat more than those occurring under any of the other alternatives. Cumulative effects include increased traffic levels on Saguache County Road T and in the Crestone/Baca Grande community, increased spending by visitors that would bolster tourism-oriented businesses across the Valley, and additional tax revenues to fund public services and facilities. The increased number of park visitors under this alternative would enhance the commercial development potential of private lands along the access routes to the park’s main entry. Any sales and subsequent development of those lands would have economic implications, as well as changing the visitor experience.

Opening Medano Ranch for public use could also result in long-term changes in traffic patterns, shifting more of the traffic from SH 150 to Alamosa County Road 6N. Having more traffic follow the combined SH 150/6N route would help promote the

Los Caminos Antiguos Scenic Byway, of which those two roads are part. The incremental effects on traffic on the highways and roads in the region, including county roads T and 6N, would be small in relationship to traffic created in the future by area residents, commercial vehicles, and other travelers through the region. The increases would result in minor increases in road maintenance requirements for the respective state and local entities.

The incremental effects of the three public nodes alternative would be negligible to minor in the short term and minor to moderate in the long term, and generally beneficial as compared to other social or economic effects resulting from the cumulative actions.

Conclusion. The economic effects of the three public nodes alternative include negligible to minor short-term and minor to moderate long-term economic benefits, the latter due to increased visitation tied to this alternative. Among the alternatives, three public nodes offers the largest economic benefits for the region. Long-term social consequences include a negligible to minor contribution to long-term population growth and demands on community infrastructure and services. Short- and long-term effects on lifestyles and attitudes are indeterminate.

HEALTH AND SAFETY

The three public nodes alternative includes a primitive campground proposed for the northern portion of the national park. Campfires would likely be allowed in the new campground, and this could increase the risk of wildfire in the area. Prevailing winds could quickly push a fire eastward into steep terrain, making such a fire difficult to fight. A fire starting in the northern portion of the national park could

also spread via prevailing winds into the Baca Grande subdivision. The increased risk of fire danger would present a minor to moderate, long-term, localized, adverse impact to human health and safety.

At the main park entrance, visitors would be redirected to (encouraged to visit) other areas once the dunes parking lot fills. This would help reduce vehicle numbers and traffic congestion along the main park road and turnouts, and at the visitor center and dunes parking area. This would aid in keeping the incidence of traffic accidents from rising in these busy visitor areas as visitation increases over time. Compared to the no-action alternative, the impact on safety would be long term, localized, negligible, and beneficial.

Administrative access to the former Baca Ranch and to Medano Ranch would continue. Guides would accompany visitors in the guided learning zone, and there would be a NPS presence at Medano Ranch. Based on available routes of access and the lack of a wilderness recommendation in this alternative, emergency response to these areas would remain relatively efficient. Any additional risk to visitors in these areas would be minimal. Bison would no longer graze within the park, so this minimal risk to visitor safety would be eliminated. Impacts would be long term, negligible, and beneficial compared to the no-action alternative.

Cumulative Impacts. Relocation of the horse loading area east of the dunes is planned for the near future. This would include providing a dirt surface, allowing surer footing for horses. The *Greater Sand Dunes Interagency Fire Management Plan* (2005) includes measures for safely and efficiently managing wildland fires within the park, the Baca National Wildlife Refuge, and The Nature Conservancy's Medano Zapata Ranch. The dunes parking

area within the national park is planned for minor expansion (~5%) and reconfiguration to improve vehicle circulation and increase capacity. Although the incidence of traffic accidents in the dunes parking area is very low, this action would likely provide some small measure of increased safety as visitor use increases over time. The three public nodes alternative would contribute minor to moderate adverse and negligible beneficial impacts on visitor safety. Combined with other past, present, and reasonably foreseeable future actions, the three public nodes alternative would have a long-term, minor, adverse effect on safety.

Conclusion. The three public nodes alternative would provide negligible beneficial safety impacts from managing visitor use in the easternmost frontcountry zone (by redirecting visitors to other areas), elimination of bison from the park, and from NPS and guide presence around Medano Ranch and the guided learning zone. Long-term, minor to moderate, adverse impacts would accrue from increased wildfire risk due to campfires at the proposed primitive campground.

NATIONAL PARK SERVICE OPERATIONS

New or improved facilities that would add to the park's maintenance load are proposed in the three public nodes alternative. Examples include a new access road, trailhead, and primitive campground in the northern portion of the national park, and new trails in several areas. Assuming The Nature Conservancy eventually transfers Medano Ranch to the National Park Service, facilities there would be upgraded and minimally expanded for public day use, administrative, and possibly concession purposes, and maintenance would become the responsibility of the National Park

Service. Due to the condition of facilities at Medano Ranch, the park's maintenance backlog would be increased. Maintenance of additional facilities would place an additional burden on maintenance staff. Overall, this would have a long-term, moderate, adverse impact on park operations.

Activities that would require more NPS planning, coordination, and management include managing public day use at Medano Ranch and in the guided learning zone, managing the northern access / trailhead / primitive campground, patrolling and maintaining new trails, and managing nonnative invasive species. The new campground would attract and keep more visitors in the northern portion of the park, so this area would require careful monitoring to ensure resource protection. Managing and staffing the busy Medano Ranch frontcountry area and associated guided learning zone would be the biggest burden. Interpretation and information services, visitor and resource protection, management of guided learning zone tours, etc., would be needed there during most daylight hours. Administrative access to different park areas would not be as extensive as in the no-action alternative, but it would still allow relatively quick access for operational activities. Overall, new or expanded management responsibilities for the National Park Service would have long-term, moderate, adverse impacts on park operations.

Cumulative Impacts. Expansion of nearby communities, fire management responsibilities, elk herd reduction, pursuing a NPS water right, management of oil and gas exploration activities, and similar management needs would require time and attention by senior NPS staff. Cooperation and coordination with neighboring agencies and entities regarding planning, proposals near the park, etc., also require substantial

amounts of staff time. The three public nodes alternative would place an additional burden on NPS staff, but this burden would be lessened if the park were adequately staffed. Combined with past, present, and reasonably foreseeable future impacts, the three nodes alternative would have moderate, long-term, adverse impacts on NPS operations.

Conclusion. Maintenance of additional facilities (especially in the northern portion of the park and at Medano Ranch) would have moderate, long-term, adverse impacts on park operations. New or expanded management responsibilities would also have long-term, moderate, adverse impacts on park operations.

OPERATIONS OF OTHER ENTITIES AND MANAGEMENT AGENCIES

Public Vehicle Access To/Through Northern Portion of Park

Two potential routes for public vehicle access to the backcountry access zone in the northern portion of the national park would be considered under this alternative. The first route to be considered would involve access to the national park via the Baca National Wildlife Refuge; this option would be studied by the USFWS. If the USFWS determined this option to be incompatible with the purposes of the refuge, a second option of entering the park via a public county road from the Baca Grande subdivision (e.g., Camino Real), would be studied by the National Park Service in cooperation with Saguache County and the Baca Grande Property Owners Association. Consideration by Baca Grande/Crestone and the USFWS of potential access routes to the northern portion of the park would unavoidably place an additional responsibility on these

two agencies during their comprehensive planning processes. This additional responsibility would be anticipated to add to the duration, complexity, and cost of the planning process for both entities. As such, this component of the alternative would have a short- and long-term, moderately adverse impact on the management actions of other agencies or entities.

This alternative provides for two additional (subsequent) public vehicle access options to be considered in a separate future joint NPS/USFS public planning and environmental analysis process if USFS planning indicated that such access was needed. First, if either of the above-described access routes into the national park were implemented, Cow Camp Road could be extended to the mountain front to connect with Liberty Road. Second, if neither of the above-described access routes were determined to be feasible, the 0.7-mile segment of Liberty Road within the national park could be converted to a backcountry access zone. Either option would permit public vehicle access to the new USFS lands, an option that the USFS would like to preserve. Environmental impacts of these options would be addressed by a future study; they are not addressed in this GMP.

Should an acceptable route through the northern portion of the park to USFS lands be identified, concerns of the USFS relative to public vehicle access closer to the mountain front for general recreation would be satisfied. Such a route would also provide public vehicle access closer to private in-holdings in Liberty, Short Creek, and Pole Creek. Finally, public vehicle access into the northern portion of the park would partially address CDOW and USFS concerns about limited hunter harvest of elk in adjacent USFS lands due to lack of vehicle access. This specific concern is also addressed by this alterna-

tive in the form of hunter access provided through use of the Superintendent's Compendium. Therefore, this alternative would be anticipated to have minor, long-term, beneficial impacts on other agencies.

Designation of Additional Wilderness Areas within the Park

No new areas would be recommended for wilderness designation under the three public nodes alternative. Therefore, this alternative would have no impacts relative to additional wilderness designations.

Cumulative Impacts. The most relevant past, present, and reasonably foreseeable future actions that may interact cumulatively with this alternative to affect other agencies are the Great Sand Dunes National Park and Preserve Act (2000), and expansion of communities near the park. Impacts of the act are exemplified by this GMP. Increased human habitation in the area would reduce options for wildlife and wildlife management activities, as well as complicating the logistics of mineral exploration, among other activities. Combined with past, present, and reasonably foreseeable future actions, the impact of the preferred alternative would be long-term, minor to moderately adverse on other entities and agencies.

Conclusion. Provision for evaluation of potential access routes to and through the northern portion of the park places much of the responsibility of evaluating such routes on the USFWS and Baca Grande/Saguache County—a short- and long-term, moderately adverse impact, depending on the duration of their respective planning processes. However, should an acceptable route be identified and implemented, it

would partially address USFS and CDOW concerns about public vehicle access to the mountain front and about hunter elk harvest. As such, this alternative is anticipated to have short- and long-term, minor to moderately adverse impacts on these agencies, as well as minor, long-term beneficial impacts.

UNAVOIDABLE ADVERSE EFFECTS

Some impacts caused by human use (especially minor inadvertent impacts to archeological sites, vegetation, soils, water resources, etc.) are essentially unavoidable because not allowing people in the park would be inconsistent with the NPS mission.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible impacts are permanent. An irretreivable commitment of resources refers to resources that, once removed, cannot be replaced. Archeological resources that are stolen or vandalized are irretreivably lost. Even moving or disturbing such resources constitutes an irreversible commitment of resources because information is lost if the context (location and condition) is changed, even inadvertently. Thus, there would be some irreversible loss or commitment of archeological resources from this alternative.

RELATIONSHIP OF SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

There would be no adverse effects on biological or economic productivity from implementation of this alternative.

TABLE 26. SUMMARY OF IMPACTS OF THE ALTERNATIVES

Impact Topic	No-Action Alternative	NPS Preferred Alternative	Dunefield Focus—Maximize Wildness Alternative	Three Public Nodes Alternative
Archeology	<p>In frontcountry, along creeks, and along established trails, damage to sites (trampling, vandalism, and theft) from increased visitor use (-)</p> <p>Little potential damage to sites in much of park expansion area, including Medano Ranch, due to lack of public access and private ownership (+)</p> <p><u>Conclusion:</u> adverse: long term, minor to moderate; beneficial: minor</p>	<p>In frontcountry, along creeks, and along established trails, damage to sites (trampling, vandalism, and theft) from increased visitor use (-)</p> <p>Potential damage to sites in north part of park and core park areas from increased visitor access, trailhead, and new trails (-)</p> <p>Increased protection of sites in certain park expansion areas from NPS presence, guided learning zone and recommended wilderness (+)</p> <p><u>Conclusion:</u> adverse: long term, minor to moderate; beneficial: minor</p>	<p>In frontcountry, along creeks, and along established trails, damage to sites (trampling, vandalism, and theft) from increased visitor use (-)</p> <p>Potential site-specific impacts from multiuse trail and possible frontcountry parking and restroom expansion (-)</p> <p>Little potential damage to sites in much of park expansion area due to general lack of public access and recommended wilderness (+)</p> <p>Vandalism and theft possible despite very low use levels in remote areas due to low NPS presence and monitoring (-)</p> <p><u>Conclusion:</u> adverse: long term, minor to moderate; beneficial: long term</p>	<p>In frontcountry, along creeks, and along established trails, damage to sites (trampling, vandalism, and theft) from increased visitor use (-)</p> <p>Potential damage to sites in north part of park and core park areas from increased visitor access, trailhead, campground, and new trails (-)</p> <p>Increased protection of sites in certain park expansion areas from NPS presence, guided learning zone (+)</p> <p><u>Conclusion:</u> adverse: long term, minor to moderate; beneficial, minor</p>
Historic Structures	<p>Maintenance of Medano Ranch headquarters structures' integrity by Nature Conservancy ownership and management (+)</p> <p><u>Conclusion:</u> beneficial, long term, negligible</p>	<p>Increased maintenance and some stabilization of Medano Ranch structures from NPS adaptive use (+)</p> <p>Potential changes to Medano Ranch structures' character-defining features and possible removal of minor buildings due to NPS adaptive use; potential vandalism, wear and tear from scheduled public access (-)</p> <p>Possible disturbance to an unevaluated ditch segment from hiking/biking path (-)</p> <p>Reduced maintenance of some elements (e.g., roads and ditches) due to recommended wilderness (-)</p> <p><u>Conclusion:</u> beneficial: minor, long term; adverse: minor to major. (Impact severity can be reduced below the "major" threshold)</p>	<p>Deterioration of structures, vandalism, and building removal possible due to management of Medano Ranch as "natural/wild zone" (-)</p> <p>Reduced maintenance of some elements (e.g., roads and ditches) due to recommended wilderness (-)</p> <p><u>Conclusion:</u> adverse: long term, minor to major. (Impact severity can be reduced below the "major" threshold)</p>	<p>Increased maintenance and some stabilization of Medano Ranch structures from NPS adaptive use (+)</p> <p>Potential changes to Medano Ranch structures' character-defining features, possible removal of minor buildings, and possible new facilities due to NPS adaptive use; potential vandalism, wear and tear from scheduled public access (-)</p> <p><u>Conclusion:</u> beneficial: minor, long term; adverse: minor to major. (Impact severity can be reduced below the "major" threshold)</p>
Cultural Landscapes	<p>Maintenance, ownership, and management of Medano Ranch headquarters continued by The Nature Conservancy and current park maintenance policies followed at visitor's center (+)</p> <p><u>Conclusion:</u> beneficial, long term, negligible</p>	<p>Changes to Medano Ranch potential cultural landscape from NPS adaptive reuse and rehabilitation of buildings (+ and -)</p> <p>Integrity of NPS administrative potential cultural landscape restored by removal of nonhistoric entrance station (+)</p> <p><u>Conclusion:</u> beneficial: minor to moderate; adverse: long term, negligible to minor</p>	<p>Loss of integrity (from deterioration, vandalism, possible building removal) of the Medano Ranch potential cultural landscape due to management of Medano Ranch as "natural/wild zone" and wilderness recommendation (-)</p> <p><u>Conclusion:</u> adverse: long term, moderate to major. (Impact severity can be reduced below the "major" threshold)</p>	<p>Changes to Medano Ranch potential cultural landscape from NPS adaptive reuse, rehabilitation, and possible addition or removal of buildings (+ and -)</p> <p><u>Conclusion:</u> beneficial: long term, minor; adverse: long term, moderate to major. (Impact severity can be reduced below the "major" threshold)</p>
Vegetation	<p>Potential for introduction of nonnative plant species, social trail establishment, and trampling of vegetation from increased use in certain areas (-)</p> <p>Streambank trampling, species composition shifts due to selective consumption of more palatable species, and introduction of nonnative plant species from continued managed bison grazing (-)</p> <p><u>Conclusion:</u> adverse: long term, minor to moderate; beneficial: long term, moderate</p>	<p>Potential for introduction of nonnative plant species and trampling from increased visitor use in certain areas (-)</p> <p>Social trails and trampling effects minimized in sensitive areas by providing designated trails, guided learning zone, and carrying capacity approach (+)</p> <p>Localized damage or destruction of vegetation from limited new facilities (access road, trailhead, trails, fee booth, bicycle lanes, hiking/biking path, any cooperative / joint facilities) (-)</p> <p>Plant community recovery from discontinuation of managed bison grazing (+)</p> <p><u>Conclusion:</u> adverse: long term, negligible to moderate; beneficial: long term, minor to moderate</p>	<p>Potential for introduction of nonnative plant species, social trail establishment, and trampling from increased visitor use in certain areas; impacts tempered by carrying capacity-approach (-)</p> <p>Localized damage or destruction of vegetation from limited new facilities (multiuse path, possible frontcountry parking and restroom expansion) (-)</p> <p>Plant community recovery from discontinuation of managed bison grazing (+)</p> <p><u>Conclusion:</u> adverse: long term, negligible to moderate; beneficial: long term, minor to moderate</p>	<p>Potential for introduction of nonnative plant species and trampling from increased visitor use in certain areas (-)</p> <p>Social trails and trampling effects minimized in sensitive areas by providing designated trails, guided learning zone, and carrying capacity approach (+)</p> <p>Localized damage or destruction of vegetation from limited new facilities (access road, trailhead, primitive campground, trails)</p> <p>Plant community recovery from discontinuation of managed bison grazing (+)</p> <p><u>Conclusion:</u> adverse: long term, negligible to moderate; beneficial: long term, minor to moderate</p>

TABLE 26. SUMMARY OF IMPACTS OF THE ALTERNATIVES

Impact Topic	No-Action Alternative	NPS Preferred Alternative	Dunefield Focus—Maximize Wildness Alternative	Three Public Nodes Alternative
Ecologically Critical Areas	<p>Potential for introduction of nonnative plant species, social trail establishment, and incidental trampling of vegetation and soils in the Great Sand Dunes and Deadman Creek ecologically critical areas (-)</p> <p>Streambank trampling, species composition shifts from consumption of more palatable species, and introduction of nonnative plant species from continued managed bison grazing in the San Luis Lakes / Sand Creek ecologically critical areas (-)</p> <p><u>Conclusion:</u> adverse: long term, minor to moderate; beneficial: long term, minor to moderate</p>	<p>Potential for introduction of nonnative plant species and trampling from increased visitor use in certain areas of the Great Sand Dunes and Deadman Creek ecologically critical areas (-)</p> <p>Social trails and trampling effects minimized in sensitive areas by providing designated trails, guided learning zone, and carrying capacity approach (+)</p> <p>Localized effects from limited new facilities (access road, trailhead, trails, fee booth, bicycle lanes, hiking/biking path, any cooperative/ joint facilities) (-)</p> <p>Plant community recovery within Great Sand Dunes and San Luis Lakes / Sand Creek ecologically critical areas from discontinuation of managed bison grazing (+)</p> <p><u>Conclusion:</u> adverse: long term, minor to moderate; beneficial: long term, minor to moderate</p>	<p>Potential for introduction of nonnative plant species, social trail establishment, and trampling from increased visitor use in the Great Sand Dunes and Deadman Creek ecologically critical areas; impacts tempered by carrying capacity-approach (-)</p> <p>Localized effects from limited new facilities (multiuse path, possible frontcountry parking and restroom expansion) (-)</p> <p>Plant community recovery within Great Sand Dunes and San Luis Lakes / Sand Creek ecologically critical areas from discontinuation of managed bison grazing (+)</p> <p><u>Conclusion:</u> adverse: long term, minor to moderate; beneficial: long term, minor to moderate</p>	<p>Potential for introduction of nonnative plant species and trampling from increased visitor use in certain areas of the Great Sand Dunes and Deadman Creek ecologically critical areas (-)</p> <p>Social trails and trampling effects minimized in sensitive areas by providing designated trails, guided learning zone, and carrying capacity approach (+)</p> <p>Localized effects from limited new facilities (access road, trailhead, primitive campground, trails) (-)</p> <p>Plant community recovery within Great Sand Dunes and San Luis Lakes / Sand Creek ecologically critical areas from discontinuation of managed bison grazing (+)</p> <p><u>Conclusion:</u> adverse: long term, minor to moderate; beneficial: long term, minor to moderate</p>
Federal Threatened and Endangered Species	<p>Increased visitor use not anticipated to have detectable/ measurable impacts on any southwestern willow flycatchers, yellow-billed cuckoos, bald eagles, Mexican spotted owls, or Canada lynx moving through or attempting to take up residence (-)</p> <p>Presence of leashed dogs and unleashed hunting dogs in the preserve not anticipated to noticeably affect any lynx passing through or establishing territories in the preserve (-)</p> <p><u>Conclusion:</u> adverse: short and long term negligible on southwestern willow flycatcher, yellow-billed cuckoo, bald eagle, Mexican spotted owl, and Canada lynx ("may affect—not likely to adversely affect" determination)</p>	<p>Increased visitor use not anticipated to have detectable / measurable impacts on any southwestern willow flycatchers, yellow-billed cuckoos, bald eagles, Mexican spotted owls, or Canada lynx moving through or attempting to take up residence (-)</p> <p>Presence of leashed dogs and unleashed hunting dogs in the preserve not anticipated to noticeably affect any lynx passing through or establishing territories in the preserve (-)</p> <p>Construction of a backcountry access road, trailhead, and associated parking area in the northwestern portion of the park would be sited north of the Deadman Creek corridor and are thus not anticipated to impact habitat for listed species.</p> <p><u>Conclusion:</u> adverse: short and long term negligible on southwestern willow flycatcher, yellow-billed cuckoo, bald eagle, Mexican spotted owl, and Canada lynx ("may affect—not likely to adversely affect" determination)</p>	<p>Increased visitor use not anticipated to have detectable / measurable impacts on any southwestern willow flycatchers, yellow-billed cuckoos, bald eagles, Mexican spotted owls, or Canada lynx moving through or attempting to take up residence (-)</p> <p>Presence of unleashed hunting dogs in the preserve not anticipated to noticeably affect any lynx passing through or establishing territories in the preserve (-)</p> <p>Elimination of leashed dogs in the preserve not anticipated to noticeably affect any lynx passing through or establishing territories in the preserve (+)</p> <p><u>Conclusion:</u> adverse: short and long term negligible on southwestern willow flycatcher, yellow-billed cuckoo, bald eagle, Mexican spotted owl, and Canada lynx; beneficial: short and long term negligible on Canada lynx ("may affect—not likely to adversely affect" determination for all addressed species)</p>	<p>Increased visitor use not anticipated to have detectable / measurable impacts on any yellow-billed southwestern willow flycatchers, yellow-billed cuckoos, bald eagles, Mexican spotted owls, or Canada lynx moving through or attempting to take up residence (-)</p> <p>Presence of unleashed hunting dogs in the preserve not anticipated to noticeably affect any lynx passing through or establishing territories in the preserve (-)</p> <p>Elimination of leashed dogs in natural-resource sensitive areas of the preserve not anticipated to noticeably affect any lynx passing through or establishing territories in the preserve (+)</p> <p>Construction of a backcountry access road, trailhead, and associated parking area in the northwestern portion of the park would be sited north of the Deadman Creek corridor and are thus not anticipated to impact habitat for listed species.</p> <p><u>Conclusion:</u> adverse and beneficial, short and long term negligible on southwestern willow flycatcher, yellow-billed cuckoo, bald eagle, Mexican spotted owl, and Canada lynx ("may affect—not likely to adversely affect" determination)</p>
Wildlife, Including Colorado State-Listed Species	<p>Impacts on riparian species from increased recreational use (-)</p> <p>Impacts on wetlands-associated species from removal of artificial water sources (- and +)</p> <p>Impacts on ungulate herd numbers and health due to continued limited access for elk hunting (-)</p> <p>Impacts on bighorn sheep populations from presence of leashed dogs in national preserve (-)</p> <p><u>Conclusion:</u> adverse: long term, negligible to moderate; beneficial: long term, negligible to minor</p>	<p>Impacts on riparian species from increased recreational use (-)</p> <p>Impacts on wetlands-associated species from removal of artificial water sources (- and +)</p> <p>Impacts on ungulate herd numbers and health from facilitation of elk hunting (+)</p> <p>Impacts on bighorn sheep populations from presence of leashed dogs in national preserve (-)</p> <p><u>Conclusion:</u> adverse: long term, negligible to moderate; beneficial: long term, negligible to minor</p>	<p>Impacts on riparian species from increased recreational use (-)</p> <p>Impacts on wetlands-associated species from removal of artificial water sources (- and +)</p> <p>Impacts on ungulate herd numbers and health due to continued limited access for elk hunting (-)</p> <p>Impacts on bighorn sheep populations from absence of leashed dogs in national preserve (+)</p> <p><u>Conclusion:</u> adverse: long term, negligible to moderate; beneficial: long term negligible to minor</p>	<p>Impacts on riparian species from increased recreational use (-)</p> <p>Impacts on wetlands-associated species from removal of artificial water sources (- and +)</p> <p>Impacts on ungulate herd numbers and health from facilitation of elk hunting (+)</p> <p>Impacts on bighorn sheep populations from restriction of leashed dogs in areas where the two species might interact (+)</p> <p><u>Conclusion:</u> adverse: long term, negligible to moderate; beneficial: long term, negligible to minor</p>

TABLE 26. SUMMARY OF IMPACTS OF THE ALTERNATIVES

Impact Topic	No-Action Alternative	NPS Preferred Alternative	Dunefield Focus—Maximize Wildness Alternative	Three Public Nodes Alternative
Soils and Geologic Resources	<p>Social trails in northern portion of the national park from increased day-use hiking (-)</p> <p>Localized disturbance and compaction from vehicles parking along road shoulders when the dunes parking lot fills (-)</p> <p><u>Conclusion:</u> adverse: long term, mostly localized, minor to moderate</p>	<p>Localized soil disturbance and compaction from construction of new trails in the backcountry adventure and guided learning zones; vehicle access route and new trailhead in the northern backcountry access zone; and bicycle lanes, hiking/biking path in frontcountry zone (-)</p> <p>Fewer social trails due to provision of trails to direct foot traffic (+)</p> <p>Less localized disturbance and compaction along road shoulders due to visitor modest shuttle (+)</p> <p><u>Conclusion:</u> adverse: long term, site-specific, minor to moderate; beneficial: long term, localized minor</p>	<p>Social trails in northern portion of the national park from increased day-use hiking and equestrian use (-)</p> <p>Localized soil disturbance and compaction from limited new facilities (multiuse path, possible frontcountry parking and restroom expansion) (-)</p> <p>Gradual recovery of disturbed soils in park expansion areas due to extensive natural / wild zone (+)</p> <p><u>Conclusion:</u> adverse: long term, mostly localized, minor to moderate; beneficial: long term, mostly localized, minor to moderate</p>	<p>Localized soil disturbance and compaction from construction of new trails in the backcountry adventure and guided learning zones; vehicle access route, new trailhead, and primitive campground in the northern backcountry access zone (-)</p> <p>Fewer social trails due to provision of trails to direct foot traffic (+)</p> <p>Reduced disturbance and soil compaction from vehicles parking along road shoulders due to redirection of visitors (+)</p> <p><u>Conclusion:</u> adverse: long term, site-specific, minor to moderate; beneficial: localized minor beneficial</p>
Wetlands	<p>Introduction of nonnative species, and trampling of wetland soil and vegetation from increased visitor use in certain areas (-)</p> <p>Drying of introduced wetlands from removal of livestock watering ponds (-)</p> <p>Continued streambank and bottom erosion from the Medano Ranch managed bison herd (-)</p> <p><u>Conclusion:</u> adverse: long term, negligible to minor; beneficial: long term, negligible to moderate</p>	<p>Introduction of nonnative species, and trampling of wetland soil and vegetation from increased visitor use in certain areas (-)</p> <p>Drying of introduced wetlands from removal of livestock watering ponds and discontinuation of Medano Ranch meadow irrigation (-)</p> <p>Reestablishment or expansion of former wetlands from discontinuation of Medano Ranch meadow irrigation (+)</p> <p>Improved wetlands structure and function due to elimination of managed bison herd (+)</p> <p><u>Conclusion:</u> adverse: long term, negligible to moderate; beneficial: long term minor to major</p>	<p>Introduction of nonnative species, and trampling of wetland soil and vegetation from increased visitor use in certain areas (-)</p> <p>Drying of introduced wetlands from removal of livestock watering ponds and discontinuation of Medano Ranch meadow irrigation (-)</p> <p>Reestablishment or expansion of former wetlands from discontinuation of Medano Ranch meadow irrigation (+)</p> <p>Improved wetlands structure and function due to elimination of managed bison herd (+)</p> <p><u>Conclusion:</u> adverse: long term, negligible to moderate; beneficial: long term minor to major</p>	<p>Introduction of nonnative species, and trampling of wetland soil and vegetation from increased visitor use in certain areas (-)</p> <p>Drying of introduced wetlands from removal of livestock watering ponds and discontinuation of Medano Ranch meadow irrigation (-)</p> <p>Reestablishment or expansion of former wetlands from discontinuation of Medano Ranch meadow irrigation (+)</p> <p>Improved wetlands structure and function due to elimination of managed bison herd (+)</p> <p><u>Conclusion:</u> adverse: long term, negligible to moderate; beneficial: long term, minor to major</p>
Water Resources	<p>Increased potential for water quality impacts associated with increased visitation (-)</p> <p>Continued stream channel impacts from managed bison herd (-)</p> <p>Continued effects on groundwater and surface quantity impacts from irrigation of hay meadows on Medano Ranch (nature of impacts unknown)</p> <p><u>Conclusion:</u> adverse: short and long term, localized, negligible to minor</p>	<p>Increased potential for water quality impacts associated with increased visitation and visitation in new areas (-)</p> <p>Improved water quality from restricting leashed dogs to certain zones within the national park, creating the guided learning zone and installing backcountry toilets (+)</p> <p>Effects on groundwater and surface water quantity from discontinuing irrigation of hay meadows on Medano Ranch (nature of impacts unknown)</p> <p><u>Conclusion:</u> adverse: short and long term, localized, negligible; beneficial: long term, minor</p>	<p>Increased potential for water quality impacts associated with increased visitation and visitation in new areas (-)</p> <p>Improved water quality from restricting dogs to developed areas (+), and from backcountry toilets (+)</p> <p>Sedimentation from increased social trails (no new trails to direct use away from sensitive areas) (-)</p> <p>Effects on groundwater and surface water quantity from discontinuing irrigation of hay meadows on Medano Ranch (nature of impacts unknown)</p> <p><u>Conclusion:</u> adverse: long term, minor; beneficial: long term, minor</p>	<p>Increased potential for water quality impacts associated with increased visitation and visitation in new areas (-)</p> <p>Improved water quality from the guided learning zone (+), and from backcountry toilets (+)</p> <p>Effects on groundwater and surface water quantity from discontinuing irrigation of hay meadows on Medano Ranch (nature of impacts unknown)</p> <p><u>Conclusion:</u> adverse: long term, localized, negligible to minor; beneficial: long term, minor</p>
Visitor Use and Experience	<p>Projected annual visitation: nearly 375,000 by 2025</p> <p>Equestrian users frustrated by having no easy way to access the north part of the park (-)</p> <p>Dunes parking lot would fill often; visitors must park along road shoulders (-)</p> <p>Visitor dissatisfaction with crowded conditions at certain locations (-)</p> <p>Dogs allowed in all areas of the park, provided they are on a leash (- and +)</p> <p><u>Conclusion:</u> adverse: long term, minor to moderate; beneficial: long term, minor to moderate</p>	<p>Projected annual visitation: 427,100 by 2025</p> <p>Improved hiking and horseback access to new park lands, mountain front, and north part of the national preserve (+)</p> <p>Increased diversity of visitor programs and experiences with more bases for interpretation (+)</p> <p>More recreation options with bicycle lanes and hiking/biking path; more opportunities to see wildlife from expanded access to new areas (+)</p> <p>Reduced parking/driving frustrations when visitor shuttle is running (+)</p> <p>Leashed dogs restricted to national preserve, plus frontcountry, dunes play, and backcountry access zones, and Liberty Road administrative zone in national park (- and +)</p> <p>More perceptions of crowding in frontcountry areas (-)</p> <p>New wilderness experiences from wilderness recommendation (+)</p> <p><u>Conclusion:</u> adverse: long term, minor; beneficial: long term, minor to major</p>	<p>Projected annual visitation: 397,100 by 2025</p> <p>Visitor opportunities diversified by easier access to localized areas of the dunes and Medano Creek and multiuse trail (+)</p> <p>Improved horseback access to northern portion of national park (+)</p> <p>Reduced parking/driving frustrations from frontcountry parking expansion (+)</p> <p>More perceptions of crowding in frontcountry areas (-)</p> <p>Leashed dogs restricted to parking lots, car campgrounds, and picnic areas within the national park and not allowed in national preserve (- and +)</p> <p>New wilderness experiences from wilderness recommendation (+)</p> <p><u>Conclusion:</u> adverse: long term, minor; beneficial: long term, minor to major</p>	<p>Projected annual visitation: 441,000 visitors by 2025</p> <p>Improved hiking and horseback access to new park lands, mountain front, and north part of the national preserve (+)</p> <p>Increased diversity of visitor experiences and programs with more bases for interpretation (+)</p> <p>More opportunities to see wildlife from expanded access to new areas (+)</p> <p>New wheelchair-accessible public facilities (Medano Ranch and new primitive campground) (+)</p> <p>Leashed dogs not permitted in areas with high potential for or a history of problems (- and +)</p> <p>Visitor frustration from being redirected to other areas when dunes lot fills (+)</p> <p><u>Conclusion:</u> adverse: long term, minor to major; beneficial: long term, minor to major</p>

TABLE 26. SUMMARY OF IMPACTS OF THE ALTERNATIVES

Impact Topic	No-Action Alternative	NPS Preferred Alternative	Dunefield Focus—Maximize Wildness Alternative	Three Public Nodes Alternative
Scenic Resources and Visual Quality	<p>Localized scenic impacts from people parking vehicles within Baca Grande subdivision to visit north part of park (-)</p> <p>No effects on visibility or night skies</p> <p><u>Conclusion:</u> adverse scenic: long term, localized, minor to moderate; no impacts on visibility or night skies</p>	<p>Frontcountry zone scenic impacts from limited new facilities (bicycle lanes, hiking/biking path) (-)</p> <p>Scenic and night sky effects in park expansion lands from backcountry access zone trailhead in the north, possible new structures at Medano Ranch, and vehicles at both locations (-)</p> <p>Visibility effects from vehicles and dust in park expansion areas (-)</p> <p><u>Conclusion:</u> adverse: short and long term, localized, negligible to minor on scenery, visibility, and night skies</p>	<p>Frontcountry zone scenic impacts from limited new facilities (expanded parking and restrooms, multiuse path) (-)</p> <p>Localized scenic effects from people parking vehicles and horse trailers within Baca Grande subdivision to visit north part of park (-)</p> <p>Scenic, visibility, and night sky effects from discontinuation of use and possible eventual removal of structures at Medano Ranch (+)</p> <p><u>Conclusion:</u> adverse: short and long term, minor to moderate, adverse on scenery and visibility; beneficial: long term, negligible to minor on scenery, visibility, and night skies</p>	<p>Scenic and night sky effects in park expansion lands from backcountry access zone trailhead and primitive campground in the north, possible new structures at Medano Ranch, and vehicles at both locations (-)</p> <p>Visibility effects from vehicles and dust in park expansion areas (-)</p> <p><u>Conclusion:</u> adverse: long term, minor to moderate on scenery and visibility; long term, minor on night skies</p>
Socio-economics	<p>Projected annual visitor spending: \$18.43 million by 2025; 472 jobs supported (+)</p> <p>Projected NPS operations spending: \$6.8 million for future construction; \$7.4 million in other major maintenance spending (+)</p> <p>Vehicle congestion from visitors parking (or trying to park) near the terminus of county roads (-)</p> <p>This alternative fails to establish clear management direction for the expanded park (-)</p> <p>This alternative avoids certain outcomes or impacts that Great Sand Dunes community members might find objectionable; may be perceived to leave open management options for further consideration (+)</p> <p><u>Conclusion:</u> economic impacts: short term, negligible to minor, beneficial and long-term minor beneficial; community services impacts: indeterminate and negligible; traffic and emergency services impacts: long term, minor adverse; attitudes and lifestyles impacts: indeterminate—more likely adverse than beneficial</p>	<p>Projected annual visitor spending: \$21.18 million by 2025; 543 jobs supported (+)</p> <p>Projected NPS operations spending: \$21.2 million for future construction; \$7.7 million in other major maintenance spending (+)</p> <p>Traffic increase (from park visitors) on some local roads, including Saguache County Road T (-)</p> <p>This alternative establishes future management direction for the park reflecting public input and fundamental park values (+)</p> <p>This alternatives offers something for many to appreciate and something for many to disfavor (+ and -)</p> <p>Direct and indirect lifestyle consequences most apparent to neighbors and visitors to the park (+ and -)</p> <p><u>Conclusion:</u> economic impacts: short term, negligible to minor, beneficial and long-term, minor, beneficial community services impacts: indeterminate and negligible; traffic and emergency services impacts: negligible adverse over the short and long term across most of the region, and long term minor adverse north of the park (Crestone / Baca Grande area); attitudes and lifestyles impacts: indeterminate</p>	<p>Projected annual visitor spending: \$19.61 million by 2025; 503 jobs supported (+)</p> <p>Projected NPS operations spending: \$10.6 million for future construction; \$7.4 million in other major maintenance spending (+)</p> <p>Vehicle congestion from visitors parking (or trying to park) near the terminus of county roads (-)</p> <p>This alternative establishes future management direction for the park reflecting public input and fundamental park values (+)</p> <p>This alternative would tend to polarize opinions and attitudes (+ and -)</p> <p>Relatively few direct lifestyle consequences (+ and -)</p> <p><u>Conclusion:</u> economic impacts: short term, negligible to minor beneficial and long term minor beneficial; community services impacts: indeterminate and negligible; traffic and emergency services: long term, minor to moderate adverse; attitudes and lifestyles impacts: indeterminate</p>	<p>Projected annual visitor spending: \$21.91 million by 2025; 561 jobs supported (+)</p> <p>Projected NPS operations spending: \$20.6 million for future construction; \$7.7 million in other major maintenance spending (+)</p> <p>Traffic increase (from park visitors) on some local roads, including Saguache County Road T (-)</p> <p>This alternative establishes future management direction for the park reflecting public input and fundamental park values (+)</p> <p>This alternative would tend to polarize opinions and attitudes (+ and -)</p> <p>Direct and indirect lifestyle consequences most apparent to neighbors and visitors to the park (+ and -)</p> <p><u>Conclusion:</u> economic impacts: short term, negligible to minor beneficial and long-term minor to moderate beneficial; community services impacts: indeterminate and negligible; traffic and emergency services: negligible adverse over the short and long term over most of the region, and long term minor adverse north of the park (Crestone/Baca Grande area); attitudes and lifestyles impacts: indeterminate</p>
Health and Safety	<p>No new risks from wildfire</p> <p>Some increased risk of traffic accidents with increased visitation over time (-)</p> <p>Continued safety risk (negligible) associated with a managed bison herd in the park (-)</p> <p><u>Conclusion:</u> adverse, long term, negligible</p>	<p>No new risks from wildfire</p> <p>Reduced risk of traffic accidents due to visitor shuttle system, bicycle lanes, and hiking/biking path (+)</p> <p>Longer emergency response times to former Baca Ranch due to limited access and wilderness recommendation (-), and shorter emergency response times to Medano Ranch and guided learning zone due to NPS presence (+)</p> <p><u>Conclusion:</u> beneficial: long term, negligible to minor; adverse: long term, minor</p>	<p>Possible increased risk of wildfire from Medano Ranch structures being left unmaintained (-)</p> <p>Some increased risk of traffic accidents with increased visitation over time, and busier frontcountry (-)</p> <p>Reduced risk of traffic accidents from multi-use path (+)</p> <p>Longer emergency response times to former Baca Ranch and Medano Ranch areas due to limited access and wilderness recommendation (-)</p> <p><u>Conclusion:</u> beneficial: long term, negligible to minor; adverse: long term, minor</p>	<p>Increased risk of wildfire in the north due to new primitive campground (-)</p> <p>Reduced risk of traffic accidents due to redirection of visitor vehicles when dunes lot fills (+)</p> <p>Shorter emergency response times to former Baca Ranch, Medano Ranch and guided learning zone due to NPS presence and lack of wilderness recommendation (+)</p> <p><u>Conclusion:</u> beneficial: long term, negligible; adverse: long term, minor to moderate</p>
National Park Service Operations	<p>No to negligible impacts on NPS operations</p> <p><u>Conclusion:</u> no to negligible impacts</p>	<p>Increased operational burden from maintenance of additional facilities (trails, trailhead, bicycle lanes, Medano Ranch headquarters)(-)</p> <p>Increased operational burden from administering scheduled public activities at Medano Ranch, managing public use of the guided learning zone, managing a visitor shuttle system, patrolling the northern access/trailhead and new trails, and managing expanded wilderness (-)</p> <p><u>Conclusion:</u> adverse: long term, moderate</p>	<p>Increased operational burden from maintenance of additional facilities (expanded parking, restrooms, and multiuse path in frontcountry zone) (-)</p> <p>Increased operational burden from patrolling the frontcountry multiuse path, patrolling remote backcountry areas, providing emergency response services in remote areas, and managing expanded wilderness (-)</p> <p><u>Conclusion:</u> adverse: long term, minor to moderate</p>	<p>Increased operational burden from maintenance of additional facilities (trails, trailhead, primitive campground, Medano Ranch headquarters) (-)</p> <p>Increased operational burden from managing public day use at Medano Ranch and in the guided learning zone, managing the northern access / trailhead / primitive campground, and patrolling and maintaining new trails (-)</p> <p><u>Conclusion:</u> adverse: long term, moderate</p>

TABLE 26. SUMMARY OF IMPACTS OF THE ALTERNATIVES

Impact Topic	No-Action Alternative	NPS Preferred Alternative	Dunefield Focus—Maximize Wildness Alternative	Three Public Nodes Alternative
<p>Operations of Other Entities and Management Agencies</p>	<p>Doesn't provide for possible future evaluation of public vehicle access routes to the mountain front—a USFS and CDOW goal (-)</p> <p>Doesn't provide for a northern route or routes for hunting access to USFS lands (-)</p> <p>No burden placed on USFWS and the Baca Grande subdivision/ Saguache County to consider potential access routes across their respective lands in their planning processes</p> <p>Remediation expenses for possible degradation of near-pristine conditions on adjacent USFS lands not expected to increase beyond those projected from visitation trends</p> <p>No new wilderness-related effects on activities of other agencies and organizations</p> <p><u>Conclusion:</u> adverse: short and long term, minor</p>	<p>Provides for possible future evaluation of public vehicle access routes to the mountain front—a USFS and CDOW goal (+)</p> <p>Provides for a northern route or routes for hunting access to USFS lands (+)</p> <p>Burden placed on the Baca Grande subdivision / Saguache County to consider potential access routes across their respective lands in their planning processes (-)</p> <p>Possible increased remediation expenses for degradation of near-pristine conditions on adjacent USFS lands (-)</p> <p>Burden on other agencies to ensure that their activities on NPS lands are conducted in a way that protects wilderness values (-)</p> <p><u>Conclusion:</u> beneficial: long term, minor; adverse: short and long term minor to moderate</p>	<p>Doesn't provide for possible future evaluation of public vehicle access routes to the mountain front—a USFS and CDOW goal (-)</p> <p>Provides for a northern route or routes for hunting access to USFS lands (+)</p> <p>No burden placed the Baca Grande subdivision / Saguache County to consider potential access routes across their respective lands in their planning processes</p> <p>Remediation expenses for possible degradation of near-pristine conditions on adjacent USFS lands not expected to increase beyond those projected from visitation trends</p> <p>Burden on other agencies to ensure that their activities on NPS lands are conducted in a way that protects wilderness values (-)</p> <p><u>Conclusion:</u> adverse: short and long term, minor to moderate</p>	<p>Provides for possible future evaluation of public vehicle access routes to the mountain front—a USFS and CDOW goal (+)</p> <p>Provides for a northern route or routes for hunting access to USFS lands (+)</p> <p>Burden placed on USFWS and the Baca Grande subdivision/ Saguache County to consider potential access routes across their respective lands in their planning processes (-)</p> <p>Possible increased remediation expenses for degradation of near-pristine conditions on adjacent USFS lands (-)</p> <p>No new wilderness-related effects on activities of other agencies and organizations</p> <p><u>Conclusion:</u> beneficial: long term, minor; adverse: short and long term, minor to moderate</p>



Chapter Five: Consultation and Coordination

SUMMARY OF PUBLIC INVOLVEMENT, INCLUDING SCOPING

To date, public involvement for the Great Sand Dunes National Park and Preserve General Management Plan has included:

- one preliminary community-based workshop (about 40 participants)
- 12 public meetings in five communities (total attendance about 222)
- four wilderness hearings in four communities (testimony by about 50 individuals)
- five newsletters (334 comments received)
- 60-day public review of the draft GMP (3,394 comments received)
- quarterly (or more frequently) Advisory Council public meetings since January 2003
- numerous informal and formal meetings in communities by the Advisory Council, park superintendent, and park staff

PRELIMINARY WORKSHOP

A three-day workshop: “Community-Based Ecosystem Stewardship,” was held in Alamosa, Colorado, on November 19–21, 2002. The National Park Service hosted the workshop with the goal of developing solid working relationships among people committed to effective management of public lands within Great Sand Dunes National Park and Preserve. Approximately 40 participants, primarily from the San Luis Valley and representing various formal and informal groups, attended. Participants also included representatives from neighboring federal and state land management agencies.

SCOPING

In January 2003, the public was notified of the Great Sand Dunes GMP effort via three methods: (1) a *Federal Register* notice of intent to prepare an environmental impact statement, (2) distribution of Great Sand Dunes GMP Newsletter 1, and (3) a press release announcing public scoping meetings for the GMP.

Newsletter 1, January 2003

- provided an overview of the Great Sand Dunes system and the Great Sand Dunes National Park and Preserve Act of 2000
- introduced the Great Sand Dunes Advisory Council
- discussed the concepts of general management planning and wilderness review
- outlined GMP issues and a general schedule for development of the GMP
- invited the public to attend four public scoping meetings about the GMP

Scoping Public Meetings

Seventeen people attended the Alamosa, Colorado, meeting held on February 13, 2003. Twenty-three people attended the Crestone, Colorado, meeting on February 14, 2003. Twelve people attended the Golden, Colorado, meeting held on February 20, 2003, and 13 people attended the Westcliffe, Colorado, meeting on February 21, 2003. Many questions were answered and about 33 comments were

received at these meetings. Superintendent Steve Chaney held a supplemental informal question and answer session in Crestone in April 2003. About 80 people attended this meeting.

Great Sand Dunes National Park Advisory Council members also held formal and informal meetings with various groups and individuals to identify planning issues and concerns. Council members then shared this information with the planning team during advisory council meetings.

Seventy written scoping comments were received by mail, e-mail, or Internet between February 13, 2003 and May 31, 2003.

PLANNING FRAMEWORK

All GMP planning must be done within the framework of the purpose and significance of the park and applicable laws. The public was invited to contribute to the development of that planning framework.

Newsletter 2, November 2003

- provided a synopsis of comments received from Newsletter 1 and the public scoping meetings
- reviewed the park purpose, significance, mission, and interpretive themes
- outlined special park mandates including the advisory council, water resources, wilderness, hunting, fishing, trapping, domestic livestock, and the Closed Basin Project
- discussed fundamental resources and values including the dunes system, natural diversity, human connections, and visitor opportunities

- updated the planning steps and status of the wilderness review

Seventeen written comments were received by mail, e-mail, or Internet between June 23, 2003 and January 3, 2004.

Newsletter 3, April 2004

- summarized comments received from the second public comment period
- revised and condensed fundamental resources and values statements
- summarized an interagency meeting related to Great Sand Dunes planning
- provided a wilderness review update
- provided a Great Sand Dunes National Park Advisory Council update
- provided a planning steps update

ALTERNATIVE DEVELOPMENT

After identifying issues and concerns and establishing the planning framework, the National Park Service identified desired future conditions (goals) consistent with addressing these concerns and issues, and developed management zoning strategies that would achieve the goals identified above. Finally, alternative ways of achieving those goals were developed with public input.

Newsletter 4, July 2004

- discussed parkwide desired conditions (goals)
- provided an overview of the draft management zones
- updated the status of the wilderness review

- provided an advisory council update
- discussed alternative management concepts

Twenty-four comments were received by mail, e-mail, or Internet between January 4, 2004 and August 19, 2004.

Newsletter 5, January 2005

- presented refined alternatives
- discussed actions considered but dismissed
- provided a planning steps update
- invited the public to attend four public meetings

Public Meetings on the Alternatives

Ten people attended the Alamosa, Colorado, meeting held on January 31, 2005; about 40 people attended the Crestone, Colorado, meeting on February 1, 2005; four people attended the Golden, Colorado, meeting held on February 8, 2005; and six people attended the Westcliffe, Colorado, meeting on February 2, 2005. Many questions were answered and about 50 comments recorded at these meetings.

About 140 additional written comments were received by mail, e-mail, or Internet between August 20, 2004 and February 24, 2005.

Using input from the public and considering the probable environmental consequences and costs of the alternatives, the planning team developed a preferred alternative. Development of the preferred alternative is discussed in appendix E. A draft general management plan and environmental impact statement was

produced and distributed for public review.

Newsletters and draft documents were also available online.

Great Sand Dunes National Park Advisory Council meetings, which were held every few months and were open to the public, included additional opportunities for public comment. Great Sand Dunes Superintendent Steve Chaney also held several separate, informal question and answer sessions in Crestone as the need arose. These sessions were well attended.

DRAFT GENERAL MANAGEMENT PLAN

The draft General Management Plan / Wilderness Study / Environmental Impact Statement (GMP/WS/EIS) for Great Sand Dunes National Park and Preserve was on public review between May 1 and June 30, 2006. A total of 3,394 comments were received via written letters, e-mails, and Web responses. In addition, four public meetings with wilderness study hearings were held in Crestone, Alamosa, Westcliffe, and Denver, Colorado, in mid-May.

There were 3,394 written comments received during the comment period. Of those, 3,326 were letters with nearly identical content (form/campaign letters). Nearly 50% of the comments came from the San Luis Valley and about 66% were from individuals.

The following summarizes the primary GMP topics addressed in the comments (wilderness study comments are found at the end):

Access. This topic generated by far the most comments. There are subtopics of access to the northwest portion of the park,

access to national forest lands (including Liberty Road), as well as access in general. Nearly all the agencies and organizations commented on access to the northwest portion of the park, as did most individuals. The focal point of the issue was using roads through Baca Grande subdivision or the Baca National Wildlife Refuge and how far into the park motor vehicles would be allowed. The plan proposes to defer this decision until a cooperative planning effort specific to the issue can be concluded.

Most of the respondents from the Baca Grande subdivision opposed access through the subdivision, although some supported it. Most of the general public supported access through the subdivision; however, they also favored ending motorized access at a trailhead located away from sensitive resources (at or near the park boundary). The USFS, CDOW, and several individual supporters proposed using or preserving the possibility of using Liberty Road for public motorized access to the Baca Mountain Tract for hunting and recreation. A similar number of Baca Grande residents, organizations, and individuals specifically opposed opening Liberty Road to public motorized access.

The USFWS cited their policies for new roads in a refuge, concluding that constructing a road into the park through the refuge is inappropriate for the foreseeable future. Friends of the San Luis Valley National Wildlife Refuge asked the National Park Service to drop all references to that option in the preferred alternative. Finally, several individual respondents specifically stated that motorized access to the park backcountry would be inappropriate.

Alternative Selection and Overall Plan.

The overwhelming majority of agency, organizational, and individual respondents gave overall support for the preferred

alternative. Descriptive words such as strongly, enthusiastically, and heartily were common. The Environmental Protection Agency rated the preferred alternative as “LO” which indicates a lack of objections (their highest rating). There were, however, some suggestions to change elements of the preferred alternative, primarily as it addressed wilderness and access. The USFS, CDOW, and several individuals (form letters) challenged the adequacy of the document for an insufficient range of alternatives, primarily related to access (Liberty Road), and elk management. The Colorado Historical Society questioned the adequacy of the identification and evaluation of historic properties, and disagreed with some of the findings of effect. The USFWS questioned the sufficiency of the information to adequately evaluate the nature of effects on some federally listed species.

Wildlife Management/Hunting. About a third of respondents, including the USFS, CDOW, and individuals via form letters, addressed this topic. Some thought the GMP should be more specific about elk management. Some expressed concern that management of the elk herd in the area would be hampered if motorized access and harassment techniques to accommodate harvesting through hunting were hindered by closed roads and no mechanized equipment, which they felt would be the case with the wilderness recommendation proposed in the preferred alternative. Some expressed concern about NPS permit requirements to carry firearms and game through the park. Some suggested that the park be opened for hunting, while others were concerned about the impact of hunting on the Baca Grande subdivision (from where it is allowed on adjacent USFS land). A few comments were received from organizations and individuals that supported natural methods of wildlife

management, including reintroduction of natural predators.

Facilities. About half the organizations and individuals commented on facilities. Most wanted no new facilities in the park. They felt new facilities such as roads, parking areas, and campgrounds should be located outside or at the boundary of the park. Only a few individuals favored minimal new development of primitive campgrounds and roads. Several horseback groups and riders asked for improved horse trailer parking near the visitor center.

Bison. This topic was primarily addressed by organizations rather than individuals. The Nature Conservancy and several supporting groups presented information and arguments opposing the proposal in the preferred alternative wherein the National Park Service would likely not manage a herd of bison if The Nature Conservancy stops managing its herd. The Jicarilla Apache Tribe supported retaining bison.

Sensitive and Fragile Resources. Most of the organizations and many individuals supported inclusion of all fragile and sensitive areas (such as Deadman Creek and riparian areas) within the wilderness recommendation for increased protection and for directing visitors away from these areas. Those organizations and letters also supported the expedited purchase of mineral rights on the former Baca and Medano ranches, archeological surveys of the entire park and subsequent protection of archeological sites, and removal of roads

to qualify more land for wilderness designation. A few individuals supported protecting cultural resources through the use of the guided learning zone.

Wilderness Study. The wilderness study was conducted within the GMP, but to comply with special wilderness study requirements public involvement for the wilderness study has been somewhat separated. Distinct hearings were held during the public meetings, and written comments regarding wilderness were compiled separately. There was substantial support for the wilderness recommendation presented in the GMP. Most organizations, most unaffiliated individuals, Saguache County, and more than 3,000 form letters supported the recommendation. There was a significant amount of information provided related to the benefits of wilderness designation. Many organizations and 3,000-plus form letters favored including additional lands (northwest and southwest corners of the park) in the wilderness recommendation. CDOW and some individuals expressed concern about wilderness designation interfering with elk management. The USFS thought there should be more information on existing roads, wilderness condition, and restoration needs. Backcountry Horsemen and some unaffiliated individuals were opposed to wilderness designation for various reasons.

Comment letters and summaries of comments received, with responses, are included later in this chapter.

CONSULTATION

Consultation with most agencies and tribes for the development of this GMP/wilderness study was initiated in 2004. A series of interagency meetings (for federal and state agencies) on the GMP/wilderness study were hosted by the National Park Service during the planning process. The first meeting was held in November 2004, to aid understanding of the different agencies' missions, roles, and concerns related to management of lands in and near the Great Sand Dunes. The second meeting was held in April 2004, and its purpose was to share the National Park Service and ACHP's preliminary ideas about management alternatives for the national park and preserve and to get feedback on these ideas. The third meeting was held in March 2005, and its purpose was to gather input from the agencies on more detailed alternatives for the park.

Two key federal agencies involved in the GMP planning process are the USFWS (San Luis Valley National Wildlife Refuge) and the USFS Rio Grande National Forest, land management agencies on the east and west side of the park and preserve. The USFWS sent a comment letter on the draft GMP. The USFWS stated that their policies probably would not allow an access road through the refuge to the northwest corner of the park. The access would have to be directly tied to a wildlife-dependent activity and the USFWS would have to justify the road for refuge purposes first. The National Park Service and the USFWS held a follow-up meeting on July 28, 2006, to discuss and clarify USFWS comments. The USFWS sent a follow-up letter stating that public vehicle access across the refuge will not occur during the life of the GMP. Both letters are included in a subsequent section of this chapter.

The USFS Rio Grande National Forest also sent a comment letter on the draft GMP. They expressed the desire for the GMP to leave the option open to analyze a vehicle access alternative to USFS lands and invited the National Park Service to be a cooperating agency in their planning effort for the Baca Mountain Tract. The USFS also expressed concerns about elk management and the permitting system for hunters and other USFS users.

The National Park Service initiated Endangered Species Act, section 7 consultation with the USFWS (Colorado field office) in January 2005, to determine the presence of federally listed threatened, endangered, and candidate species in the park. The USFWS responded on February 15, 2005, with a list of species potentially occurring in Alamosa and Saguache counties. The National Park Service delivered the draft GMP/EIS to the USFWS, along with a letter requesting concurrence, in April 2006. Comments by the USFWS on the draft GMP/EIS prompted a meeting between the National Park Service and the USFWS on September 20, 2006, to discuss revised treatment of the southwestern willow flycatcher, yellow-billed cuckoo, bald eagle, and Mexican spotted owl in the final GMP/EIS. A revised memo requesting concurrence with the determinations for federally threatened, endangered, and candidate species, along with relevant sections of the revised GMP/EIS was delivered to the USFWS on December 14, 2006. Additional consultation took place regarding the NPS preferred alternative, and the revised text serves as the biological assessment for this consultation. The USFWS issued a letter of concurrence on January 24, 2007.

The National Park Service initiated consultation with the Colorado SHPO in January 2005. The Colorado SHPO responded on January 13, 2005, indicating that it concurred with the intent to use the NEPA process and documentation to comply with section 106 of NEPA.

On September 19, 2006, the National Park Service met with staff of the Colorado SHPO and clarified its intent not to use the NEPA process and documentation to

comply with section 106 of the NHPA for specific projects identified within the GMP, diverging from its previous position. The National Park Service will comply with section 106, in accordance with 36 CFR 800, as it proceeds with further projects and plans as identified in the actions identified in table 27. Additional consultation took place regarding cultural resources in the GMP/WS/EIS. The Colorado SHPO issued a letter of concurrence on January 18, 2007.

TABLE 27. FUTURE ACTIONS REQUIRING COMPLIANCE WITH SECTION 106 OF THE NHPA

Action	Section 106 Compliance
<ul style="list-style-type: none"> ▪ New bicycle lanes along the park entrance road 	<p>The National Park Service will comply with section 106 in accordance with 36 CFR 800 for the proposed new bicycle lanes.</p>
<ul style="list-style-type: none"> ▪ Entrance station replacement in a new location near the park entrance 	<p>The National Park Service will comply with section 106 in accordance with 36 CFR 800 for the proposed entrance station replacement.</p>
<ul style="list-style-type: none"> ▪ Adaptive use of Medano Ranch headquarters for an NPS administrative center and for public uses on a limited, scheduled basis 	<p>The National Park Service will comply with section 106 in accordance with 36 CFR 800 for the proposed adaptive reuse and other management of Medano Ranch. This would include consultation on rehabilitation, maintenance (including lack of maintenance), new construction, and other management of Medano Ranch including structures and landscape elements.</p>
<ul style="list-style-type: none"> ▪ Management and maintenance (including lack of maintenance) of other buildings and structures including but not limited to the superintendent's house, cabins in wilderness areas, stamp mill, etc. 	<p>The National Park Service will comply with section 106 in accordance with 36 CFR 800 for the management including maintenance (including lack of maintenance) or removal of buildings and structures. This would include evaluation of NRHP eligibility.</p>
<ul style="list-style-type: none"> ▪ New access road and trailhead in the backcountry access zone in the northern portion of the park 	<p>The National Park Service will comply with section 106 in accordance with 36 CFR 800 for proposed new access road and trailhead in the northern backcountry access zone.</p>
<ul style="list-style-type: none"> ▪ New trails in undetermined locations within the backcountry adventure and guided learning zones 	<p>The National Park Service will comply with section 106 in accordance with 36 CFR 800 for all proposed new trails.</p>
<ul style="list-style-type: none"> ▪ New hiking/biking path connecting Pinyon Flats campground to dunes parking area and visitor center 	<p>The National Park Service will comply with section 106 in accordance with 36 CFR 800 for the proposed new hiking/biking path connecting Pinyon Flats campground to the dunes parking area and visitor center.</p>

TABLE 27. FUTURE ACTIONS REQUIRING COMPLIANCE WITH SECTION 106 OF THE NHPA

Action	Section 106 Compliance
<ul style="list-style-type: none"> ▪ Other projects and management plans (i.e., elk management plan, wilderness management plan, noxious weed management plan, commercial services management plan) 	<p>The National Park Service will comply with section 106 in accordance with 36 CFR 800 regarding other management plans and projects. The 1995 nationwide programmatic agreement among the National Park Service, National Conference of State Historic Preservation Officers, and the ACHP will be followed.</p>

The National Park Service initiated consultation with affiliated tribes on January 5, 2004, when a letter was sent to each tribe notifying them of the GMP effort. The letter included as enclosures the GMP newsletters published to date. It also invited the tribes to participate in the planning effort. A year later, on January 11, 2005, a letter was sent to each tribe inviting representatives to participate in a March 2005 meeting of the Great Sand Dunes National Park Advisory Council; the Oglala Lakota and Jicarilla Apache tribes responded affirmatively and participated in the meeting. On February 8, 2005, the National Park Service sent another letter to the tribes regarding a land exchange effort that is not directly related to the GMP. This letter included a reminder that the National Park Service also seeks their input on the GMP. Park staff conducted follow-up meetings and telephone calls with representatives from several tribes throughout the planning process.

More than 20 American Indian tribes have been informed of the ongoing general management planning process, and were sent the draft GMP and invited to consult further. Two tribes, the Comanche Tribe and the Pueblo of Laguna, responded to the draft GMP/ WS/DEIS with letters, and two tribes requested consultation meetings.

Southern Ute Tribe. On June 5, 2006, members of the GMP planning team met with the NAGPRA coordinator of the Southern Ute Tribe in the cultural affairs office at tribal headquarters in Ignacio, Colorado. The draft plan was presented and discussed. The only comment by the Tribe was for the National Park Service to keep the plan as flexible as possible so the National Park Service can react as conditions change in the future.

Jicarilla Apache Tribe. On June 6, 2006, members of the GMP planning team met with several members of the Jicarilla Apache Tribe at tribal headquarters in Dulce, New Mexico. Attendees included the president and vice president of the Jicarilla Apache Culture Committee and the director of the Jicarilla Apache Culture Center. The team presented the plan and discussed details and issues. The only issue that generated any significant discussion was the NPS proposal to probably not continue a bison herd if The Nature Conservancy chooses to discontinue bison management. The genetic condition of the existing herd and the confirmed presence of cow genes was discussed. The tribal representatives commented that genetic purity was not the important factor. How the herd is fed (free range) is more important. It was pointed out that the National Bison Association is working to remove cow genes from bison. It was also

pointed out that the state of Colorado considers bison a wild animal. The tribe expressed an interest in the bison herd being managed as wild in its natural state, much the same as elk and deer. Also discussed was that the current land used to manage the herd (40,000 acres) was too small for a free-ranging herd and that it might be more feasible if more land becomes available for a free-roaming bison

herd. With that in mind, the discussion ended with a desire on the part of the tribe to change the wording in the GMP, putting more emphasis on being flexible to possible changing future conditions than on “probably not continue.” They suggested they would send formal comments on the draft GMP, which would include new wording for the bison issue.

**LIST OF AGENCIES AND ENTITIES CONTACTED FOR INFORMATION
OR SENT A COPY OF THE PLAN**

Federal Agencies

Advisory Council on
Historic Preservation
Bureau of Land
Management
Bureau of Reclamation
Federal Highway
Administration
U.S. Environmental
Protection Agency
U.S. Fish and Wildlife
Service
U.S. Forest Service
U.S. Geological Survey
U.S. Natural Resources
Conservation Service
USDA Resource
Conservation and
Development

Tribes

Cheyenne and Arapahoe
Tribes of Oklahoma
Comanche Indian Tribe of
Oklahoma
Hopi Indian Tribe
Jicarilla Apache Indian Tribe
Kiowa Tribe of Oklahoma
Navajo Nation
Northern Arapaho Indian
Tribe
Northern Cheyenne Indian
Tribe
Pine Ridge Oglala Lakota
Indian Tribe
Pueblo of Acoma
Pueblo of Cochiti
Pueblo of Jemez
Pueblo of Picuris
Pueblo of San Juan
Pueblo of Santa Clara
Pueblo of Taos
Pueblo of Zia

San Juan Southern Paiute
Tribe
Southern Ute Tribe
Uintah and Ouray Ute Tribe
Ute Mountain Ute Tribe
White Mesa Ute Tribe

**U.S. Senate / House of
Representatives**

Senator Wayne Allard
Senator Ken Salazar
Representative Bob
Beauprez
Representative Diana
DeGette
Representative Joel Hefley
Representative Scott
McGinnis
Representative Marilyn
Musgrave
Representative John T.
Salazar
Representative Thomas
Tancredo
Representative Mark Udall

State Agencies

Colorado Division of Water
Resources
Colorado Division of
Wildlife
Colorado Historical Society/
State Historic
Preservation Office
Colorado State Forest
Service
Colorado State Land Board
Colorado State Parks

Other Agencies and Organizations

Alamosa County, Colorado
Baca Grande Library—
Crestone, Colorado
Baca Grande Water and
Sanitation District
Colorado College Library
Colorado Mountain Club
Friends of the Dunes
National Parks and
Conservation Assoc.

Saguache County, Colorado
San Luis Valley Ecosystem
Council
Southern Peaks Public
Library—Alamosa,
Colorado
The Nature Conservancy
The Wilderness Society
West Custer County
Library—Westcliff,
Colorado

REVIEW OF THE DRAFT GENERAL MANAGEMENT PLAN REVISION / WILDERNESS STUDY / ENVIRONMENTAL IMPACT STATEMENT

This section includes substantive comments received during the public review period from May 1 to June 30, 2006, on the Draft General Management Plan Revision / Wilderness Study / Environmental Impact Statement. Approximately 300 copies were sent to individuals, organizations, agencies, and tribes. The draft document was also posted on the National Park Service Web site.

WRITTEN COMMENTS

In accordance with CEQ regulations implementing NEPA, all letters from federal, state, or local agencies, and American Indian tribes, as well as all substantive public comments, must be reprinted in the final environmental impact statement. Responses must be provided to substantive comments. Comments are substantive if they:

- question, with reasonable basis, the accuracy of information in the environmental impact statement

- question, with reasonable basis, the adequacy of the environmental analysis
- suggest different viable alternatives
- cause changes or revisions in the proposal

In other words, comments are substantive if they raise, debate, or question a point of fact or a point of policy from an alternative. Comments in favor or against the proposed action or alternatives, or comments that only agree or disagree with NPS policy, are not considered substantive.

Letters and Web comments from agencies and tribes on the Great Sand Dunes National Park and Preserve Draft General Management Plan Revision / Wilderness Study / Environmental Impact Statement are reprinted here in full, along with NPS responses to substantive comments. Substantive comments from organizations and individuals are summarized for brevity. Full letters, Web comments, and meeting transcripts are a part of the project administrative record.

April

June 2008



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18TH STREET- SUITE 200
DENVER, CO 80202-2466
Phone 800-227-8917
<http://www.epa.gov/region08>

Ref: 8EPR-N

JUN 27 2006

Suzy Stutzman, Lead Planner
National Park Service
Intermountain Region
12795 West Alameda Parkway
P.O. Box 25287
Denver, CO 80225-0287

RE: Great Sand Dunes National Park and
Preserve, General Management Plan and
Wildness Study Draft EIS, Alamosa and
Saguache Counties, Colorado

Dear Ms. Stutzman:

The Environmental Protection Agency (EPA) Region 8 has reviewed the Draft Environmental Impact Statement (DEIS) for the General Management Plan (GMP) and Wilderness Study for the Great Sand Dunes National Park and Preserve. The following comments are provided in accordance with our responsibilities and authorities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act (CAA).

The purpose of the plan is for this recently-designated National Park to manage its resources in a manner that will preserve them unimpaired for future generations, while also providing opportunities for visitor use and enjoyment. Some aspects of the Park Service's Preferred Alternative include recommendation for wilderness status for the northeastern portion of the Park known at the Dunesfield Focus, and limiting access to the Big Spring and Little Spring areas to guided public access, while maintaining one existing visitor center as the main access route into the Park and Preserve.

1.

Water Resources and Wetland Management We concur with the Preferred Alternative presented in the GMP that if the Medano Ranch lands are transferred to the Park Service, surface irrigation for bison forage would be discontinued. Restoration of Sand, Big Spring, and Little Spring Creeks could be enhanced if the flow is allowed to remain within their natural drainage rather than being redirected to irrigate hay meadows. The elimination of the current irrigation practice could be designed to mimic pre-existing riparian conditions. We suggest the Final EIS further define the proposed study of this change in water flow management. The study should investigate whether other unimpaired stream(s) in a similar ecosystem could be identified and used to establish these management goals and objectives. We note that the proposed guided learning management zone is well suited to direct public access away from sensitive wetland

Response 1: Goals and desired future conditions are established within the GMP, but analysis is conducted at a more detailed level of planning. Big and Little Springs are unique gaining streams. It would be difficult to find another stream with similar characteristics. The current water regime has been in place for over 100 years. Decisions associated with reverting the system back to a "natural" water regime will be driven by water rights and the Closed Basin Project. "Natural" will need to be defined since the system within park boundaries would be depositing into an altered system outside the park. Additional studies and research would be required to determine if restoration is even possible, and would need to be designed for this unique system, not to mimic another system. This type of research and study is beyond the scope of the GMP and would be conducted in a separate study. Please refer to "Desired Conditions for the Dunes" and "Biological Diversity, Natural Resources, and Diversity Strategies."

areas. These sensitive areas could be compacted by foot traffic or result in the introduction of non-native plant species if a less controlled visitor plan were adopted for the ecologically fragile lands surrounding Big and Little Springs.

2.

Vegetation Management The Preferred Alternative presented in the GMP indicates that the Park Service would identify and manage nonnative plant species and possibly eliminate some nonnative plant stands. EPA supports this goal, as it is well recognized that nonnative species are a significant threat to maintaining sustainable ecological conditions. Methods used to control nonnative species include mechanical elimination, herbicide application or the introduction of beneficial insects. These controls are expensive and usually require repeated treatments over several seasons. EPA suggests that special attention be given to nonnative species in wetland and riparian areas, as these ecosystems are rare and highly valued by the visitor. Canadian thistle (*Cirsium arvense*), leafy spurge (*Euphorbia esula*), and whitetop (*Cardaria pubescans*) are perennial nonnative plants that can dominant wetland areas and exclude all native plant species. The Final EIS could provide further information about the available budget, methods, and priorities for controlling nonnative species on and adjacent to the Park and Preserve.

Response 2: As stated in response 1, nonnative plant species management is beyond the scope and analysis of the GMP. This would be conducted under a resource management strategy or another implementation plan. Please refer to "Desired Conditions for the Dunes" and "Biological Diversity, Natural Resources, and Diversity Strategies."

3.

Elk Management According to the Forest Service and the Colorado Division of Wildlife there is a significant overpopulation of elk in the Sangre de Christo range with rapid habitat degradation in portions of the Sangre de Christo Wilderness. Some recommendations provided by the Forest and DOW would eliminate the Dunefield Focus area from wilderness recommendation and make it a national preserve in order to allow public hunting or DOW-administered hazing to prevent concentration of elk. We recognize that the Park Service plans a 3-year study of elk management to study its options to resolve the problem of excessive numbers of elk in the Park and adjacent Forest lands. However, public hunting access, especially if were to include vehicular access, into the Dunefield Focus area could undermine the objective to maintain that area unimpaired for future generations. Risks to the ecosystem due to hunter vehicular access include the spread of nonnative plant species, increased wildfire risk, and risks to public safety. We think the Preferred Alternative which will provide a route across the Park for hunter access to Forest lands where hunting is permitted is appropriate, but not a significant factor in reducing the 6000 elk in the San Luis Valley herd to a sustainable level. Consequently, we concur with the Park's intention to proceed with the Dunefield Focus Wilderness recommendation while the Park Service and DOW study means other than public hunting to control the elk herd size.

Response 3: As stated in response 1, an elk management plan is beyond the scope and analysis of the GMP. An elk management plan will address elk management options including hunting in cooperation with the Colorado Division of Wildlife, the U.S. Forest Service, and U.S. Fish and Wildlife Service.

Results from the first year of the elk study indicate there are about 2,000 fewer animals than originally estimated, and that the size of the herd has declined by about 1,000 animals over the last six years.

Access for hunting on U.S. Forest Service land and in the preserve on Liberty Road is addressed and allowed under certain conditions—please refer to the "Management Zones," "Administrative Zone" section of the GMP.

4.

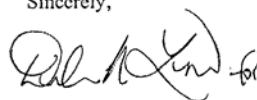
Tribal Consultation In March 2005, the Hopi Tribe indicated to the Park Service that the 'lakes' situated within the dunes are important to the Tewa people living on the Hopi Reservation. We suggest the Final EIS present the results, if any, of the Park Service's and the Hopi Tribe's consultation process and whether the Preferred Alternative presented in the GMP would adversely impact these areas of importance to these native people. There may be opportunities for the visitors to the guided learning management zone which includes Big Spring and Little Spring areas to understand the historical cultural value of these resources to the Tewa culture.

Response 4: The Hopis were contacted during scoping and the National Park Service received a response during scoping. The Hopis received a copy of the draft GMP/WS/EIS, but did not respond during the comment period on the draft GMP/WS/EIS.

EPA evaluates the potential effects of a Proposed Action and the adequacy of information in a Draft EIS. The Park Service's Preferred Alternative is rated by EPA as "LO" under EPA's rating criteria, which is enclosed. The "LO" rating means that our review has indicated a lack of objections to the proposed action. We do suggest that the Final EIS include additional information about the change in irrigation management on the Medano Ranch, priorities for nonnative plant species management, clarify the ecological risks associated with hunter access in the Dunefield Focus area in response to recommendations provided by the Colorado Division of Wildlife and the Forest Service, and summarize the results of tribal consultations, especially with the Hopi Tribe.

Weston Wilson of my staff has coordinated EPA's comments. He can be reached at the address above, by telephone at (303) 312-6562, or by e-mail at wilson.wes@epa.gov. Thank you in advance for considering our comments.

Sincerely,



Larry Svoboda
Director, NEPA Program
Office of Ecosystems Protection
and Remediation

Enclosure:

cc: Peter Clark, Rio Grande National Forest, Monte Vista, Colorado
Leigh Kuwanwisiwma, Hopi Tribe, Kykotsmovi, Arizona

**U.S. Environmental Protection Agency Rating System for Draft Environmental Impact Statements
Definitions and Follow-Up Action***

Environmental Impact of the Action

LO - Lack of Objections: The Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC - Environmental Concerns: The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO - Environmental Objections: The EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU - Environmentally Unsatisfactory: The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1 - Adequate: EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 - Insufficient Information: The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

Category 3 - Inadequate: EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment, February, 1987.

2064



U.S. Fish and Wildlife Service



San Luis Valley National Wildlife Refuge Complex
9383 El Rancho Lane • Alamosa, CO 81101
Phone (719) 589-4021 • Fax (719) 587-0595

July 11, 2006

Steve Chaney, Superintendent
Great Sand Dunes National Park and Preserve
11500 Highway 150
Mosca, Colorado 81146-9798

Dear Mr. Chaney:

I am writing with comments on the Draft General Management Plan/Wilderness Study/Environmental Impact Statement for Great Sand Dunes National Park and Preserve (Park). My primary concern with this plan is related to the issue of vehicular access to the Park and how that may influence the adjoining Baca National Wildlife Refuge.

The preferred alternative contains provisions that would allow public vehicular access to the Backcountry Access Zone in the northwestern corner of the Park. In the discussion on "Public Access to Federal Lands in the North - Ongoing Collaboration" the reader is left with the impression that future planning efforts by the U.S. Fish and Wildlife Service may result in access across refuge lands to the access zone on the Park.

Recently the Fish and Wildlife Service issued a final policy on appropriate uses of National Wildlife Refuges. A copy of this policy is enclosed. This policy provides guidelines to refuge managers in deciding whether a proposed use is appropriate on any refuge. The National Wildlife Refuge System Improvement Act of 1997 defines six wildlife-dependent public uses, including hunting, fishing, wildlife observation and photography, and environmental education and interpretation as appropriate uses of refuges when they are determined to be compatible with the purpose of the refuge. All other proposed refuge uses must be evaluated for their appropriateness. The procedures contained in this policy describe the initial decision process the refuge manager follows when first considering whether or not to allow a proposed use on a refuge by passing ten criteria.

In considering the public using a road across the Baca National Wildlife Refuge simply to access the Park's Backcountry Access Zone it does not satisfy the following three criteria:

- 1) **The use is not manageable within available budget and staff.** Construction and maintenance of new roads are out of the realm of feasibility at the refuge's current level of funding, as is the conversion of any existing roads to this use.
- 2) **The use is not manageable in the future within existing resources.**

Chapter Five: Consultation and Coordination

- 3) **The use does not contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, nor does the use benefit the refuge's natural or cultural resources.** The refuge is rich in natural and cultural resources. Without thoughtful interpretation, vehicular access across the refuge in order to reach the Park's Backcountry Access Zone will not contribute to public understanding and appreciation for those resources. Without a significant visitor management effort such access can easily jeopardize these resources.

5.

I request that you modify the discussion in "Public Access to Federal Lands in the North – Ongoing Collaboration" to wording that more clearly illustrates to the reader that construction of new roads or conversion of existing Refuge roads closed to the public, for the purpose of allowing public access to the Park is an inappropriate activity for the foreseeable future. Please contact me if you would like to collaborate on text to communicate this situation to the public.

I appreciate the difficulty surrounding this access question and am committed to working with you until it is resolved.

Sincerely,

Michael Blenden
Project Leader

Enclosures

Cc: Rick Coleman – Refuges/Region 6
Dave Wiseman – Refuges/Region 6
Michael Spratt – Refuges/Region 6

Response 5: Based on this letter, the following letter, and further discussions with the U.S. Fish and Wildlife Service, the preferred alternative in the final GMP has been modified. The area abutting the refuge has been changed to backcountry adventure zone no longer allowing the possibility of public vehicle access from the refuge. Please refer to map and description of the preferred alternative.



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mountain-Prairie Region

MAILING ADDRESS:
Post Office Box 25486
Denver Federal Center
Denver, Colorado 80225-0486

STREET LOCATION:
134 Union Blvd.
Lakewood, Colorado 80228-1897



IN REPLY REFER TO:

NWRS/ALM 5.20
Mail Stop 60130

AUG 11 2006

Steve Chaney, Superintendent
Great Sand Dunes National Park and Preserve
11500 Highway 150
Mosca, Colorado 81146-9798

Dear Mr. Chaney:

I am writing to you concerning the letter dated July 13, 2006, that you received from Ron Garcia, Refuge Manager, Baca National Wildlife Refuge (Refuge), and Mike Blenden, Project Leader, San Luis Valley National Wildlife Refuge Complex (Complex), commenting on the Draft General Management Plan/Wilderness Study/Environmental Impact Statement for Great Sand Dunes National Park and Preserve (Park). The need for this letter of clarification was identified at a meeting on July 28, 2006, which included you, National Park Service planning staff, Michael Blenden, and Ron Garcia.

The July 13 letter described why building new roads or using already existing roads on the Refuge solely to provide visitor access to the Backcountry Access Zone (identified in the Draft General Management Plan) is not an appropriate use of a National Wildlife Refuge. The letter did not address hypothetical, wildlife-dependent use that may result from our future planning efforts. In the July 28 meeting, you described your need to know from the United States Fish and Wildlife Service (Service) whether future development of wildlife-dependent public use on the Refuge may or may not facilitate access to the Backcountry Access Zone during the 15-20 year life of the Park General Management Plan.

The question is whether or not it is possible that any future, wildlife-dependent public use of the Refuge will be sited in a way to be compatible with Refuge purposes and provide access to the Backcountry Access Zone. Based upon the professional judgment of the management staff of the Complex and from specialists in our Regional Office, I can say that at least for the life of the Park's General Management Plan, the Service will not be developing any wildlife-dependent public use on the east side of the Refuge that would require visitors to traverse substantial amounts of refuge habitat and that would subsequently facilitate access to the Backcountry Access Zone on the Park. Wildlife-dependent public use may eventually occur on the east side of the Refuge and even near the Park's Backcountry Access Zone, but bringing visitors to these

Steve Chaney, Superintendent

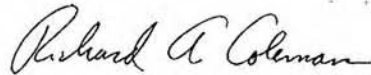
2

points using the Lexam Road or constructing a new road from the northern, western, or southern boundary would be cost prohibitive and incompatible with the purpose of the Refuge.

I hope this adds the clarity you need to state in the General Management Plan that access to the Backcountry Access Zone from roads on the Refuge is not a practical option.

Thank you for considering the needs of the National Wildlife Refuge System in developing the General Management Plan for Great Sand Dunes Park and Preserve. Please let me know if you need more information or assistance with this or any other matter of mutual interest. You may telephone me at (303) 236-4303.

Sincerely,



Richard A. Coleman, Ph.D.
Assistant Regional Director
National Wildlife Refuge System

07/24/06 14:51 FAX 3632364035 US FISH & WILDLIFE 2068



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Colorado Field Office
P.O. Box 25486, DFC (65412)
Denver, Colorado 80225-0486

IN REPLY REFER TO:
ES/CO: NPS/Sand Dunes
Mail Stop 65412

JUL 24 2006

Mr. Steve Chaney
Suprintendent
Great Sand Dunes National Park and Preserve
11500 Highway 150
Mosca, Colorado 81146-9798

Dear Mr. Chaney:

The U.S. Fish and Wildlife Service (Service) received your letter and draft General Management Plan/Wilderness Study/Environmental Impact Statement (GMP/EIS) for the Great Sand Dunes National Park and Preserve in Alamosa and Saguache Counties, Colorado, on April 19, 2006. Your letter requested concurrence with your determination that the proposed plan may affect, but is not likely to adversely affect the Canada lynx (Lynx canadensis) and that other Federally-listed species that may occur in the management action area be dismissed from further analysis based on no anticipated impact to those species. These following comments have been prepared under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C 1531 et. seq.) and the Interagency Cooperation Regulations (50 CFR 402).

The Service believes that there is not sufficient information to adequately evaluate the nature of the effects on Federally-listed species and cannot provide a concurrence for your determination of effects at this time. We are submitting the following comments and questions regarding your letter and GMP/EIS:

- 6. 1) General Comment - The rationale for "dismissing" species is not clear in either the letter or the GMP/EIS. Is the dismissal based on lack of habitat for these species, or is it based on the likelihood that impacts will not occur? The dismissal of the yellow-billed cuckoo, southwestern willow flycatcher, bald eagle, and Mexican spotted owl should be discussed further with the Service.
7. 2) Table 4, Boreal Toad - Please note that the boreal toad is no longer a candidate for Federal listing.

Response 6: Based on further consultation with the U.S. Fish and Wildlife Service, the rationale for dismissal of species has been further clarified in the final GMP/W/S/EIS to differentiate between absence of the species or habitat versus the lack of anticipated impacts to the species. Please see specific comments and responses below.

Response 7: The boreal toad classification as a candidate for federal listing has been deleted.

07/24/05 14:00 FAX 3032001005

- 8. 3) Table 4, Gunnison Sage Grouse – Please note that the Gunnison Sage Grouse is no longer a candidate species for Federal listing.
- 9. 4) Table 4, Yellow-Billed Cuckoo – We do not agree with the statement that there is “not suitable habitat in the park”. We should discuss this further.
- 10. 5) Table 4, Southwestern Willow Flycatcher - We do not agree with the statement that there is “not suitable habitat in the park”. We should discuss this further.
- 11. 6) Table 4, Bald Eagle – If bald eagles are using the San Luis Lakes State Park, which is relatively close to the park line, we should probably have a more thorough analysis of the potential for the bald eagle to use the park.
- 12. 7) Table 4, Mexican Spotted Owl - We do not think that suitable fields surveys have been done to be able to say that there are no Mexican spotted owls in the park.
- 13. 8) Page 1, Uncompahgre Fritillary Butterfly – Sovell 2005 is not in the reference section.
- 14. 9) Page 3, Yellow-Billed Cuckoo - The text says that Rawinski (2004) reported a cuckoo in the park in 1984, but Rawinski is not in the references. If there was a report of the cuckoo in the park, why is this species dismissed from analysis?
- 15. 10) Page 3, Yellow-Billed Cuckoo - The Service generally considers a patch size of greater than 10 acres of riparian habitat to be large enough for evaluation as habitat for the cuckoo. We agree that the park has narrow riparian corridors, but we should evaluate the patch sizes within the park more thoroughly.
- 16. 11) Page 3, Southwestern Willow Flycatcher - The Service generally considers a patch size of 0.25 acres or greater that contains dense riparian vegetation that is more than 5 feet in height to be suitable habitat for the flycatcher. Small stringers of riparian vegetation can be suitable if they are connected to a larger block or if a number of small stringers are in close proximity to each other.
- 17. 12) Page 4, Bald Eagle - Same comment as #7.
- 18. 13) Page 4, Mexican Spotted Owl - As stated in Comment # 8, we do not think that suitable fields surveys have been done to be able to say that there are no Mexican spotted owls in the park. Areas that should be considered as spotted owl habitat include mixed conifer forests (ponderosa pine and Douglas-fir, and often white fir) on steep slopes (greater than 40%), and often in a canyon or rocky outcropping setting.

Response 8: The Gunnison sage grouse classification as a candidate for federal listing has been deleted.

Response 9: Willow/cottonwood stands, which may serve as potentially suitable habitat for this species, do occur along the Medano, Sand (particularly lower), Little Medano, and Mosca creeks. Since potentially suitable habitat is present, the GMP/EIS has been revised to consider that the potential for occurrence of the species does exist (although there is no documented use of the habitat by these birds), and therefore, potential impacts have been analyzed and a determination of “may affect – is not likely to adversely affect” has been added. Please refer to the “Threatened and Endangered Species” sections of chapters three and four.

Response 10: The habitat requirements for the southwestern willow flycatcher are similar to those of the yellow-billed cuckoo. Since potentially suitable habitat is present, the GMP/EIS has been revised to consider that the potential for occurrence of the species does exist, and therefore, potential impacts have been analyzed and a determination of “may affect – is not likely to adversely affect” has been added. Please refer to the “Threatened and Endangered Species” sections of chapters three and four.

Response 11: Suitable bald eagle winter roost sites exist along Sand Creek. Since potentially suitable habitat is present in scattered cottonwood stands along Sand Creek, as well as the occurrence of the winter roost site, the GMP/EIS has been revised to consider that the potential for occurrence of the species does exist, and therefore, potential impacts have been analyzed and a determination of “may affect – is not likely to adversely affect” has been added. Please refer to the “Threatened and Endangered Species” sections of chapters three and four.

Response 12: Based on slope, aspect, and vegetative cover, potential habitat for the Mexican spotted owl occurs along the western slope of the Sangre de Cristo range in the eastern portion of the park and preserve. The National Park Service will conduct a separate NEPA analysis for the development of new trails through the area potentially supporting the Mexican spotted owl and conduct owl-specific surveys to support that effort. A determination of “may affect – not likely to adversely affect” is appropriate. Refer to the “Threatened and Endangered Species” discussion in chapters three and four.

Response 13: Sovell reference has been added to bibliography.

Response 14: Please see comment 9, The Rawinski report has been added to the bibliography.

Response 15: Please see response 9.

Response 16: Please see response 10.

Response 17: Please see response 11.

Response 18: Please see response 12.

Page 3

19.

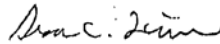
14) Page 4, Mexican Spotted Owl - Recreational activities, including hiking, can adversely affect spotted owls, specially if the activity is near an active nest site.

20.

15) Page 4, Canada lynx - The elevational range for the lynx is typically 8,000 to 12,000 feet (not 9,000 to 14,500 feet) and the habitat is typically a closed-canopy forest (not open canopy).

The Service appreciates the opportunity to review the letter and GMP/EIS and looks forward to working further on this plan with your staff. If the Service can be of further assistance, please contact Leslie Ellwood of my staff at (303) 236-4747.

Sincerely,



Susan C. Linner
Colorado Field Supervisor

cc: FWS-ES-CO (T. Ireland)

References: Projects\NPS\NPS_SandDunesGMP_FWSCComments

Response 19: Please see response 12.

Response 20: The U.S. Fish and Wildlife Service is satisfied with the current treatment of the Canada lynx in the EIS; however, a statement has been included in the mitigation measures for Canada lynx that indicates that if den sites are identified in the future, protective measures would be established through further discussions and consultation with the U.S. Fish and Wildlife Service.



United States
Department of
Agriculture

Forest
Service

Rio Grande National Forest

1803 West Hwy 160
Monte Vista, CO 81144
719-852-5941

2024

File Code: 1900
Date: June 30, 2006

Steve W. Chaney
Superintendent
Great Sand Dunes National Park and Preserve
11500 Hwy 150
Mosca, CO 81146

Dear Steve:

I am pleased to have the opportunity to comment on the Great Sand Dunes National Park and Preserve General Management Plan/Wilderness Study Draft Environmental Statement (DEIS). As the Forest Supervisor of the neighboring land management agency and also a recipient of portions of the former Baca Ranch, I have a great interest in the Great Sand Dunes National Park and Preserve General Management Plan (GMP).

I am encouraged by the National Park Service commitments in the GMP to work collaboratively with the Park's neighbors. However, I believe that the two most important issues to the Forest Service are not adequately addressed in the proposed alternatives in the DEIS. These issues are 1) providing public motorized access through the National Park to National Forest lands and 2) management of the burgeoning elk population which is having an adverse effect on habitats within the National Forest.

I previously sent you a letter dated February 14, 2005 with 10 concerns that I asked to be addressed in the DEIS. I do not feel that these have been adequately addressed in the GMP. These concerns are still valid and they need to be fully addressed in the FEIS and GMP. The Colorado Division of Wildlife (CDOW) also sent you a letter, which I could not find in the DEIS, that provides you with CDOW's issues and concerns regarding the elk population and elk management. I fully agree and support their input to the GMP analysis.

I have several specific topics that I want to bring to your attention in this letter.

(1) Cooperating Agency

21.

The issues articulated in this letter are of great importance to me in my responsibilities to appropriately manage the National Forest Baca Mountain Tract. Therefore, I am requesting that you grant me Cooperating Agency status under 40 CFR 1501.6, to ensure that these concerns are fully considered in your analysis and GMP. Although we have been working with you on an informal basis up to this point, I feel it is appropriate to request formal Cooperating Agency status in this analysis to ensure that our two agencies work more closely together on the development of the final GMP. I also encourage you to request that both the US Fish and Wildlife Service, as a neighboring federal agency involved with access to the National Park, and the Colorado Division of Wildlife, with expertise and responsibility for elk management, be invited to become Cooperating Agencies as well.

Response 21: To accomplish the intent of the cooperating agency section of NEPA, the U.S. Forest Service would have needed to become a cooperating agency earlier in the planning process. At this late stage, there would be little benefit to the U.S. Forest Service as a cooperating agency. The only noteworthy difference would be the requirement to allow the U.S. Forest Service the opportunity to review and comment on language changes in the final GMP/WS/EIS prior to the document being released to the public, which will happen without entering into a formal agreement. The U.S. Forest Service has agreed to this approach and requested that the National Park Service be a cooperating agency in their forest plan amendment planning effort for the Baca Mountain Tract.



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JUL 11 03 2006 01:09PM P2

FAX NO. : 7193786310

FROM : GRSB

I feel strongly that the three affected federal agencies and the CDOW should be closely working together to ensure that each agency's goals and mission are being met. This would also dovetail well with the current efforts of Saguache County and the Sonoran Institute to come to a multi-agency resolution of access to the National Park and the National Forest.

The Rio Grande National Forest has initiated our planning effort for the Baca Mountain Tract. I am proposing that our two agencies conduct our management planning for our portions of the Baca Ranch concurrently so that the public is effectively engaged once and the efforts are as compatible as possible. I encourage you to join the Forest Service as a cooperating agency as we amend our Forest Plan to add the Baca Mountain Tract under the direction of our Land and Resource Management Plan for the Rio Grande National Forest.

(2) Public Access to the National Forest

22.

There are substantial NEPA weaknesses in the DEIS regarding the access issue. The DEIS Purpose and Need for the GMP includes the need to define public access (p. 7) and a key issue defined in the DEIS is access to other federal lands (p. 33). However, the DEIS never substantively responds to the stated purpose and need for the GMP relative to the access issue in any alternative. While the DEIS and GMP appear to address the issue of public access to the National Forest, in reality there are no alternatives in the DEIS which provide any public motorized access to the National Forest. Instead, the DEIS inappropriately postpones an analysis of access to the National Forest to an uncertain future analysis and decision. This violates NEPA by segmenting the decision and avoiding an issue which is ripe for decision at this time.

The FEIS and GMP need to address this issue directly. The Forest Service will work as a collaborative agency with you on an alternative which provides unrestricted motorized public access through the National Park to the National Forest.

23.

The DEIS should also clearly describe the current existing access on the Liberty Road. The reader may be confused by the way the Liberty Road is discussed in the DEIS. It appears as an afterthought and as only the fourth possible access route to the National Forest, when in reality it is the only current existing access route. It should be described as the existing route and then compared with other alternative access routes which could be developed in the future.

(3) Wilderness

While it may not be readily apparent to the DEIS reader, the area of the Baca Ranch has been intensively used since Euro-American settlement with roads, water developments, livestock grazing, mining and habitation. It was an intensively used ranch until just a few years ago. The Baca Ranch lands are not in a pristine condition. Both the newly acquired National Park and Forest Service lands are in similar condition and neither agency owns the mineral estate. The Forest Service will also be conducting a wilderness suitability assessment in the Baca Mountain

Response 22: The GMP does not preclude public vehicle access, nor does it guarantee such access. The National Park Service has determined that the decision should not be made at this time. There is not sufficient information to assess impacts of motorized public access to the national forest until it is known what the U.S. Forest Service plans are for the area. The Baca Grande subdivision and Crestone community are also involved in a planning process involving access options. The GMP leaves flexibility in the preferred alternative to consider vehicle access options in cooperation with the U.S. Forest Service in the future as management options are assessed.

Response 23: Additional text has been added to the GMP to further describe Liberty Road, please refer to chapter one, "Relationship to GMP and Other Planning Efforts, Liberty Road."

Tract through our Forest Plan amendment analysis. My initial assessment is that it is unlikely that the Baca Mountain Tract would meet the wilderness suitability criteria used by the Forest Service.

24.

The DEIS for the GMP recognizes the past human development and influence on Baca Ranch lands but then determines that these lands can be restored to wilderness and thereby declares them eligible for wilderness designation. However, the GMP does not include the actual restoration activities which would be required to make them suitable for wilderness in any alternative. I applaud the GMP for recognizing the need for restoration. I would like to see these restoration activities included in at least one of the alternatives. This should also include the cost and likelihood of each of these restoration actions actually occurring, so the public has a complete understanding of this commitment. There should also be more discussion on why the existing roads would be compatible with wilderness condition and how the National Park Service would obtain the privately owned land and mineral rights within the proposed wilderness. Without a commitment in the GMP that the land would be restored to wilderness condition, it seems that the proposed wilderness designation is unrealistic.

Response 24: The National Park Service conducted a wilderness suitability study as part of this planning process. The proposed wilderness does meet NPS criteria for wilderness. Some human development does not disqualify land from wilderness designation. Restoration actions for wilderness are not within the scope of the GMP; however, the GMP does include a strategy to develop a wilderness management plan. Please refer to "Appendix G: Wilderness Study and Recommendation."

(4) Range of Alternatives

The DEIS/GMP suffers a NEPA weakness in that the analysis is constrained by a range of alternatives which are too narrow. I would like to see the alternatives expanded to include the discussion below.

25.

I encourage you to consider a new alternative or expand an existing alternative to provide restoration activities in the GMP to allow wilderness designations to be meaningful. I strongly disagree with the DEIS assessment that the Baca Mountain Tract is in near pristine condition. As stated in the Wilderness topic heading above, the land has been historically impacted. I would like to work closely with the National Park Service as a collaborative agency on restoration needs -- especially on topics such as existing noxious weeds, the multitude of roads from the National Park onto the National Forest, and working together with the CDOW toward maintaining the elk population within herd objectives (which affects both land management agencies).

Response 25: Please see responses 2, 3, and 24.

26.

As previously discussed, the EIS also needs an alternative which provides public motorized access to the National Forest across the National Park on the existing Liberty Road. This could be accomplished in the GMP or by providing the Forest Service with a road easement or similar authorization to use the road. This is the only existing feasible access route to the National Forest. The public currently has legal access on Saguache County roads through the Baca Grande subdivision to the National Park Liberty Gate. The Liberty Road then extends across the National Park for .7 miles and then onto the National Forest for the length of the western boundary of the Baca Mountain Tract.

Response 26: Please see response 22.

Developing this alternative would provide the National Park Service with an alternative(s) to develop management options for the public entering the National Park from a parking lot located on the National Forest. This alternative would result in reduced impacts to the National Park from new roads and parking currently proposed in the GMA Preferred Alternative. Any parking

lot and associated trail system into the National Park could be developed collaboratively between our two agencies, including mitigation measures to minimize visitor impacts to the National Park.

(5) Elk

27. As previously stated, the Forest Service has concerns over the impacts of the existing elk herds on habitat and other wildlife on the National Forest including the Baca Mountain Tract. The National Park Service recognizes the need to manage wildlife populations when they exceed the carrying capacity of the habitat in other National Parks. For example, Rocky Mountain National Park is addressing elk management due to overpopulation and impacts on habitat inside and outside that National Park. I think it is essential that the GMP be proactive on this issue and provide a management plan, or at least ensure there is flexibility in the GMP, to manage elk into the future for both the National Park and their neighboring land owners.

(6) Federal Advisory Committee Act of 1972 (FACA)

28. The access decision described in the GMA, p. 61, last paragraph misleads the public since it does not accurately reflect federal agency authorities and responsibilities, and violates the FACA. The DEIS should provide a clear definition of the roles of the public and the different agencies in the EIS/GMP process.

(7) Alaska National Interest Lands Conservation Act of 1980 (ANILCA)

29. The EIS should clearly describe both National Park Service and Forest Service obligations under the ANILCA to provide access to private in-holdings across federal lands and how this may affect the GMP. The EIS should research and provide an assessment of the future plans for these private in-holdings.

(8) Accessibility

30. I applaud the National Park Service's commitment to accessibility provided in the GMA, p.29, under Desired Conditions – Park Accessibility which is a mutually shared commitment by the Forest Service. However, I am concerned that the current north Liberty Road entrance to the National Park and the Forest Service lands, designed to prevent horses, is preventing people with disabilities from entering the National Forest. Because this is the current access to the National Forest, this access should be in legal compliance with Section 504 of the Rehabilitation Act of 1973 and the Architectural Barriers Act of 1968 Accessibility Standards provision 404.2.3 which provide for minimal requirements for wheel chair access. The GMP should ensure that all access facilities to the National Forest through the National Park comply with these requirements.

Response 27: As stated in response 3, an elk management plan will address elk management options in cooperation with the Colorado Division of Wildlife, the U.S. Forest Service, and U.S. Fish and Wildlife Service.

Results from the first year of the elk study indicate that the elk population is significantly smaller than originally estimated (please see response 3), and that the herd is at a level well below "carrying capacity," or the number of animals the area's habitat can support.

The next two years of the study will focus on assessing the impacts of elk grazing on grasses, shrubs, and trees within the national park, national wildlife refuge, adjacent national forest, and The Nature Conservancy lands. Efforts will also be aimed at refining estimates of ecological carrying capacity and assessing the health of the herd.

Response 28: The National Park Service cannot implement construction of a road or parking area in the backcountry access zone unless Saguache County constructs 0.2 mile of road on its right-of-way that is contiguous with the national park boundary or develops another right-of-way to the boundary, as explained later in the paragraph to which you refer.

Response 29: The provisions in Alaska National Interest Lands Conservation (ANILCA) regarding access to private inholdings do not apply to the National Park Service, except in Alaska. However, the National Park Service will continue to provide access to the inholdings on U.S. Forest Service land through either Cow Camp Road or Liberty Road, depending on the results of the joint planning effort referenced in the GMP.

Response 30: The GMP states under the preferred alternative that if no long-term solution for public vehicle access is found, the National Park Service will install gates for horses in the northern portion of the park. Language has been added that these gates would also be pedestrian and wheelchair accessible. The current situation is temporary and interim.

31.

(9) Maps

Please include the wording "Baca Mountain Tract" on all maps showing the "Rio Grande National Forest Addition." This will help the public recognize the Baca Mountain Tract Forest Plan amendment analysis which is concurrent with this GMP analysis.

Also, please show the existing Liberty Road crossing the National Park in the GMA on the map on p. 55.

It is difficult to see the existing Liberty Road because it is covered by the Forest Service/National Park Service boundary on all maps. It would be clearer to the reader if the existing Liberty Road was shown on all maps adjacent to the boundary line rather than under it as it is currently shown.

Response 31: Maps have been relabeled as suggested. Maps have also been revised to illustrate Liberty Road across the park and along the National Park Service/U.S. Forest Service boundary.

32.

(10) Noxious Weeds

I would like to see noxious weeds management specifically addressed in the GMP with a map of the current condition. Noxious weed management needs to be addressed in a cooperative manner.

Response 32: Please see response 2.

I compliment you on the tremendous amount of work you have done on this planning effort. I appreciate the working relationship we have enjoyed to date and I look forward to working with you as a cooperative agency to address the above concerns and finish the GMP.

Sincerely,

for

Peter L. Clark
PETER L. CLARK
Forest Supervisor/Center Manager

cc:

Tom Spezze - Colorado Division of Wildlife
Mike Blenden, U. S. Fish and Wildlife Service



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The Colorado History Museum 1300 Broadway Denver, Colorado 80203-2137

May 8, 2006

Steve W. Chaney
Superintendent
Great Sand Dunes National Park and Preserve
11500 Highway 150
Mosca, CO 81146-9798

Re: General Management Plan and Wilderness Study (CHS# 47837)

Dear Mr. Chaney:

Thank you for your recent correspondence dated April 14, 2006 (received by our office on April 17) regarding the project noted above.

Previous correspondence with your agency has indicated your office's intent to use the NEPA process and documentation to comply with the requirements of Section 106 of the National Historic Preservation Act (NHPA) as stipulated in 36 CFR 800.8(c) (NPS letter dated January 5, 2005).

33.

It is our opinion that an important step in managing the cultural resources of the Great Sand Dunes National Park and Preserve (GSDNPP) is identifying the presence and nature of those resources. While the draft plan/EIS provides much information in this regard, as noted in numerous places in the document (for example, on page 211 with regard to the NPS preferred alternative) much of the park has not been surveyed for historic properties because it has until recently been privately owned. As a result, the full extent and nature of the historic properties located within the GSDNPP and the effect of the undertaking on them remains unknown. Consequently, the draft EIS fails to meet the requirements of Section 106 of the NHPA, as stipulated in 36 CFR 800.8(c) (1)(ii) which states that the agency official shall "identify historic properties and assess the effects of the undertaking on such properties in a manner consistent with the standards and criteria set forth in Sections 800.4 and 800.5", and the requirements of Section 110 of the NHPA, specifically Section 110 (a)(2)(A) which states "that historic properties under the jurisdiction or control of the agency, are identified, evaluated, and nominated to the National Register". Please note that addressing the identification and evaluation of historic properties within the GSDNPP in a proactive manner with regard to Section 110 allows for a more effective and streamlined approach to meeting the requirements of your Section 106 responsibilities when undertakings within the GSDNPP are planned.

General Management Plan and Wilderness Study (CHS# 47837)

Response 33: In a subsequent meeting with the Colorado Historical Society/State Historic Preservation Society (SHPO), it was determined that their comments were written with the misunderstanding that the National Park Service was using the GMP/EIS to satisfy its section 106 requirements, based on language in the initial NPS letter dated January 5, 2005, and reinforced with language in the GMP/DEIS. Thus, the Colorado SHPO responded to the National Park Service with references to 36 CFR 800.8 (c) in its comment on the GMP/DEIS, and other comments about shortcomings such as inadequate identification of cultural resources. The National Park Service clarified, in further consultation with the SHPO, that it intends that the GMP/DEIS be a conceptual planning document that outlines broad management directions such as zoning, with only a few specific projects identified. The National Park Service did not intend to use the GMP/EIS to satisfy its section 106 compliance per 36 CFR 800.8, and fully recognizes that it will need to comply with section 106 for specific projects in the future. Clarifying language has been added to "Impacts to Cultural Resources and Section 106 of the National Historic Preservation Act" section and text throughout the final GMP.

2008

34. In addition, we look forward to consulting with you regarding "measures that might avoid, minimize or mitigate any adverse effects of the undertaking on historic properties", as stipulated in 36 CFR 800.8(c)(1)(v). Presently, general and specific project actions with the potential to affect known historic properties are described in various locations in the document (for example, on pages 211-214 with regard to the NPS preferred alternative); as the full extent and nature of historic properties within the area of potential effect (APE) has yet to be identified such actions have the potential to affect additional historic properties.

Response 34: Please see response 33.

35. With regard to Table 27 ("Compliance with Section 106 of the National Historic Preservation Act") on page 304, our office has the following comments:

- Construction of new bikes lanes along and a new fee booth near the park entrance road are described as not having an "adverse effect on a historic property and therefore would not require consultation with the Colorado SHPO". On the contrary, it is our opinion that such undertakings have the potential to affect historic properties. Identification of the area of potential effect (APE) for these undertakings, determination of the presence or absence of historic properties within the APE, and determination of the effect (whether adverse or not) of the undertaking on such resources if present therefore should occur in consultation with our office. Unless we enter into a Programmatic Agreement with your office, our office should be consulted at each step within the Section 106 process. Section 106 provides for consultation with our office regarding each undertaking, beginning with the scoping process through the final project decision (see 36 CFR 800.16(f)).
- Four additional actions in the table are described as having the "potential to adversely affect a potentially eligible historic property and therefore would require consultation with Colorado SHPO [but] if it is determined that a resource is not eligible, consultation would not be required for that resource." As noted above, identification and evaluation of historic properties and evaluation of effect must occur in consultation with SHPO.

Response 35: Table 27 has been revised to clarify section 106 requirements for specific projects in the preferred alternative.

Thank you for the opportunity to comment on this project. If we may be of further assistance please contact Greg Wolff, Section 106 Compliance Coordinator for Archaeology, at (303) 866-4674 and/or Amy Pallante, Section 106 Compliance Coordinator for Architecture, at (303) 866-4678.

Sincerely,

Georgianna Contiguglia
State Historic Preservation Officer

GC/GAW

2020

STATE OF COLORADO
 Bill Owens, Governor
 DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE
 AN EQUAL OPPORTUNITY EMPLOYER
 Bruce McCloskey, Director
 6060 Broadway
 Denver, Colorado 80216
 Telephone: (303) 297-1192



June 28, 2006

Steve Chaney,
 Great Sand Dunes National Park and Preserve Superintendent
 National Park Service
 11500 Hwy 150
 Mosca, CO 81146

Dear Steve Chaney,

Subject: Colorado Division of Wildlife Comments to the Draft General Management Plan

On behalf of the Colorado Division of Wildlife (DOW), I would like to thank you for the opportunity to comment on the GSRA Draft General Management Plan (GMP). My staff has reviewed the plan, and the following comments reflect the findings in that review.

36.

My staff was unable to locate the letter that we submitted during the last comment period for this plan in the current draft. That letter is attached to this document as the comments made in that document are still valid and the most recent draft of the GMP fails to address the concerns we expressed in that letter.

Response 36: This letter has been added to appendix I.

In addition to our prior letter there are a few items in the GMP that I wish to address now.

Regarding the draft plan comments on pages 209, 247 and 273 which address the number of hunters, harvest rates and impact to the elk herd population; we need to clarify these statements.

The GMP reads, "Estimated numbers of hunters who might want to access the preserve and adjacent USFS lands to hunt elk range from 20-30 for each of the three 5-day seasons; equating to 60 to 90 hunters annually. The preserve and adjacent USFS lands are in CDOW game management unit 82. The success rate for elk hunters in GMU 82 in 2004 was 34% total, with 66% of harvested elk being cows. Based on the 2004 harvest rates and CDOW estimates for numbers of hunters, the potential number of elk not harvested from the preserve and adjacent USFS lands is estimated to range from 14 to 20 cows and 6-9 bull elk. Given that, at an estimated herd size of nearly 6,000 elk, the San Luis Valley herd is approximately four times larger than the 1,500-animal goal established by the CDOW. Removal or no removal of 14-20 cow elk and 6-9 bull elk would not make a substantial difference in efforts to reduce the size of this herd."

DEPARTMENT OF NATURAL RESOURCES, Russell George, Executive Director
 WILDLIFE COMMISSION, Jeffrey Crawford, Chair • Tom Burke, Vice Chair • Claire O'Neal, Secretary
 Members, Robert Bray • Brad Coors • Rick Enstrom • Richard Ray • James McAnally • Ken Torres
 Ex Officio Members, Russell George and Don Arment

37.

The above statements refer only to the National Preserve and those National Forest lands which are accessible only through National Park lands. Overall harvest in unit 82 is significantly greater. For example in 2005, total harvest in unit 82 was estimated at 332 elk. Of those 332 harvested elk, 215 were antlerless elk and 107 were antlered elk. Of the 215 antlerless elk taken that year, 90 plus antlerless elk were taken by hunters on special management hunts that were conducted on lands that will become National Park lands in the future. Since the implementation of these special management hunts in 2002 they have contributed an average of 140 antlerless elk to the harvest in GMU 82. These harvest rates have had a significant influence to the distribution of elk in GMU 82. Continued management hunts and/or harassment directed at elk in this area along with good hunter access to the Preserve and adjacent National Forest lands must continue in order to help address the elk management issues in this area.

38.

On page 269 of the draft plan the statement:
"Providing guided hiking and equestrian trails in the guided learning zone, located within the San Luis Lakes/Sand Creek ecologically critical area, would provide beneficial impacts to rare plant communities..."

Any and all accesses and special uses not related to hunting and fishing on the San Luis Lakes State Wildlife Area (SWA) are subject to review and approval by the Division of Wildlife. Such applications will be reviewed to determine compatibility with the purposes of the SWA. Applications for Special Use Permits are available through the Monte Vista office of the Colorado Division of Wildlife.

If you have any questions regarding these comments please contact Rick Basagoitia at the Monte Vista office.

Respectfully,

Rick Basagoitia
Area Wildlife Manager – Monte Vista
Colorado Division of Wildlife

rb

cc: John Bredehoft, Asst. Director – Field Operations
Tom Spezze, SW Region Manager – Durango
Scott Wait, Senior Terrestrial Biologist – Durango
Ron Rivale, District Wildlife Manager – Alamosa North
Brad Weinmeister, Terrestrial Biologist – Monte Vista

Response 37: The Colorado Division of Wildlife Web site was used for the harvest numbers for elk in game management unit 82 in the 2005 season. According to the Web site, the total number of elk harvested was 164. The number of bulls was 107. The ongoing elk research project data suggests that the herd size is smaller than previously estimated and declining in size. It is hoped that the completion of the current research will provide a better understanding of the dynamics of this particular herd of elk. The best information available will be used in the proposed elk management plan to allow management of the herd with access to limited space. Special management hunts and harassment are management options that will be analyzed; but, by law, recreational hunting in the national park is not permitted.

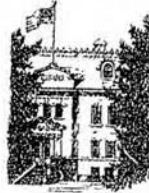
Access along Liberty Road for hunting on U.S. Forest Service land and in the preserve is addressed and allowed under certain conditions. Please refer to the "Management Zones, Administrative Zone" section of the GMP.

Response 38: The National Park Service would consult with the Colorado Division of Wildlife on access and special-use issues. Language regarding consultation is included in the GMP, please refer to "Table 1, Desired Conditions and Strategies, Relations with Private and Public Organizations, Adjacent Landowners, and Governmental Agencies," and the description of the preferred alternative.

2009

SAGUACHE COUNTY GOVERNMENT

501 FOURTH STREET
SAGUACHE, COLORADO
AREA CODE 719 ZIP CODE 81149



May 16, 2006

Superintendent Steve Chaney
Great Sand Dunes National Park and Preserve
11500 Hwy 150
Mosca, CO 81146

To Whom It May Concern:

The Board of County Commissioners met on May 16, 2006. The New Preferred Management Plan and the addition of the New Wilderness Area were discussed.

At this time we would like to let you know that the Saguache County Board of Commissioners is in unanimous support of the National Park Preferred Management Plan, which includes the addition of the New Wilderness Area.

We appreciate all of the work and effort that has gone into this process. Saguache County is very proud of the fact that we are the home of this beautiful new National Park.

Sincerely,

Mike Spearman
Chairman

Sam Pace
Commissioner
Joe Alexander
Commissioner

ASSESSOR
P.O. Box 38
655-2581

CLERK AND RECORDER
P.O. Box 176
655-2512


ADMINISTRATION
P.O. Box 655
655-2231

SHERIFF
P.O. Box 265
655-2544


TREASURER
P.O. Box 177
655-2656

2007

Office of:
The Governor
The Secretary
The Treasurer



PUEBLO OF LAGUNA
P.O. BOX 184
LAGUNA, NEW MEXICO 87028



(505) 552-6598
(505) 552-6854
(505) 552-6855

May 1, 2006

Mr. Steve Chaney
Superintendent
Great Sand Dunes National Park and Preserve
11500 Highway 150
Mosca, CO 81146-9798

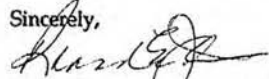
Dear Mr. Chaney:

RE: General Management Plan(GMP) and Wilderness Study

The Pueblo of Laguna appreciates your consideration of possible interest your project may have on traditional religious or cultural properties.

At this time Laguna Pueblo has determined that the proposed undertaking WILL NOT have an affect at this time, but in the event that any new archaeological sites are discovered and any items are recovered, we would like to be notified to review items.

Sincerely,



Roland E. Johnson, Governor
Pueblo of Laguna



May 30, 2006

Steve Chaney, Superintendent
National Park Service
Great Sand Dunes National Park and Preserve
11500 Highway 150
Mosca, CO 81146-9798

Re: Draft *General Management Plan/Wilderness Study/ Environmental Impact Statement* for
Great Sand Dunes National Park and Preserve

Dear Mr. Chaney:

Thank you for your letter of April 26th regarding the draft document as referenced above.

After review of the document, the Comanche Nation has no immediate concerns or issues regarding the draft plan; however, please keep us informed of progress. We also would like to receive any further archaeological reports and a copy of the new plan when finalized.

We look forward to your reports as planning proceed.

Sincerely,

A handwritten signature in cursive script that reads "Fred Nahwoosky".

Fred Nahwoosky, NAGPRA Coordinator

ORGANIZATIONS

Substantive comments received from organizations are summarized below and include responses from the National Park Service.

Baca Grande Property Owners Association (POA)

Comment: *Establishing the entrance to a national park through an existing community is without precedent in the U.S., as far as I can discern. That this seems likely to occur in our community, internationally known as a place to come for solitude and religious retreat, is not without irony.*

Response: Existing county roads within the subdivision currently provide pedestrian access up to the park boundary. The National Park Service proposes public vehicle access to a small trailhead/parking area for 10 to 15 vehicles in the park to provide access for hikers, backpackers, horseback riders, and hunters. Implementing a vehicular connection to the proposed backcountry access zone will require ongoing planning and collaboration with the community, Saguache County, and other agencies.

Comments: *While the Park Service does not specifically propose an entrance coming through the community, your plan creates a de-facto vehicle entrance, by creating a vehicle friendly “back country access” zone*

contiguous with the subdivisions southern boundary but inaccessible from any other direction.

Response: The backcountry access zone permits a vehicle access road to be constructed from the park boundary and within the park. However, currently, the backcountry access zone is not accessible from the subdivision (no road connection to the park boundary exists). The National Park Service cannot construct a road or parking area in the backcountry access zone until or unless Saguache County constructs 0.2 mile of road to the park boundary on its right-of-way or develops another right-of-way to the boundary.

Comment: *In addition, your plan provides for vehicular access to USFS lands through our subdivision without establishing or demanding any limits on the number of those vehicles. (Page 62, “...if no public vehicle access to the north part of the park could be found over the long term...the NPS would provide gates for horses [access to Forest Service land] at the north park boundary at Camino Real and Liberty Road.”)*

Response: The GMP has been amended to read “If no public vehicle access to the north part of the park could be found over the long term so that trailering

horses into the northern part of the park was not possible, the National Park Service would provide gates for horses at the north park boundary at Camino Real and Liberty Road and a partner would be sought to provide a horse trailhead facility outside the park.”

Comments: *While your plan calls for limiting the number of parking sites available inside the park and creating some sort of regulatory limit on the number of vehicles that can park there (should demand become excessive) it nowhere addresses limiting the number of vehicles entering through the park lands to access forest service lands. That number is likely to exceed, by far, the number of park visitor-vehicles only. This makes it quite difficult to estimate the actual number of vehicles that the NPS is proposing to allow entry to and begs the question of whether the USFS is circumventing its mandated public process in the development of its own general management plan.*

Response: The GMP addresses carrying capacity and proposes cooperative efforts with land managing agencies with whom the National Park Service shares a boundary. The USFS has expressed an interest in such a cooperative effort. Until the USFS conducts its planning for the Baca Mountain Tract, the National Park Service cannot analyze impacts, which is why this action has been deferred.

Backcountry Horsemen

Comment: *I am definitely against the ‘Wilderness’ designation. That word alone makes an area susceptible to crowding once the information gets out. Look at some of the areas outside of Silverton. They not only have destroyed the peace and quiet, the wildlife is habituated to the extent they come right into camp.*

Response: It is not anticipated that the area proposed for wilderness designation (the dunes and preserve are already designated wilderness) would experience high visitation. However, the GMP includes carrying capacity indicators and strategies, and calls for a wilderness management plan, to address these types of concerns. Please refer to the “Desired Conditions and Strategies” and “Management Zones” sections in chapters one and two.

Comment: *The game needs to be managed through hunting and what will in turn keep out disease.*

Response: Hunting is allowed in the preserve by the Great Sand Dunes Act of 2000; hunting is not allowed in the national park.

Front Range Backcountry Horsemen

Comment: *Please continue to consider pack and saddle stock travel as an alternative means to visit and view this unique place. It is*

a great opportunity to provide access to those who are physically unable to hike into the backcountry areas of the park and to preserve an important part of America's heritage.

Response: Horseback riding is allowed in most lands within the national park and preserve. Horseback riding would not be allowed in the dunes play zone and in the frontcountry zone, except for loading and unloading.

Trailwise Backcountry Horsemen

Comment: *Historically horses have been used in this area that is now the Great Sand Dunes National Park. We do not want to lose this privilege. The parking for horse trailers is a problem.*

- *Propose to improve the access and parking for horse trailers in the main dunes area (at the "point of no return" area, the Mosca Pass trailhead, and/or the amphitheater area).*

Response: As part of the no-action alternative, the horse loading area would be relocated from the amphitheater parking lot to a nearby area and redesigned. Park managers will seek input from horse groups regarding the design of the new horse loading area. This action would also, therefore, be a part of any of the action alternatives.

Center for Native Ecosystems (CNE)

Comment: *Wilderness. ...the NPS proposed management plan would protect portions of...Deadman Creek and San Luis Lakes PCAs (potential conservation areas). However, the proposed wilderness designation does not include the full extent of the PCAs. We encourage the PS to consider extending the wilderness boundary to include more or all of these PCAs. In the northwest corner of the Park, the NPS should consider moving the wilderness boundary north of the Cow Creek Road so as to encompass more of the Deadman Creek ecosystem and its surrounds. The NPS should also consider moving the wilderness boundary in the southwest corner of the Park to the southern and western boundaries of the Park, so as to include more of the rare and important sabkha ecosystem, encompassed by the San Luis Lakes PCA.*

Response: The existence of Cow Camp Road, an improved road, rendered most of the area to the north of the road ineligible for wilderness (please see appendix G). The revised, preferred alternative proposes to realign a portion of Cow Camp Road, which allows for a small area (257 acres) to be reclaimed and added to the proposed wilderness designation. The remaining land in the northwest is segmented by the backcountry access zone and creates isolated

parcels that are not appropriate sizes for wilderness. The remaining area is zoned as backcountry adventure, which would allow the land to remain relatively natural with minimal development.

In the southwestern portion, an additional parcel (1,705 acres) between Big and Little springs has been added to the proposed wilderness designation. The remaining remnants around Medano Ranch and including the sabkha, are not suitable for wilderness due to the Closed Basin Project, overhead powerlines, wells, and irrigation and other structures that are needed for the foreseeable future. The remaining land would be protected by the natural/wild zone.

Comment: *Bison. ...regarding bison...we believe the NPS should consider managing for a free-roaming wild bison herd. We defer to the scientific support cited in these comments and encourage the NPS to work closely with The Nature Conservancy to explore the possibility to managing for a wild bison herd in the Park.*

Response: Please see responses to The Nature Conservancy's comments.

Colorado Mountain Club

Comment: *First, we recommend that you consider creating a third wilderness category called*

'potential wilderness areas' and apply it to the block of land north of the Cow Camp Road once the northern access issue is resolved. All lands not intended to provide access to the mountain front in the northern section of the park should revert into a recommended wilderness status once the access decisions are made.

Response: Once the access route is determined, the remaining backcountry access zone would be converted to backcountry adventure zone. The existence of Cow Camp Road, an improved road, rendered most of the area to the north of the road ineligible for wilderness (please see appendix G, the preferred alternative text, and see previous Center for Native Ecosystems response above).

Comment: *Second, we recommend that you consider slightly redrawing the wilderness boundary in the southwest corner of the park in the Natural/Wild zone. Specifically, to facilitate manageability, we recommend that the wilderness boundary on the east side of this southwestern section be drawn to surround the administrative roads and facilities with a 100' buffer.*

Response: The preferred alternative wilderness recommendation includes an additional 1,705 acres between Big and Little Springs, northeast of Medano Ranch. The remaining remnants around Medano, are not suitable for wilderness due to the Closed Basin Project,

overhead powerlines, wells, irrigation and other structures that would need to be maintained for the foreseeable future. The remaining land would be zoned natural/wild and managed in a natural state. Please see previous CNE response.

Comment: *Support the wild and scenic rivers evaluation, but recommend that the NPS assess the values in Pole Creek and include the analysis in the final plan and decision.*

Response: Pole Creek is an intermittent stream and sufficient data has not been collected. The National Park Service is working with the USFS to collect data to evaluate Pole and Deadman creeks. These creeks will be evaluated when sufficient data is collected. Please refer to the “Desired Conditions and Strategies, Water Quality and Quantity.”

Comment: *Access on the north side of the park. We support the park’s decision to put the access decision on hold until a local decision-making process can play out.*

- *If via Cow Camp Road, recommend that the end (parking lot and trail head) be located further west to protect sensitive riparian values in Deadman Creek.*
- *If via Camino Real or Liberty Road, recommend parking lot and trailhead be located outside Deadman Creek area.*

Response: The final preferred alternative has been modified to further enhance protection of the Deadman Creek corridor. Please refer to the preferred alternative text and map.

Comment: *Medano Pass Road – We are concerned about possible impacts of dispersed camping along road corridor.*

Response: The National Park Service has designated a limited number of campsites along the road to confine and limit impacts. Camping is allowed in designated sites if camping is within the nonwilderness corridor and within 100 feet of Medano Creek. Parking and campfires are limited to established locations. Parking is allowed off-road only if it is not on vegetation. The park does not allow off-road travel to campsites.

Comment: *Four-wheel drive tours – The plan should more clearly state conditions for tours, and state why tours meet “necessary and appropriate” standards.*

Response: The four-wheel-drive tours that are offered provide park visitors who do not own a four-wheel-drive vehicle an opportunity to travel on the Medano Pass road (which allows vehicles). The visitor experience of driving on the sand on this primitive road has been identified as a fundamental resource and value, and therefore, meets the NPS criteria of “necessary.” This activity also meets all of the

“appropriate” criteria such as consistency with park values, services that do not compromise health or safety, that do not conflict with other uses, or that do not monopolize limited recreational experiences at the expense of the general public (see “Criteria for Commercial Services” in chapter one).

Comment: *We recommend that the GRSA seriously consider implementing a car shuttle in the developed area on crowded summer days.*

Response: The preferred alternative calls for transportation solutions; a shuttle system would be considered.

Comment: *...we urge the GRSA to commit in the final plan to undertaking and completing a capacity plan within five years of the final plan decision.*

Response: The National Park Service cannot commit to a time frame due to current funding restraints.

Comment: *Given the ecological importance of the PCA (Potential Conservation Sites) areas, we urge the GRSA to include management goals, strategies, standards, and guidelines for these areas.*

Response: The GMP includes parkwide goals and strategies for ecosystems and natural resources. Please refer to “Desired Conditions and Strategies, Ecosystem Management” and “Natural

Resources and Diversity” in chapter one.

Comment: *The plan should provide more information about user fees, such as NPS intentions for fees in addition to entrance fees (if any), how fees would be used, and should specify fee waivers for volunteers and low-income visitors.*

Response: Currently there is no plan for additional entrance and user fees but additional fee programs would be decided on a case by case basis according to NPS policy. Details about fees are beyond the broad management direction appropriate for a GMP.

Comment: *We recommend that the NPS check to make sure that the springs that supply water to backcountry travelers are not entirely within the guided learning zone and are available for restock by pedestrian travelers.*

Response: The text has been modified to address this comment. Please refer to “Future Conditions and Strategies, Water” in chapter one.

Comment: *We recommend that the final plan provide direction to the GRSA to acquire from willing sellers all mineral estates within the park, if NPS geologists are of the opinion that fluid mineral development is not at all a likelihood.*

Response: Strategies in the GMP include acquiring or modifying private

property, mineral rights, and water rights within the park, where possible, to minimize impacts on park resources and values. Please refer to the “Desired Conditions and Strategies” section in chapter one.

could have devastating environmental consequences.”

Response: The National Park Service is proposing a small trailhead with a parking lot. The National Park Service does not believe this modest facility would result in heavy vehicle traffic. The preferred alternative eliminates the portion of Cow Camp Road nearest Deadman Creek to better protect this riparian corridor.

Crestone Baca Land Trust

Comment: *We have been particularly concerned about maintaining viable wildlife corridors connecting the valley floor to the high meadows. One of our goals has been to prevent the creation of additional barriers to the movements of animals along these east-west corridors by discouraging inappropriate development. Heavy vehicular traffic on a north-south road across east-west corridors such as Cottonwood Creek could produce significant ecological damage.*

With a grant from the CDOW we have completed a biological survey of the Baca. The surveys indicate that the southwestern areas of the Baca Grande still retain a remarkable biological integrity, which could be destroyed by poorly planned development and increased vehicular traffic.

We have been particularly concerned over the health of the wetlands that we share with the National Wildlife Refuge. An access route along Camino Del Rey, for instance, with heavy vehicular traffic crossing the Spanish Creek wetlands

Friends of the San Luis Valley
National Wildlife Refuges

Comment: *We agree with the majority of the preferred alternative described in the draft management plan. Our concern is the proposed access to the northern section of the park. The proposed alternative states the “Assuming neighboring entities find a way to provide vehicle access, the trailhead would be accessed via the Baca National Wildlife Refuge or...” We believe that including this suggestion to provide access via the Baca refuge in the proposed alternative was inappropriate. This suggestion has created tremendous public pressure on the US Fish and Wildlife Service to provide access across the refuge when doing so violates their policies. An analogy would be if the US Fish and wildlife Service proposed to the public that the Great Sand Dunes should allow elk hunting within the park boundaries because the elk were damaging refuge*

resources. We believe that several alternatives for access to the northern part of the park exist, and that the suggestion to allow access across the Baca National Wildlife Refuge should never have been included in the draft management plan, and that any further plans regarding northern access not include this option.

Response: Based on ongoing collaboration with the USFWS, the National Park Service has modified the preferred alternative to indicate that access through the refuge is no longer considered feasible. Please refer to preferred alternative text and map.

Foundation for North American Wild Sheep

Comment: *The foundation for North American Wild Sheep (FNAWS) is in support to the National Park Service preferred alternative plan. However, as more of the park is proposed to wilderness status, will the existing man-made water sources be removed? If natural water sources (especially at higher elevations) are unavailable for wildlife, we recommend keeping the man-made water sources in place. These water sources, as opposed to being artificial are merely “water-replacements.” These water replacements are needed due to increased demand for human uses resulting in the reduction of available surface water.*

Response: Through an update of its Water Resource Management Plan the National Park Service would review water management issues for the expanded park. Before removing any human-made water sources, the National Park Service would, as you suggest, consider the extent to which these features are water replacements. Please refer to “Desired Conditions and Strategies, Water Quality and Quantity and Natural Biodiversity” section in chapter one.

The Nature Conservancy

Comment: *Overall, we strongly support the preferred alternative and believe that it lays the groundwork necessary to ensure the long-term persistence of the important ecological resources within the Park. We do, however, ask the Park Service to reconsider its elimination of the alternative to restore a native and NPS-managed bison herd, as bison are a critical component of the functionality of the landscape.*

We strongly support wilderness designation for the vast majority of the new lands that have been added to the park.

The Conservancy would strongly support the restoration of bison for several reasons.

- 1. Bison are one of only four native mammal species not currently present in a near-wild state in the ecoregion.*

2. *Bison are a critical driver of ecosystem processes and are needed to meet the Park's long-term management goals.*
3. *Bison restoration would provide the Park Service with a unique and invaluable opportunity to play a significant national role in the restoration of bison.*
4. *Bison restoration would conform to NPS reintroduction policy.*
5. *"There are alternate views of the NPS's justification for eliminating the possibility of bison restoration.*

Response: There is insufficient data to support that bison were of critical importance to the park's ecosystem functionality and processes, in particular. Wherever bison occur in large numbers, that statement would be true (critical ecosystem process drivers). The question is whether bison were an ecosystem process driver in the park, or did bison impact the system only intermittently and in small numbers? The literature and explorer accounts suggest intermittent and small herds.

The Nature Conservancy herd is a domesticated livestock herd with cow genes. At present, the park has had only verbal confirmation from a third party regarding the genetic purity of the bison. This is the mitochondrial DNA analysis, which tests maternal lines. Genetic impurity results from this test

indicate 5%. To date, the park has had no confirmation regarding tests for paternal purity, which would likely increase that impurity percentage. NPS *Management Policies* support reintroduction of extirpated species in the event that the wild animal species to be reintroduced is genetically pure (inasmuch as is possible), and that the species in question indisputably inhabited that area. The park would not be able to assume the present The Nature Conservancy herd as its genetic purity is in question. The park would have to remove the present herd and replace it with animals that are appropriate to NPS policies.

The park museum has four bison records—one record is of a single phalange found in the park. Although there is a date of collection (1958), no analysis has been done to determine the age of this bone. Also, this could not be identified to species (*Bison* sp.). It could have been from a bison that died here, or it could have been transported into the park by some other means. However, no whole, partial, or multiple bones of an animal was noted at the time of collection. A second record is of a skull with an unknown provenience (it could not be connected to the park or the area surrounding the park), and so was deaccessioned from the park's collection. The third and fourth records combined are of a pair of horns found on the White Ranch. Again, only identified to genus (*Bison* sp.),

no age given, and no indication that a whole, partial, or multiple bones of an animal was located. This pair of horns may have come from an animal which died here and the horns were separated from the body, or they could have been transported into that area by some other means (people), as there were known anthropological uses for horns.

There is insufficient knowledge to determine whether adequate habitat and sufficient forage exist to support the species long-term (in perpetuity) as a free-ranging herd. From 1990–1999, each year was an above-average year for precipitation with the exception of 1991, which measured 10.19 inches for the year. Average is 11.0 inches per year. The average for each year during the 1990s was 14.25 inches per year (The Nature Conservancy assumed Medano-Zapata management in 1999). This level of precipitation undoubtedly has an effect on the availability and quality of forage. Added to that is the effect that consecutive years of above average precipitation has on the wetlands/wet meadow environments (where the bison graze), as these environments are largely defined by groundwater levels (percolation from the mountain front/alluvial fan). The park's resource management staff is aware that periods of below-average precipitation affect these meadows/wetlands, and that it is a delayed response (months or years before effects are

shown), but does not fully understand how long that effect is sustained, and what the long-term effects are to those environments. The park began monitoring stream levels during 1994–1995 (wet years), and therefore does not have solid data on long-term drought conditions. Further, any droughts experienced since 1991 (2002–2003, 2005–2006) have only been months long, not years, so it is difficult to justify knowing how to run the herd even during drought years (compare to the drought in the 1950s to 1960s, when 12 of 16 years had considerably below-average precipitation). A long-term drought (multiyear) would necessitate that park staff cull the herd or move it entirely to “mimic” the natural variation of large mammal populations and the effects of drought.

Bison management is costly and staff intensive. Natural predators are absent; therefore, the herd would have to be gathered and culled periodically. Additional staff would be required to cull the herd and to maintain miles of heavy-duty fence.

The present economic environment is not favorable for the additional funding that would be required for bison management and additional staff. Under the current situation, conditions would not meet NPS policies for a free-ranging bison herd. However, the National Park Service will

continue to consider a bison herd as conditions change, and as more information is gathered. The park's position is that The Nature Conservancy can continue to manage bison on some park lands, contributing to persistence of bison in the San Luis Valley so long as The Nature Conservancy elects to manage these herds.

The Wilderness Society

This letter was cosigned by and submitted on behalf of the following groups:

- Colorado Environmental Coalition
- Rocky Mountain Recreation Initiative
- San Luis Valley Ecosystem Council
- San Juan Citizens Alliance
- Sinapu
- Southern Rockies Ecosystem Project
- Upper Arkansas and South Platte Project

Comment: *Expansion of the wilderness recommendation.*

- *Extend the wilderness recommendation to the northern boundary in the northwest corner of the park. Include lands in the vicinity of Cow Camp Road – we believe these lands to be eligible for wilderness. Any lands not deemed necessary for a trail head and parking area (when the location is finalized) should be*

included in the wilderness proposal. Lands near the Deadman Creek riparian area should be protected from motorized travel.

- *Extend wilderness to the southern and western boundary in the southwest corner of the park. Extend the wilderness recommendation to include all of the land zoned “Natural/Wild” in the vicinity of the Medano Ranch. We do not agree with the NPS reasons for excluding this area from the recommendation. Inclusion of these lands would provide permanent protection for extended sections of Big Spring and Little Spring creeks, the San Luis Lakes/Sand Creek potential conservation site, the sabkha and its unique wetlands and wildlife. The wilderness boundary should approach the Medano Ranch road to within a 75- to 100-foot buffer. Exclude non-wilderness compatible Closed Basin features without disqualifying surrounding lands. The administrative area immediately around the Medano Ranch can be excluded without disqualifying surrounding lands. Corrals, stock tanks, and other impermanent ranch structures should not preclude lands from wilderness eligibility.*

Response: We have revised the preferred alternative to realign a portion of Cow Camp Road, allowing a small area (257 acres) to be reclaimed and added to the proposed wilderness designation. The existence of Cow Camp Road, an improved road, rendered most of the area to the north of the road ineligible for wilderness (please see appendix G).

In the southwestern portion, an additional parcel (1,705 acres) between Big and Little Springs has been added to the proposed wilderness designation. The remaining remnants around Medano and including the sabkha, are not suitable for wilderness due to the Closed Basin Project, overhead powerlines, wells, irrigation and other structures that would need to be maintained for the foreseeable future and segment the land into too small of parcels. The remaining land would be protected by the natural/wild zone.

Comment: *Wildlife management concerns: elk management: In general, we support efforts to restore herd populations to what would be expected under natural (historical) conditions, and we support using natural mechanisms for such management whenever possible.*

- *Concerns about limited flexibility for elk management are understandable, but easily addressed. The minimum tool*

requirement, under the Wilderness Act, directs managers to analyze which management actions have the least impact. The rule can be flexible and could allow motorized use in specific situations.

- *If studies of elk and bison determine a need to reduce the elk herd, the NPS should consider a wide range of tools, including natural predation. Study the feasibility and viability of reintroducing either Mexican or gray wolves to the area.*
- *We encourage the National Park Service to collaborate with other government agencies to determine the best solution for elk management.*

Response: A separate elk management plan developed in cooperation with CDOW, the USFS, and USFWS will address elk management options.

Results from the first year of the elk study indicate there are about 2,000 fewer animals than originally estimated, and that the size of the herd has declined by about 1,000 animals over the last six years.

Access along Liberty Road for hunting on USFS land and in the preserve is addressed and allowed under certain conditions. Please refer to the "Management Zones, Administrative Zone" section of chapter two.

Comment: *Backcountry access: northwest corner of park lands*

- *Public motorized access should be primarily provided on established roads outside the park. We agree with all access decisions in the NPS preferred alternative with the exception of the backcountry access designation to the entirety to Cow Camp Road and the administrative access designation for four-wheel drive roads in lands with wilderness qualities deemed natural/wild near Medano Ranch.*
- *Encourage the National Park Service to collaborate with other agencies (USFS and USFWS) as well as other relevant entities (Baca Grande subdivision) to find solutions for providing motorized access to the park on established roads such as Camino Real and the section of Liberty Road north of the park boundary.*
- *Parking areas, if necessary, should be located outside the park boundary.*
- *Encourage the National Park Service to address access issues in greater detail in the GMP. National Park Service should identify the public access options that would most benefit the park and its resources.*

Response: The designation of Cow Camp Road or another existing primitive road as a backcountry access route has been slightly revised in the final plan to keep motorized access away from sensitive riparian areas. The GMP has been revised to clarify that once a route is selected, segments of the Cow Camp Road not needed for public access would be converted to the administrative zone. The remaining backcountry access zone not needed for public access would be converted to the backcountry adventure zone.

The National Park Service is committed to continuing to find the best solutions for implementing motorized access to the park on established roads such as Camino Real and county roads leading to Liberty gate north of the park boundary. Ongoing collaboration with the community, Saguache County, and other agencies is described in the preferred alternative – “Public Vehicle Access to Federal Lands in the North – Ongoing Collaboration.” However, it is not possible at this time to go into greater detail until this collaboration occurs.

Comment: *Use at the end of Cow Camp Road.*

- *Motorized use at the end of Cow Camp Road – it comes too close to sensitive ecological areas such as Deadman Creek.*

- *Cow Camp Road should not be extended eastward to Liberty Road, for the same reasons.*

Response: The preferred alternative has been revised to better protect the Deadman Creek corridor. Extension of Cow Camp Road or another primitive road to Liberty Road would be a potential option in a future separate environmental analysis with public involvement. Please refer to the preferred alternative text and map.

Comment: *Keep Liberty Road closed to public vehicles and to all motorized use beyond the first 0.25 mile within the park boundary.*

Response: The GMP zones the Liberty Road for administrative use only. Opening it to public vehicle access may be considered through a future separate public joint (NPS/USFS) environmental analysis study. (Please see chapter one, "Relationship of the General Management Plan to Other Planning Efforts: Planning for Lands Added to Rio Grande National Forest in the Year 2000" for more information about USFS planning efforts.) If the results of this subsequent joint NPS/USFS environmental analysis should determine some form of public vehicle access on to federal lands via Liberty Road is the best option, the National Park Service would not need the backcountry

access zone or use of another route through the park. The parking area could be sited on USFS land.

Comment: *Keep parking area out of sensitive lands in the northwest corner of park.*

Response: The final preferred alternative has been modified so that a route through the north portion of the park ends 0.5 mile or more from Deadman Creek. The exact location of the parking area at the end of the road would be analyzed under a separate environmental analysis with public involvement. Please refer to the preferred alternative text and map.

Comment: *Limit administratively-zoned routes at Medano Ranch.*

- *Support NPS proposal to allow only administrative vehicle access in the southwest portion of the park (limiting public access) and therefore limiting the potential for vandalism at nearby archeological sites and damage to ecologically sensitive areas.*
- *Urge the National Park Service to limit the number of administratively zoned routes around Medano Ranch.*
- *Urge the National Park Service to reduce use of two-track routes used by staff primarily for the purpose of monitoring wells. Consider the*

possibility of monitoring these wells by foot or horseback. If there are routes that must remain open to motorized use, we believe the best option is to cherry-stem the roads with standard wilderness buffers.

Response: Administrative roads are necessary to maintain the Closed Basin Project infrastructure, overhead utility lines, irrigation structures, and wells. These activities are not only performed by the National Park Service. They are primarily performed by other entities that have authorized access.

Comment: *Excluding the main administrative vehicle access road to Medano Ranch, we recommend that the Park Service zone all routes in this area as Natural /Wild or Backcountry Adventure instead of administrative.*

Response: Please see response above.

Comment: *Reduce backcountry access zone in the northwest corner of the park when the specific locations of access roads and parking have been determined.*

Response: The National Park Service has revised the preferred alternative to indicate that once an access route is determined, the remaining backcountry access zone would be converted to backcountry adventure zone. The existence of Cow Camp Road, an improved road,

rendered most of the area to the north of the road ineligible for wilderness (please see appendix G and the preferred alternative text).

Comment: *Motorized/Mechanized Vehicles.*

- *We understand that “driving in sand on the Medano Pass Primitive Road” is considered a “fundamental visitor opportunity.” Make sure the location and volume of traffic do not degrade the natural values of Medano Creek or compromise visitor’s experiences of quiet in the park.*

Response: The National Park Service intends to continue working with the USFS and other agencies and neighbors to achieve future desired conditions for resources within the park. Please refer to “Desired Conditions and Strategies” in chapter one and “Carrying Capacity Measures” for the backcountry access zone in chapter two.

Comment: *We urge the Park Service to actively and fairly pursue ownership for all wilderness-quality lands within park boundaries.*

Response: Strategies in the GMP include acquiring or modifying private property, mineral rights, and water rights within the park, where possible, to minimize impacts on park resources and values. Please refer to the

“Desired Conditions and Strategies” section in chapter one. Through a separate planning process, the National Park Service, BLM, USFWS, and Colorado State Land Board are collaborating on a land exchange (please see “Relationships of the GMP to Other Planning Efforts” in chapter one).

the concentration of visitor services in current locations is desirable, and the backcountry should be reserved for foot and horse travel. Roads and parking lots within the park should be kept at an absolute minimum.

Response: The GMP preferred alternative does not propose changes to camping facilities. The GMP does include strategies for park managers to consider the availability of existing or planned facilities in nearby communities and adjacent lands, as well as the possibility of joint facilities with other agencies. Please refer to “Desired Conditions and Strategies, Facilities, and Services” section in chapter one.

Upper Arkansas and South Platte Project

Comment: *I fully support this Wilderness designation. I strongly urge the addition of sand sheet lands in the northwest corner of the park to your wilderness proposal. Please recommend wilderness protection for lands not slated for access and parking lots if such structures are necessary [in the northwest corner]. Wilderness-quality lands surrounding Medano Ranch...should also be added to the plan's proposed Wilderness areas. The sabkha... is underrepresented in the wilderness proposal...*

Comment: *If jeep use is to be continued on the Medano Pass road, cooperative work with the National Forest may be needed to reduce the impact of stream crossings.*

Response: The National Park Service intends to continue working with the USFS and other agencies and neighbors to achieve future desired conditions for park resources. This level of detailed planning is beyond the scope of the GMP. However, the park would update its water resources management plan to address park expansion lands. Please refer to “Desired Conditions and Strategies, Water Quality, and Quantity” section in chapter one.

Response: Please see response to Center for Native Ecosystems comment above.

Comment: *One of the most endearing aspects of camping at Sand Dunes is the absence of electrical and water hookups at individual campsites. I strongly urge that this style of campground be maintained. Commercial enterprises outside the park are available and can grow to accommodate increased request. In addition,*

Comment: . . . *archeological surveys on all park lands should be conducted as soon as possible. It is important to expedite the purchase of subsurface mineral rights . . .*

Response: These are goals for the park. Please see the “Desired Conditions and Strategies” section in chapter one.

INDIVIDUALS

Substantive comments received from individuals are summarized below with the NPS response following. Comments are summarized and combined to reduce redundancy.

Access

Comment: *The Park Service has chosen to ignore the key issue of access in the north part of the park by deferring analysis to another agency or future analysis. Ignoring a key issue is a violation of the National Environmental Policy Act (NEPA), which requires identification of key issues. NEPA also requires that key issues drive alternative development and analysis. Astoundingly, the Park ignores this and gives it minor focus, when this issue could be one of the most significant of all that you need to address in the Park plan.*

Response: The National Park Service has determined that it is desirable to have a small backcountry trailhead parking area for 10 to 15 vehicles to provide access for hikers, backpackers, horseback riders, and hunters near the foot of the mountains but away from sensitive riparian environ-

ments. The NPS preferred alternative in this GMP proposes to develop such access via the backcountry access zone shown on the map, which includes the use of an existing primitive road. However, implementing a vehicular connection to that zone depends upon ongoing planning and collaboration with the community, Saguache County, and other agencies.

Comment: *I realize the Park is concerned with uncontrolled motorized access in the north part of the Park. As a compromise, why not keep the Liberty Road limited to foot travel in most times of the year, but allow motorized use during the big game hunting seasons, like September 1 through December 30th. This way an increasing elk herd can be trimmed and reasonably removed from the area. It would keep the rest of the area free of motorized use during winter and the rest of the year.*

Response: Under the preferred alternative, Liberty Road is available year-round for pedestrians. Hunter access is provided in consultation with CDOW.

Please refer to the “Management Zone, Administrative Zones” section of chapter two.

Comment: *The proposed public access to Alpine Camp via the Baca NWR is untenable. Public access off the Cow Camp Road may involve new road construction, which will heighten environmental effects and essentially remove it from reasonable alternatives. You need to focus on the most reasonable alternative, the Liberty Road, and move forward with an array of acceptable vehicle access options.*

Response: The preferred alternative in the final GMP has been modified. The area abutting the refuge has been changed to back-country adventure zone, and thus, no longer allows public vehicle access from the refuge. Please refer to map and description of the preferred alternative. In consultation with the USFS, more information about the Liberty Road and future planning has been added to chapter one “Planning Considerations and Constraints,” and chapter two “NPS Preferred Alternative, Public Vehicle Access to Federal Lands in the North – Ongoing Collaboration.”

Comment: *You have selectively decided not to adequately address the access issue in your draft plan. If this is not rewritten to address this issue my traditional hunt in this area will be forever changed. I fear the*

traditions, stories, and historic hunting experience that have been enjoyed though this access will not be able to be shared with my three upcoming hunting sons.

Response: There is no place in the park where public hunting was previously allowed that is precluded now.

Comment: *The public should have unrestricted access through the park on the Liberty Road. This should be part of all of your alternatives. Blocking public vehicle access across 0.7 of a mile of NPS jurisdiction from a county road should never be allowed to happen. It is inappropriate for the park to manage USFS activities and mission by blocking access.*

Response: Liberty Road is currently available for administrative use by the USFS (and other agencies), and would remain available under the preferred alternative. The National Park Service cannot open the road to unrestricted access without analyzing the environmental consequences of doing so. Until the USFS develops specific alternatives for management of the Baca Mountain Tract there is insufficient information upon which to determine the environmental consequences.

Comment: *Let the backcountry hikers access the northern area of the Sand Dunes Park and the adjacent Forest Service land through the development of*

existing roads in the Great Sand Dunes National Park. Use maps included in the plan do not show existing Sand Dunes road access to the north park area, and the Baca Wildlife Refuge will not be granting access as this would conflict with their federal mandate. If the Sand Dunes and the Forest Service want access for the public then they should use their own roads.

Response: There are a number of two-tracks, Cow Camp Road, and Liberty Road, on the former Baca Ranch lands that have been added to the park. The only way for any of them to be utilized by the public for vehicle access to new public lands in the north is via the Baca Grande subdivision because public vehicle access through the Baca National Wildlife Refuge is not an option. The preferred alternative has been modified to no longer show backcountry access as possible from the refuge. An additional option has been added along an existing two-track. The intent of the preferred alternative backcountry access zone is to utilize an existing road or two-track, any of which connect to the subdivision. The implementation of one of these routes depends upon ongoing collaboration.

Comment: *I am against changing the back country parking area to San Luis Lakes State Park because it will increase my horse riding and hiking time to approxi-*

mately 25 miles, across the sand without water along the route, just to reach the national preserve or national forest.

Response: The preferred alternative does not propose “moving” the horse loading and unloading area from the frontcountry zone to the San Luis State Park for access to the park and forest, but instead proposes a possible cooperative opportunity with the state park for an additional access point for enjoying other areas of the park.

Comment: *NPS park rangers drive the Liberty Road on regular basis and no one but the National Park Service has jurisdiction over the first 0.7 mile on that road. It is very feasible to use the Liberty Road as the access point to the back country without building a new road. This is solely under the control and jurisdiction of the National Park Service. This plan must be rewritten to address Liberty Road as a northern access to the back country zone and the National Forest.*

Response: Liberty Road is currently available for administrative use by the USFS (and other agencies), and would remain available for such use under the preferred alternative. The plan has been modified in consultation with the USFS to provide more information about Liberty Road and future planning. Please see chapter one, “Planning Considerations and Constraints,” and chapter

two, “NPS Preferred Alternative, “Public Vehicle Access to Federal Lands in the North – Ongoing Collaboration.”

Comment: *In the purpose and need for the plan it clearly states that “Access to the National Forest” is an issue. However, the statement in the purpose and need is totally misleading to the public. On page 36 of the purpose and need, it states that “The Rio Grande National Forest has preliminarily identified the need to provide the public with vehicle access (to provide for the use and enjoyment of the National Forest) along the existing US Forest Service Portion of the Liberty Road that lies within the Rio Grande National Forest boundary.” This is a false statement according to the official letter written by the Rio Grande National Forest on Page 426 of the GMP. The letter states that the Rio Grande National Forest is requesting, “Unencumbered vehicle access across the park for hunters to NFS lands on the Liberty Road, Mosca Pass Road, and Medano Pass Road.” Whether public vehicle access would be allowed along the existing Forest Service portion of the Liberty Road is yet to be determined in the Forest Service planning process. Due to this misleading statement a new draft plan must be written to strike this misleading statement and disclose correct information.*

Response: The purpose and need statements to which you refer have been revised in consultation with the USFS. Access to USFS land and a future planning process has already been addressed.

Comment: *The National Park should not be planning visitor access for the National Forest. Putting quotas/permits on vehicle numbers in a parking area on the north end of the Park to limit numbers of people entering the National Forest should not be determined by the National Park. The National Forest and National Park have very different missions and making this new section of National Forest a “De Facto” National Park would be a tragedy. The public purchased this National Forest Land to be managed as National Forest. This plan must be rewritten to finalize vehicle access to the National Forest and allow the National Forest to manage their lands.*

Response: As stated above, the Baca Grande community, Saguache County, and the USFS are engaged in a related planning process. The USFS is likely to develop access and management options for the Baca Mountain Tract, and these options will be analyzed in a separate environmental study, with input from the public, neighboring communities, and the National Park Service.

Comment: *I am amazed that the National Park Service is making believe*

that there is no visitor use on the Liberty Road, The Liberty Road is used every day by many people. The Liberty Road is obviously used to access the back country and the National Forest. The seven tenths of a mile section of road should be indicated on the map as a “back country access” location, not just National Forest and not the National Park.

Response: The existing character and use of Liberty Road has been described in more detail in the final plan. Under the preferred alternative, Liberty Road would be zoned administrative. The administrative zone permits visitor hiking or horseback travel in addition to administrative use by the agencies. Please refer to the “Management Zones, Administrative Zone” section in chapter two.

Comment: *This plan does not address the immediate need for public parking and horse access on the north end of the National Park. It only allows the minority Baca Subdivision residents hiking access but does not address the immediate need for public access to the north end of the park. This cannot be put off and should be addressed now.*

Response: Under the preferred alternative, if no public vehicle access to the north part of the park could be found over the long term so that trailering horses into the north part of the park was not possible, the National Park Service would provide gates for horses at the north

park boundary at Camino Real and Liberty Road, and a partner would be sought to provide a horse trailhead facility outside the park. The National Park Service cannot open the road to unrestricted access without analyzing the environmental consequences of doing so. Until the USFS develops specific alternatives for management of the Baca Mountain Tract there is insufficient information upon which to determine the environmental consequences.

Comment: *I would like to see a shared responsibility for access to the park between the U.S. Fish and Wildlife Service and the Baca Grande subdivision. The subdivision would be the public access from January through mid-August, and the U.S. Fish and Wildlife Service would provide access during the critical hunting season portion of the year, which is the least compatible use with the subdivision.*

Response: Based on consultations with the USFWS, the preferred alternative in the final GMP has been revised to indicate that access from the refuge is not a feasible option for public vehicle access into the park. Please refer to the map and description of the preferred alternative.

Comment: *It is my belief and hope that the National Park Service, the USFWS, and the USFS will be able work together to provide an access to the northern Baca area through an entry, jointly*

funded, constructed, and staffed, located just south of the mi. 100 marker on CO 17. Possibly the CO Dept. of Wildlife could be a participating entity in this endeavor.

Response: This option was considered and dismissed early in the planning process due to (1) the high costs to construct and maintain such a road, and (2) the fact that such a road would cross the major wetlands system that runs in a north-south direction through the refuge. Based on ongoing discussion and consultation with the USFWS, vehicle access to the park and forest across the refuge is no longer a viable option. Please refer to the USFWS letters in the previous section.

Wildlife/Hunting

Comment: *Your DEIS erroneously diminishes the elk harvest of 30 animals a year and concludes that hunting would not make much difference in the herd. Considering how difficult it has been to get into areas across the Park, the harvest would be an order of magnitude better if reasonable motorized access was allowed. It still may not solve the elk problem but would be a step in the right direction to trim the herd.*

Response: For this data, the harvest numbers for elk in game management unit 82 in the 2005 season were taken from the CDOW Web site. The total

number of elk harvested was 164, and 107 of those were bull elk.

An elk management plan developed in cooperation with CDOW, the USFS, and USFWS will address elk management options, including hunting. Results from the first year of the elk study indicate there are about 2,000 fewer animals than originally estimated, and that the size of the herd has declined by about 1,000 animals over the last six years.

Study results also indicate that this elk herd's calf recruitment rate, which is the number of calves that survive to six months old and are "recruited" into the herd, has been declining since about 1990. At this time, the reasons for the decline and whether the decline will continue into the future are unknown. However, the findings indicate that the low recruitment rate is not related to "density effect," or over population of elk.

Comment: *There are so many elk that they are damaging the vegetative resources, especially the willows, in some of the drainages in the new Rio Grande NF tract. It's the same situation that Rocky Mountain NP is now facing. The Colorado DOW has been trying to address the problem through new hunting seasons and game management units. When hunting season arrives, the elk will move into the park and into the new National Forest*

tract. Since access along the Liberty road is restricted, most of the hunters going into that area will be on foot. The result will be that fewer elk will be harvested, thus having very little effect on the population. If the numbers of elk are not controlled, the elk will not only destroy the vegetation on the Forest tract, but will damage the resources on the park.

any of the alternatives. The elk issue is not addressed in the purpose and need section of the GMP, therefore you do not have an adequate range of alternatives to address the overpopulation of elk. This document must be rewritten to address the overpopulation of elk and it's affect on the National Park and adjacent lands.

Response: Results from the first year of the elk study indicate that the elk population does concentrate within Great Sand Dunes National Park, Baca National Wildlife Refuge, and the lands administered by The Nature Conservancy in the fall and winter. However, the results also indicate that the elk population is significantly smaller than originally estimated (please see response above), and that the herd is at a level well below “carrying capacity,” or the number of animals the area’s habitat can support.

Response: Please see responses immediately above.

Comment: *Blocking the general public from the Liberty Road does not facilitate herd reduction. Neither does making huge acreages Wilderness within the Park, since once the government herd reduction begins, you will need motorized access to process and salvage tons of elk meat by use of motor vehicles. The situation needs a rational solution, and the preferred alternative only allows further elk herd increases. Facilitating hunting near the Park would be a step In the right direction.*

The next two years of the study will focus on assessing the impacts of elk grazing on grasses, shrubs, and trees within the national park, national wildlife refuge, national forest, and The Nature Conservancy lands. Efforts will also be aimed at refining estimates of ecological carrying capacity and assessing the health of the herd.

Response: Please see response above.

Comment: *As for the extremely large elk population, it is not addressed in the preferred alternative or*

Comment: *It would not be unreasonable for the park to make this new section of land a National Preserve Wilderness instead of a National Park Wilderness and provide means to manage wildlife. National Preserves allow hunting as a management tool where National Parks do not. None of the alternatives in the draft GMP/Wilderness Study/EIS for the Great Sand*

Dunes Park and Preserve address this issue through a National Preserve alternative.

Response: A basic premise of the NPS general management planning process is to work within the sideboards of existing law and policy. Congress created the new Great Sand Dunes National Park and Preserve in 2000, and clearly had the intent of expanding Great Sand Dunes National Monument to a National Park, and designating the watershed above as a National Preserve to allow continued hunting on those lands.

Comment: *By limiting motorized access the National Forest's ability to provide multiple use activities is reduced. Many kinds of recreation normally permitted on Forest lands and the ability to work with CDOW to manage the summering elk herd on Forest lands are also reduced. Limiting motorized access also affects the bighorn sheep herd health and population.*

Response: The preferred alternative allows hunters who are accompanied by agency personnel to access the national forest. Please refer to "Management Zones, Administrative Zone" and the NPS "Preferred Alternative" map.

Analysis Improvements/Corrections

Comment: *On page DEIS 90, there is a description of Vegetation and the 7 life zones as described by Nature Serve 2005. This does not appear to be an ecosystem classification system as defined by the National Hierarchy of Ecological Classification, or similar system. Ecosystem classification systems are usually composed of an abiotic and a biotic nomenclature. Moreover, the DEIS does not quantify the proposed systems (sabkha etc.) so the reader has no idea how much of what systems you have. Simple descriptions are inadequate if there are no mapped resources to accompany those descriptions. Without mapped areas, you cannot quantify affected ecosystems accordingly. You also are unable to use important management implications of those ecosystems.*

Response: The Great Sand Dunes draft EIS used two classifications: a broader and more generally intuitive "life zone" and the "ecological systems" that comprise each life zone. The ecological systems approach used in the draft EIS is a direct implementation of the ecological systems hierarchical classification developed by Nature-Serve and as such is a well documented and appropriate way to describe habitat and land cover. Ecological systems are similar to the U.S. National Vegetation Classification (NVC) in that extant vegetation is an important component, but

they also incorporate habitat and landform attributes (including soils), creating an integrated approach to delineating landscapes. They range in scale, but typically fall between NVC formation and alliance levels. They are well described and currently mapped at a coarse scale by Southwest Regional Gap Analysis Project (REGAP; <http://fws-nmcfwru.nmsu.edu/swregap/ut>), Nature-Serve and the Colorado Natural Heritage Program for the Southern Rockies Ecoregion. Moreover, ecological systems are being used in the ongoing NPS-USGS Vegetation Mapping project. They are either map units in and of themselves or may be cross-walked from other forms of map units (usually U.S. NVC alliances or associations). The USFS (Rio Grande National Forest) is an active partner in this project and has endorsed the classification system being used. When this project is complete (2007 or 2008), ecological systems will be mapped at a scale of 1:12,000 to 1:20,000 with a high degree of accuracy in an area of about 413,000 acres, including all of the park. Therefore, with the vegetation mapping product on the horizon, along with the integrated approach that ecological systems embody, using ecological systems in the draft EIS (even though they are coarse at this point) is a refined and appropriate approach.

Comment: *The soil surveys that apply to your area are the best*

“ecological units” available and can easily be quantified. In addition to soil types, potential vegetation is described as well as landforms, geology and climate. The three applicable surveys include Alamosa County, Saguache County, and the Sangre de Cristo Soil and ecological Resource Inventory, 2006.

Response: Sources noted. CEQ regulations (40 CFR 1500.1 (b)) state, “Most important NEPA documents must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail.” The GMP is not intended to be an exhaustive description of the park and preserve. Many management objectives in the preferred alternative are more directly connected to extant vegetation and habitat than soils or surficial geology. Future projects included in the preferred alternative that involve ground disturbance would be subject to subsequent environmental analysis and impacts to affected soils would be addressed therein.

Comment: *Soils data for the entire Preserve portion is lacking in the analysis.*

Response: Please see response above. The preferred alternative proposes very few actions having the potential to impact soils in the preserve. Construction of new trails would be subject to a subsequent environmental analysis and impacts to affected

- soils would be addressed therein.
- Comment: *On page 71 1st paragraph, (2) states that “off-highway vehicle use west of Medano Pass was formerly allowed, before the area became part of the National Preserve.” This statement is not true.*
- Response: The use of vehicles off highway was not permitted but the use of off highway vehicles was permitted.
- Comment: *Regarding Yellow-billed Cuckoo, the table reports “Not found in or near Park”. In 1984, there was a report of a Yellow-billed Cuckoo at the Sand Dunes. Also, I don’t know if these observations qualify as “near the Dunes” but, a bird survey crew reported an audible call that was heard in 06-2003 at McIntyre-Simpson property, east of La Jara. Subsequently, two birds were seen at that location.*
- Response: The text for the yellow-billed cuckoo has been completely revised, to indicate that a yellow-billed cuckoo was reported at Great Sand Dunes in 1984. However, no subsequent records in the park are known.
- Comment: *DEIS Page 113 describes the aggregated Pinyon and Juniper to Montane Zone as 8,000 to 9,500 feet. The Sangre de Cristo Soil and Ecological Inventory shows the Montane Zone*
- (dominated by Douglas fir, ponderosa, white fir and aspen communities), occurs normally to about 10,400 elevation. The Subalpine zone, dominated by Engelmann Spruce occurs from 10,400 to 11,400. The alpine zone occurs from 11,400 to the highest peaks of the Sangre Mountain range. The DEIS needs to reexamine these zone descriptions and make necessary changes.*
- Response: The zone descriptions to which you refer have been reexamined and verified by park natural resources staff.
- Comment: *DEIS page 113. The bird names need to be consistent with the American Ornithological Union nomenclature and should be singular. As such, Western Tanager, Chipping Sparrow, Northern Goshawk. ...should be listed under each lifezone. etc.*
- Response: These changes have been made.
- Comment: *DEIS page 114 first paragraph, should read White-tailed Ptarmigan.*
- Response: This change has been made.
- Comment: *The Great Sand Dunes Advisory Council is not the same as the “Advisory Council on Historic Preservation,” an entirely different entity. The index should reflect this.*
- Response: For clarification, the document has been revised to refer to the

Great Sand Dunes Advisory Council as the “Advisory Council,” and the Advisory Council on Historic Preservation as the ACHP.

Comment: *“The Nature Conservancy” should not be indexed under “T.” It should be under “N.”*

Response: The Nature Conservancy is now indexed under “N.”

Facilities

Comment: *The day-use parking situation at the Sand Ramp Trail will only become worse if a solution is not achieved. I hope you develop an appropriate solution (maybe you could have 2 spaces for backcountry and 2 spaces for day use... and sign them appropriately).*

Response: This is too detailed an issue for GMP-level planning. The park staff has noted this concern.

Comment: *Another alternative would be to provide parking at the northern boundary between the park and the Baca subdivision at the terminus of Camino Real. Access for foot and horse travel to Deadman Creek via the Cow Camp road could then be provided by trail.*

Response: The land between the end of Camino Real and the northern boundary of the park is a Saguache County right-of-way. While it allows for public

pedestrian access to the park, the National Park Service does not have jurisdiction over land outside of the park boundary. Providing parking at that location would require action by the county and the subdivision.

Comment: *Please put the visitor’s center out past the Baca Ranch access so people know the right way to go to get to the park.*

Response: The preferred alternative does not propose a new visitor center, but does state that a joint visitor contact station with the USFWS and National Park Service (e.g., on the refuge at the former Baca Ranch headquarters or along SH 17) could be a potential cooperative opportunity.

Comment: *Put the visitor center on State Highway 17, not on County Road T.*

Response: Please see response above.

Comment: *I strongly recommend that the proposed NW entrance have a campground (per three public nodes option). Likewise, there should someday be a campground at Medano Ranch headquarters area (and/or near—but not next to—Big and Little Spring creeks) and a campground for those participating in the activities in the Guided Learning area (perhaps in the Medano Ranch Hdqtrs. Area) or the western access (via*

Medano Ranch hdqtrs.) to the Guided Learning area.

Response: A campground in the north-west is proposed as part of the three public nodes alternative, but was not included in the preferred alternative based on the probable environmental impacts. The three public nodes alternative also analyzes the impacts of converting Medano Ranch headquarters to a public day use area (front-country zone). Due to staff and funding constraints and potential impacts, this was not included in the preferred alternative. A campground would not be compatible with the proposed zoning for Medano Ranch.

Medano Ranch

Comment: *The Medano Ranch might best serve as a learning center. Rather than attempting to restore this long-used ranch to some semblance of 'natural, it might be best utilized as a node where visitors could learn about the riches of the Park and Preserve.*

Response: The preferred alternative allows for limited (scheduled) public access for the purposes you propose.

Nonnative Species Management

Comment: *One indicator listed to limit the number of people accessing this area was noxious weeds especially in and around Deadman Creek. Noxious weeds already exist along Deadman Creek. It is important to know what the current noxious weed condition is on the new section of the National Park in order to use this as an indicator. It is also most likely that Elk are and will be the transporters of noxious weed seed not people. Until the elk population is reduced to a reasonable number this should not be an indicator of limiting access to people. This plan must be re-written to show a current noxious weed map and to address the concern listed.*

Response: A noxious weed management plan will address management of nonnative invasive species in more detail. Please refer to the "Desired Conditions and Strategies, Natural Resources and Diversity" section of the GMP.

Comment: *The weeds imported by horses and trailers will not "Preserve the remarkable biodiversity evident in the landscape from the valley floor to the mountain crest" (p.9, Sand Dunes Park Purpose.) Noxious weed control is an impossible feat and destroys fragile eco-systems. If they allow horses the manure must be collected and removed and cars must drive through an herbicide to*

enter the park. This could limit the poisoning of our fragile land to a few select areas rather than have an inadequate weed control program "wherever the invasive species are found."

Response: Please see response above.

Reintroduction

Comment: *Release the Bison to roam the park along with the release of wolves.*

Response: Please see response to The Nature Conservancy comments and response below.

Comment: *The diversity of the park would be greatly enhanced by the introduction of the Gray Wolf to the ecosystem ala Yellowstone, Idaho etc. This has been a great success in Idaho, Wyoming and Montana and the resultant cascade effect has restored the true wildness of those areas in only ten years. The wolf was a native here years ago and will help control populations of elk, coyote and rodents - all critically out of balance now.*

Response: An elk management plan developed in cooperation with CDOW, the USFS, and USFWS will consider elk management options including hunting and introduction of natural predators.

Shuttle

Comment: *Additional roads and parking lots within the park should not be constructed; rather, a shuttle system such as that at Zion or Rocky Mtn NP should be devised for peak season.*

Response: The preferred alternative does include provisions for a shuttle.

Wilderness

Comment: *I strongly urge you to add sand sheet lands in the northwest corner of the park to your wilderness proposal. Only one gravel road separates them from other deserving wilderness. Please also propose wilderness protection for wilderness-quality lands surrounding Medano Ranch. The sabkha, a fundamental park resource, is under-represented in the wilderness proposal, and unimproved two-track roads should not disqualify these lands (those not occupied by ranch buildings, the administrative access road and Closed Basin Water Project facilities) from wilderness protection.*

Response: The revised preferred alternative proposes to realign a portion of Cow Camp Road, which permits a small area (257 acres) to be reclaimed and added to the proposed wilderness designation. The existence of Cow Camp Road, an improved road, rendered most

of the area to the north of the road ineligible for wilderness (please see appendix G and the preferred alternative text).

In the southwestern portion, an additional parcel (1,705 acres) between Big and Little Springs has been added to the proposed wilderness designation. The remaining remnants around Medano and including

the sabkha, are not suitable for wilderness due to the Closed Basin Project, overhead powerlines, wells, irrigation and other structures that would need to be maintained for the foreseeable future and would segment the land into too small of parcels. The remaining land would be protected by the natural/wild zone.

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PREPARERS AND CONSULTANTS

DOCUMENT PREPARERS

Jayne Aaron*, Architectural

Historian/Environmental Planner, engineering-environmental Management, Inc. B.A. Environmental Design (Architecture), M.S. Environmental Policy and Management. Experience: 16 years Cultural Resources and NEPA. Responsible for description of existing conditions and impact analysis for: scenic quality and visual resources, health and safety, NPS operations. Also responsible for Appendix H: Wild and Scenic River Evaluation.

Ronald Dutton*, Regional Economist,

Sammons/Dutton LLC. B.S. Economics, M.S. Economics. Experience: 29 years. Responsible for description of existing conditions and impact analysis for: socioeconomics.

Terry Goodrich*, Outdoor Recreation

Planner, engineering-environmental Management, Inc., B.S. Biology, B.S. Land-use Planning. Experience: 30 years planning with National Park Service (retired). Responsible for draft plan comment resolution and final plan production.

Daniel Hart, Historical Archeologist/

Architectural Historian, engineering-environmental Management, Inc. B.A. anthropology/history, M.A. anthropology. Experience: 13 years in cultural resource management consulting. Responsible for description of existing conditions

and impact analysis for: historic structures and cultural landscapes.

David Hesker, Graphic Designer/Illustrator,

ERO Resources Corporation. B.F.A. Colorado State University, emphasis in graphic design. Experience: 15 years. Responsible for maps and other graphic illustrations.

Wanda Gray Lafferty, Technical Publica-

tions Specialist, engineering-environmental Management, Inc. Two years undergraduate work. Experience: 27 years in the legal field and as communications director for national environmental nonprofit organization. Responsible for document editing and publication.

Marilyn A. Martorano, Archeologist/

Cultural Resource Management Specialist, RMC Consultants, Inc. B.A. Anthropology, M.A. Anthropology/Archeology emphasis. Experience: 27 years. Responsible for description of existing conditions and impact analysis for cultural resource topics.

Margie Nowick, Historian, engineering-

environmental Management, Inc. M.Phil. Anthropology, A.B.D; M.S. Historic Preservation; B.A. Anthropology. Experience: 30 years, 1 year with e²M as Cultural Resources Program Manager. Responsible for editing to cultural resources descriptions and impacts analysis and consultation with Colorado SHPO.

Cheryl Schmidt, Mammalogist, engineering-environmental Management, Inc. B.S. Biology, M.S. Biology, Ph.D. Biology. Experience: 21 years, 4 years with e²M as wildlife biologist. Responsible for: description of existing conditions and impact analysis for: wildlife, federal threatened and endangered species, operations of other management agencies and entities.

Christy J. Smith, Archeologist, engineering-environmental Management, Inc. B.A. Archeology. Experience: 9 years. Responsible for description of existing conditions and impact analysis for archeology.

Miki Stuebe*, Landscape Architect/Planner, National Park Service (2006), engineering-environmental Management, Inc. (through March 2006) B.A. Biology, M.S. Biology-Ecology, M.L.A. Land Resource Planning. Experience: 16 years, 10 years with the National Park Service as Landscape Architect/Planner. Responsible for: description of existing conditions and impact analysis for: visitor use and experience. Also responsible for Chapter One: Purpose and Need for the Plan, Chapter Two: Alternatives, impact topics considered but not analyzed in detail, Chapter Five: Consultation and Coordination, and appendices B-G, and J.

Jim Von Loh, Senior Biologist, engineering-environmental Management, Inc. B.S. Biology, M.S. Biology. Ecology, Botany and Biology: 31 years experience. Responsible for description of existing conditions and impact analysis for: vegetation, ecologically critical areas, and wetlands.

Craig Vrabel, Senior Geologist, engineering-environmental Management, Inc. B.S. Geology. Geology, Hydrogeology, and Hazardous and Solid Waste Management: 17 years experience. Responsible for description of existing conditions and impact analysis for: soils and geologic resources, water resources.

*document preparers who are also Core Team Members

NATIONAL PARK SERVICE CORE TEAM MEMBERS

Art Hutchinson, Superintendent,
Great Sand Dunes National
Park and Preserve

Jim Bowman, Chief Park Ranger,
Great Sand Dunes National
Park and Preserve

Fred Bunch, Chief of Resources,
Great Sand Dunes National
Park and Preserve

Mark Seaton, Chief of Maintenance,
Great Sand Dunes National
Park and Preserve

Carol Sperling, Chief of Interpretation and Visitor Services,
Great Sand Dunes National
Park and Preserve

Suzy Stutzman, Landscape Architect/Planner, National Park Service Intermountain Region

Steve Chaney, Former Superintendent, Great Sand Dunes National Park and Preserve

GREAT SAND DUNES NATIONAL PARK ADVISORY COUNCIL

Herry Andrews, Alamosa County
Administrator; Alamosa,
Colorado (*term 2003–2007*)
Christine Canaly, Environmentalist;
Crestone, Colorado (*term
2003–2007*)
Hobart Dixon, Botanist; Alamosa,
Colorado (*term 2003–2007*)
Bill McClure, former Saguache
County Commissioner;
Center, Colorado (*term
2003–2005*)
Robert Ogburn*, Senior Judge;
Monte Vista and Pueblo
West, Colorado (*term 2003–
2007*)
Robert Philleo, former Saguache
County Commissioner;
Crestone, Colorado (*term
2003–2007*)
Paul Robertson, San Luis Valley
Project Director, The Nature
Conservancy (Colorado
Chapter); Mosca, Colorado
(*term 2005–2007*)
Terry Sandmeier, Hunting
Guide/Outfitter; Fairplay,
Colorado (*term 2003–2007*)
Michael J. Spearman, Saguache
County Commissioner;
Saguache, Colorado (*term
2005–2007*)
Michael Tetrault, Director, Western
Region, The Nature
Conservancy (Colorado
Chapter); Mosca, Colorado
(*term 2003–2005*)
George Whitten, Jr., Rancher;
Saguache, Colorado (*term
2003–2007*)

Jeff Woodard, Businessman;
Alamosa, Colorado (*term
2005–2007*)
Robert Zimmerman, former
Alamosa County
Commissioner; Alamosa,
Colorado (*term 2003–2005*)
*Chairman

CONSULTANTS

Adrienne Anderson, National Park Service
Intermountain Region
Beth Hall, former Administrative Clerk,
Great Sand Dunes National Park
and Preserve
Barb Irwin, former Chief of Administration,
Great Sand Dunes National Park
and Preserve
Margaret Johnston, Superintendent,
Golden Spike National Historic Site
Cay Ogden, Wildlife Biologist, National
Park Service Intermountain Region
Phyllis Pineda Bovin, Biologist, Great Sand
Dunes National Park and Preserve
Chris Turk, Regional Environmental
Quality Coordinator, National Park
Service Intermountain Region
Andrew Valdez, Geologist, Great Sand
Dunes National Park and Preserve
Joel Wagner, Hydrologist, NPS Water
Resources Division
Bill Wellman, Superintendent, Black
Canyon of the Gunnison National
Park and Curecanti National
Recreation Area
John White, Protection Ranger, Great Sand
Dunes National Park and Preserve
Ayesha Williams, Administrative
Technician, Great Sand Dunes
National Park and Preserve

