

# **APPENDIX I: IMPACT ANALYSIS**

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## I.1 EXAMPLES OF IMPACT THRESHOLD DEFINITIONS

### Big Cypress National Preserve — Addition Draft GMP/Wilderness Study/ Off-road Vehicle Management Plan/EIS (2009)

Impact Topic and Duration	Negligible	Minor	Moderate	Major
<p><b>Vegetation</b> (all vegetation types, including exotics/nonnative plants)</p>	<p>The action might result in a change in vegetation, but the change would not be measurable or would be at the lowest level of detection.</p>	<p>The action might result in a detectable change, but the change would be slight. This could include changes in the abundance, distribution, or composition of individual species in a local area, but would not include changes that would affect the viability of vegetation communities. Changes to local ecological processes would be minimal.</p>	<p>The action would result in a clearly detectable change in a vegetation community and could have an appreciable effect. This could include changes in the abundance, distribution, or composition of nearby vegetation communities, but would not include changes that would affect the viability of plant populations in the Addition or Preserve. Changes to local ecological processes would be of limited extent.</p>	<p>The action would be severely adverse to a vegetation community. The impacts would be substantial and highly noticeable, and they could result in widespread change. This could include changes in the abundance, distribution, or composition of a nearby vegetation community or plant populations in the Addition or Preserve to the extent that the population would not be likely to recover. Key ecological processes would be altered, and “landscape-level” (regional) changes would be expected.</p>
<p><b>Wetlands</b></p>	<p>No measurable or perceptible changes in wetland size, integrity, or continuity would occur.</p>	<p>The impact would be measurable or perceptible, but slight. A small change in size, integrity, or continuity could occur due to indirect effects such as construction-related runoff. However, the overall viability of the resource would not be affected.</p>	<p>The impact would be sufficient to cause a measurable change in the size, integrity, or continuity of the wetland or would result in a small loss or gain in wetland acreage.</p>	<p>The action would result in a measurable change in all three parameters (size, integrity, and continuity) or a loss or gain of large wetland areas. The impact would be substantial and highly noticeable.</p>

## Great Sand Dunes NP Draft GMP/Wilderness Study/EIS (2006)

### Vegetation

**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.

### Cultural Resource Impact Intensities

The following standard language was developed by the Cultural Resource Program and may be used as a basis for developing text on the method used in assessing impacts on cultural resources in the environmental consequences section of an EIS or EA. This “boilerplate” is generic; for increased usefulness, it should be modified for application in specific situations.

#### Method for Assessing Effects on Cultural Resources

This environmental impact assessment addresses effects on cultural resources – archeological sites, cultural landscapes, ethnographic resources, historic and prehistoric structures, and museum collections – that are proposed by actions in this [*insert type of document, e.g., GMP, special resource study, specific project plan, etc.*]. The method for assessing effects on cultural resources is designed to comply with the requirements of both NEPA and section 106 of the National Historic Preservation Act, and with implementing regulations 40 CFR 1500 and 36 CFR 800, respectively, while considering the differences between NEPA and NHPA language and recognizing that compliance with one does not automatically mean compliance with the other. Accordingly, the assessment of effects discusses the following characteristics of effects:

- Direct and indirect effects
- Duration of the effect (short- term, long- term)
- Context of the effect (site- specific, local, regional)
- Intensity of the effect (negligible, minor, moderate, major, both adverse and beneficial)
- Cumulative nature of the effect

In accordance with 36 CFR 800, the regulations implementing section 106 of NHPA, effects on cultural resources are identified and evaluated by:

- Determining the area of potential effect (APE) [800.4(a)]
- Identifying historic properties in the APE that are listed in or eligible for listing in the National Register of Historic Places [800.4(b)- (c)]. The results are either:
  - *No historic properties affected* – either there are no historic properties present or there are historic properties present but the undertaking [or proposed action] will have no effect upon them [800.4(d)(1)]; or
  - *Historic properties affected* – there are historic properties that may be affected by the undertaking [or proposed action] [800.4(d)(2)].
- Applying the criteria of adverse effect to affected historic properties in the area of APE [800.5.(a)(1)], as follows:
  - *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 of Historic Places in a manner than would diminish the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association. 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. [Examples of adverse effect are provided in 800.5(a)(2).]
  - A finding of *no adverse effect* is found when the undertaking’s effects do not meet the criteria of 800.5(a)(1) [800.5.(b)].
- Considering ways to avoid, minimize, or mitigate or otherwise resolve adverse effects. The following are considered:
  - Consultation with the SHPO/THPO and others to develop and evaluate strategies to mitigate adverse effects [800.6].
  - CEQ regulations and DO 12 call for the discussion of mitigating impacts and an analysis of how effective the mitigation would be in reducing the intensity of an impact, such as reducing it from moderate to minor intensity. Any resultant reduction in impact intensity is, however, an estimate of the effectiveness of mitigation under NEPA only.
  - Such reduction in impact intensity does not suggest that the level of effect as defined by Section 106 and 36 CFR 800 is similarly reduced. Cultural resources are non- renewable resources and adverse effects generally consume, diminish, or destroy the original historic materials or form, resulting in a loss of integrity that can never be recovered. Therefore, although actions determined to have an adverse effect under section 106 and 36 CFR 800 may be mitigated, the effect remains adverse.

A section 106 summary is included in the impact analysis sections. The section 106 summary provides an assessment of effect of the undertaking, or proposed action, on historic properties, based on the section 106 regulations cited above.

Definitions for impact intensity for archeological resources, cultural landscapes, ethnographic resources, historic and prehistoric structures, and museum collections are provided below.

### *Archeological Resources*

- Negligible Effect – the effect would be at the lowest levels of detection, barely measurable, with no perceptible consequences, either adverse or beneficial, to the resources. The section 106 determination would be *no adverse effect*.
- Minor Adverse Effect – the effect is measurable or perceptible, but it is slight and affects a limited area of a site or group of sites. Slight alteration(s) to any of the characteristics that qualify the site(s) for inclusion in the National Register may diminish the integrity of the site(s). For purposes of section 106, the determination of effect would be *adverse effect*.
  - Minor Beneficial Effect – the action would result in preservation of small areas of the site or group of sites.
- Moderate Adverse Effect – the effect is measurable and perceptible. The effect changes one or more of the characteristics that qualify the site(s) for inclusion in the National Register and diminishes the integrity of the site(s), but does not jeopardize the National Register eligibility of the site(s). For purposes of section 106, the determination of effect would be *adverse effect*.
  - Moderate Beneficial Effect – the action would noticeably enhance the preservation and protection of the site(s).
- Major Adverse Effect – the effect on the archeological site or group of sites is substantial, noticeable, and permanent. The action severely changes one or more characteristics that qualify the site(s) for inclusion in the National Register, diminishing the integrity of the site(s) to such an extent that it is no longer eligible for listing in the National Register. For purposes of section 106, the determination of effect would be *adverse effect*.
  - Major Beneficial Effect – the action would substantially enhance the protection and preservation of the site(s).

### *Cultural Landscapes*

A cultural landscape is a geographic area, including both cultural and natural resources, that can be associated with a historic event, activity, person, or exhibiting other cultural or aesthetic values. A key feature of a cultural landscape is the patterning of the resources into a coherent whole. Therefore, assessing the impact intensity on cultural landscapes requires the use of impact intensity definitions for archeological resources, ethnographic resources (for ethnographic landscapes), and historic or prehistoric structures, in conjunction with the definitions below, which focus on the cultural landscape as a whole, which is greater than the sum of its parts.

- Negligible Effect – the effect would be at the lowest levels of detection, barely measurable, with no perceptible consequences, either adverse or beneficial, to the resources. The section 106 determination would be *no adverse effect*.

- Minor Adverse Effect – the effect is measurable or perceptible, but it is slight and affects a limited area of the landscape or few of its patterns or features. Slight alteration(s) to any of the characteristics that qualify the landscape for inclusion in the National Register may diminish the integrity of the landscape. For purposes of section 106, the determination of effect would be *adverse effect*.
  - Minor Beneficial Effect – the action would result in preservation of small areas of the cultural landscape.
- Moderate Adverse Effect – the effect on the patterns and features of the landscape is measurable and perceptible. The effect changes one or more of the characteristics that qualify the landscape for inclusion in the National Register and diminishes the integrity of the landscape, but does not jeopardize the landscape’s National Register eligibility. For purposes of section 106, the determination of effect would be *adverse effect*.
  - Moderate Beneficial Effect – the action would noticeably enhance the preservation and protection of the landscape as a cohesive entity.
- Major Adverse Effect – the effect on the cultural landscape, its patterns and features, is substantial, noticeable, and permanent. The action severely changes one or more characteristics that qualify the landscape for inclusion in the National Register, diminishing the landscape’s integrity to such an extent that it is no longer eligible for listing in the national Register. For purposes of Section 106, the determination of effect would be adverse effect.
  - Major Beneficial Effect – the action would substantially enhance the protection and preservation of the landscape.

### *Ethnographic Resources*

Ethnographic resources are sites, structures, objects, landscapes, and/or natural resource features assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with them. Ethnographic resources that are eligible for listing in the National Register are *termed traditional cultural properties* or *traditional cultural places* because of their association with cultural practices or beliefs of a living community that (a) are rooted in that community’s history and (b) are important in maintaining the continuing cultural identity of the community (see *National Register Bulletin, Guidelines for Evaluating and Documenting Traditional Cultural Properties*, on-line at <http://www.nps.gov/history/nr/publications/bulletins/nrb38/>).

The key feature of an ethnographic resource is the cultural value assigned to it by the group associated with it. Therefore, like cultural landscapes, assessing the impact intensity on ethnographic resources requires the use of impact intensity definitions for archeological resources, cultural landscapes, historic or prehistoric structures, and natural resources in conjunction with the definitions below, which focus on the nature of the cultural association with the particular physical resource.

- Negligible Effect – the effect would be at the lowest levels of detection, barely measurable, with no perceptible consequences, either adverse or beneficial, to the resources. The section 106 determination would be *no adverse effect*.

- Minor Adverse Effect – the effect is slight but noticeable, and it may result in limited changes in traditional resource access or use, or the relationship between the resource and the affiliated group’s body of beliefs or practices. Slight alteration(s) to any of the characteristics that qualify the resource for inclusion in the National Register may diminish the integrity of the site. For purposes of section 106, the determination of effect would be adverse effect.
  - Minor Beneficial Effect – the action would allow traditional access and use, and/or accommodate a group’s traditional practices or beliefs.
- Moderate Adverse Effect – the effect is readily apparent and would interfere with traditional resource access or use, or the relationship between the resource and the affiliated group’s beliefs and practices, even though the group’s beliefs and practices would survive. The effect changes one or more of the characteristics that qualify the resource for inclusion in the National Register and diminishes the resource’s integrity, but does not jeopardize the resource’s National Register eligibility. For purposes of section 106, the determination of effect would be *adverse effect*.
  - Moderate Beneficial Effect – the action would noticeably enhance the group’s traditional resource access or use, or its relationship between the affiliated group’s body of beliefs and practices.
- Major Adverse Effect – the effect is substantial, noticeable, and permanent, and results in significant changes in traditional resource access or use, or in the relationship between the resource and the affiliated group’s beliefs and practices, to such a degree that the survival of the group’s beliefs and practices is jeopardized. The action severely changes one or more characteristics that qualify the resource for inclusion in the National Register, diminishing the resource’s integrity to such an extent that it is no longer eligible for listing in the National Register. For purposes of section 106, the determination of effect would be adverse effect.
  - Major Beneficial Effect – the action would substantially enhance traditional resource access and use, and the relationship between the resource and the affiliated group’s beliefs and practices.

#### *Historic and Prehistoric Structures*

- Negligible Effect – the effect would be at the lowest levels of detection, barely measurable, with no perceptible consequences, either adverse or beneficial, to the resources. The section 106 determination would be *no adverse effect*.
- Minor Adverse Effect – the effect is measurable or perceptible, but it is slight and affects a limited area of a structure or group of structures. Slight alteration(s) to any of the characteristics that qualify the structure(s) for inclusion in the National Register may diminish the integrity of the structure(s). For purposes of section 106, the determination of effect would be *adverse effect*.
  - Minor Beneficial Effect – the action would result in preservation of small areas of the structure or group of structures.
- Moderate Adverse Effect – the effect is measurable and perceptible. The effect changes one or more of the characteristics that qualify the structure(s) for inclusion in

the National Register and diminishes the integrity of the structure(s), but does not jeopardize the National Register eligibility of the structure(s). For purposes of section 106, the determination of effect would be *adverse effect*.

- Moderate Beneficial Effect – the action would noticeably enhance the preservation and protection of the structure(s).
- Major Adverse Effect – the effect on the structure or group of structures is substantial, noticeable, and permanent. The action severely changes one or more characteristics that qualify the structure(s) for inclusion in the National Register, diminishing the integrity of the structure(s) to such an extent that it is no longer eligible for listing in the national Register. For purposes of section 106, the determination of effect would be *adverse effect*.
  - Major Beneficial Effect – the action would substantially enhance the protection and preservation of the structure(s).

### *Museum Collections*

It is important to note that both 36 CFR 800 and the National Historic Preservation Act define historic property as including artifacts, records, and remains that are related to and located within such National Register eligible or listed properties [36 CFR 800.16(l)(1); also see NHPA Section 301(5)]. Therefore, the impact intensity definitions for museum collections must be applied, in part, in association with a related archeological site, cultural landscape, ethnographic resource, or historic or prehistoric structure. For assessing impacts to museum collections where section 106 is not applicable, only the first part of each definition statement should be applied.

- Negligible Effect – the effect would be at the lowest levels of detection, barely perceptible, with no measurable consequences, either adverse or beneficial, to the collections. The section 106 determination would be *no adverse effect*.
- Minor Adverse Effect – the effect is measurable or perceptible, but it is slight and affects the integrity of a few items in the museum collection, but would not degrade the usefulness of the collection for future research and interpretation. Slight alteration to any of the characteristics of the collection that qualify its related resource for inclusion in the National Register may diminish the integrity of the resource and its related collection. For purposes of section 106, the determination of effect would be *adverse effect*.
  - Minor Beneficial Effect – the action would stabilize the current condition of the collection or its constituent components to minimize degradation.
- Moderate Adverse Effect – the effect is measurable and perceptible, and would affect the integrity of many items in the collection and diminish the usefulness of the collection for future research and interpretation. The effect changes one or more of the characteristics of the collection that qualify its related resource for inclusion in the National Register and diminishes the integrity of the resource and its related collection, but does not jeopardize the National Register eligibility of the resource related to the collection. For purposes of section 106, the determination of effect would be *adverse effect*.

- Moderate Beneficial Effect – the action would improve the condition of the collection or protect its constituent parts from the threat of degradation.
- Major Adverse Effect – the effect on the collection is substantial, noticeable, and permanent, and would affect the integrity of most items in the collection and destroy the usefulness of the collection for future research and interpretation. The action severely changes one or more characteristics of the collection that qualify its related resource for inclusion in the National Register, diminishing the integrity of the resource and its related collection to such an extent that the resource is no longer eligible for listing in the National Register. For purposes of section 106, the determination of effect would be *adverse effect*.
  - Major Beneficial Effect – the action would substantially secure the condition of the collection as a whole or its constituent components from the threat of degradation.

## I.2 CUMULATIVE EFFECTS ANALYSIS

### I.2.a Definitions

**CEQ Regulations Sec. 1508.7:** “Cumulative impact” is 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 non- Federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Example: If the park proposes to expand a campground in grizzly bear habitat, other activities that have a combined impact on the grizzly bears must be included in the analysis. This would include other NPS road projects that would occur in grizzly bear habitat, as well as plans for future garbage disposal in the park’s gateway communities and last year’s Forest Service timber harvest. It doesn’t matter who takes the actions, or whether they took place in the past, are taking place in the present, or will take place in the foreseeable future.

**DO #12, Sec. 4-5, G.6:** “Cumulative impact information may be less exact than information on direct and indirect impacts of the alternatives, but a good faith effort to accurately and completely assess major sources of impact and their contribution to resources affected by the proposed action or alternatives should be part of any EIS or EA. For plans or other larger-scope federal actions, the analysis of cumulative effect may be a major focus of the NEPA document.”

### I.2.b How Do I Start?

1. Consider what the geographic area of influence should be for your affected resource. This area will differ from resource to resource. You might use regional watersheds, for example, or counties for economic effects.
2. Assemble a list of *other* past, present, and reasonably foreseeable future actions called the “cumulative scenario.” Be sure to include actions that might be taken by NPS or other agencies or individuals that could also affect resources in the area of influence.

3. Work through the cumulative scenario and determine which actions are relevant to your impact topic. Focus on actions with impacts that are clear contributors.
4. Develop the cumulative impact analysis. You may want to think of cumulative impacts as  $x + y = z$  (with  $x$  being the impacts you have described as a result of actions being proposed under each alternative;  $y$  being *other* past, present, and reasonably foreseeable future actions; and  $z$  being the cumulative impact).
5. Determine the context and intensity or magnitude of the actions. Intensity refers to the severity of the effect. Use the same terms that you used for your impact analysis — negligible, minor, moderate, and major.
6. Describe the total (cumulative) impact for your topic — the  $z$ . Reserve use of the label *cumulative effect* only for the  $z$ . You should also highlight the relative contributions of the NPS action proposed for the project or plan (compare  $x$  to  $z$ ). For example, the NPS alternative's contribution  $x$  may be a relatively small part of the overall cumulative impact  $z$ .
7. Where possible, use quantifiable data. Realize that your analysis may be mainly qualitative.
8. When either  $x$  or  $y$  is zero, then there are no cumulative impacts ( $z=0$ ) under this alternative.

### **Example of a Cumulative Impact Scenario and Analysis from Great Sand Dunes NP GMP/Wilderness Study/EIS (2006)**

#### *Cumulative Impacts*

Council on Environmental Quality regulations, which implement NEPA, require assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts 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 5 to 7 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, scheduled to begin in 2008, 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 lands is several years off.

#### 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 eastern-most 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 experienced an increased pace of growth recently, 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 just 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 Part 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 (Future)

The National Park Service plans to rehabilitate 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 lot will be 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 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 lot to the west side of the main park road. The horse loading area would have a dirt surface and the dump station surface would be paved.

#### Sale/Development of Private Land Parcels Near the Entrance to the Park (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, just 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 3-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.

#### ***Analysis of Cumulative Impacts to Big Horn Sheep in the NPS Preferred Alternative***

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. . . . 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 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 NPS preferred 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 (negative impacts from hunting of elk 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.

### **I.3 EXAMPLE OF MITIGATION MEASURES COMMONLY USED IN GMP ACTION ALTERNATIVES**

Although the following mitigation measures are fairly general, planners should read them CAREFULLY and see if they apply. Also, planning teams need to determine if anything else specific to their project needs to be added or deleted. Remember that a planning team should only include the mitigation measures below if they are going to be implemented by the park staff.

#### **Cultural Resources**

The National Park Service would preserve and protect, to the greatest extent possible, resources that reflect human occupation of \_\_\_\_\_ National Park. Specific mitigating measures include the following:

- Continue to develop inventories for and oversee research about archeological, historic, and ethnographic resources to better understand and manage the resources, including historic and ethnographic cultural landscapes. Conduct any needed archeological or other resource specific surveys, prepare national register evaluations, and identify recommended treatments. Incorporate the results of these efforts into the park's resource stewardship strategy and site-specific planning and compliance documents. Continue to manage cultural resources and collections following federal regulations and NPS guidelines and the Director's Order 24 "Museum Collection Management." Inventory the park's collection and keep in a manner that would meet NPS curatorial standards.
- Follow site-specific planning and compliance procedures, in accordance with the *Secretary of the Interior's Standards for Archeology and Historic Preservation*. Locate projects in previously

disturbed or existing developed areas to avoid or minimize adverse impacts to archeological resources. Use screening and/or sensitive design that would be compatible with historic resources and cultural landscapes and avoid development adjacent to ethnographic resources. If adverse impacts could not be avoided, these impacts would be mitigated by strategies determined through a consultation process with all interested parties.

- Conduct archeological site monitoring and routine protection. Conduct data recovery excavations at archeological sites threatened with destruction, where protection or site avoidance during design and construction is infeasible. Strictly adhere to NPS standards and guidelines on the display and care of artifacts. This would include artifacts used in exhibits in the visitor center. Irreplaceable items would be kept above the 500-year floodplain.
- Mitigative measures for structures and landscapes include documentation according to standards of the Historic American Buildings Survey/Historic American Engineering Record/Historic American Landscape Survey (HABS/HAER/HALS). The level of this documentation, which includes photography, archeological data recovery, and/or a narrative history, would depend on significance (national, state, or local) and individual attributes (an individually significant structure, individual elements of a cultural landscape, etc.) and be determined in consultation with the state historic preservation officer, tribal historic preservation officer(s), local community(ies), and/or other interested parties. When demolition of a historic structure is proposed, and following thorough documentation, architectural elements and objects may be salvaged for reuse in rehabilitating similar structures, or they may be added to the park's museum collection. In addition, the historical alteration of the human environment and reasons for that alteration would be interpreted to national park visitors.
- Continue ongoing consultations with culturally associated groups and American Indian tribes. Protect sensitive traditional use areas to the extent feasible by avoiding or mitigating impacts on ethnographic resources and continuing to provide access to traditional use and spiritual areas. Mitigation could include identification of and assistance in accessing alternative resource gathering areas and screening new development from traditional use areas.
- Encourage visitors through the park's interpretive programs to respect and leave undisturbed any inadvertently encountered archeological resources as well as to respect and leave undisturbed any offerings placed by American Indians.

## **Natural Resources**

### *Air Quality*

- Implement a dust abatement program. Standard dust abatement measures could include the following elements: water or otherwise stabilize soils, cover haul trucks, employ speed limits on unpaved roads, minimize vegetation clearing, and revegetate after construction.

### *Water Resources*

- To prevent water pollution during construction, use erosion control measures, minimize discharge to water bodies, and regularly inspect construction equipment for leaks of petroleum and other chemicals. Minimize the use of heavy equipment in a waterway.
- Build a runoff filtration system to minimize water pollution from larger parking areas.

### *Wetlands*

- Delineate wetlands by qualified NPS staff or certified wetland specialists and clearly mark the wetlands before construction work.
- Perform construction activities in a cautious manner to prevent damage caused by equipment, erosion, siltation, etc.

### **Soils**

- Build new facilities on soils suitable for development.
- Minimize soil erosion by limiting the time that soil is left exposed and by applying other erosion control measures, such as erosion matting, silt fencing, and sedimentation basins in construction areas to reduce erosion, surface scouring, and discharge to water bodies.
- Once work was completed, revegetate construction areas with native plants in a timely period.

### **Nonnative (Exotic) Species**

- Implement a noxious weed control program. Standard measures could include the following elements: ensure construction-related equipment arrives on-site free of mud or seed-bearing material; certify all seeds and straw material as weed-free; identify areas of noxious weeds pre-construction; treat noxious weeds or noxious weed topsoil before construction (e.g., topsoil segregation, storage, herbicide treatment); and revegetate with appropriate native species

### **Threatened and Endangered Species and Species of Concern**

Mitigation actions would occur during normal park operations as well as before, during, and after construction to minimize immediate and long-term impacts on rare, threatened, and endangered species. These actions would vary by specific project and area of the national park affected, and additional mitigations will be added depending on the specific action and location. Many of the measures listed above for vegetation and wildlife would also benefit rare, threatened, and endangered species by helping to preserve habitat. Mitigation actions specific to rare, threatened, and endangered species would include the following:

- Conduct surveys for rare, threatened, and endangered species as warranted.
- Locate and design facilities/actions to avoid adverse effects on rare, threatened, and endangered species. If avoidance is infeasible, minimize and compensate for adverse effects on rare, threatened, and endangered species as appropriate and in consultation with the appropriate resource agencies. Conduct work outside of critical periods for the specific species.
- Develop and implement restoration and/or monitoring plans as warranted. Plans should include methods for implementation, performance standards, monitoring criteria, and adaptive management techniques.
- Implement measures to reduce adverse effects of nonnative plants and wildlife on rare, threatened, and endangered species.

### **Vegetation**

- Monitor areas used by visitors (e.g., trails) for signs of native vegetation disturbance. Use public education, native plants to revegetate disturbed areas, erosion control measures, and barriers to control potential impacts on plants from trail erosion or social trailing.
- Designate river access/crossing points, and use barriers and closures to prevent trampling and loss of riparian vegetation.
- Develop revegetation plans for the disturbed area and require the use of native species. Revegetation plans should specify seed/plant source, seed/plant mixes, soil preparation, etc. Salvage vegetation should be used to the extent possible.

### **Wildlife**

- Employ techniques to reduce impacts on wildlife, including visitor education programs, restrictions on visitor activities, and park ranger patrols.

- Implement a natural resource protection program. Standard measures would include construction scheduling, biological monitoring, erosion and sediment control, the use of fencing or other means to protect sensitive resources adjacent to construction, the removal of all food-related items or rubbish, topsoil salvage, and revegetation. This could include specific construction monitoring by resource specialists as well as treatment and reporting procedures.

### **Visitor Safety and Experiences**

- Implement a traffic control plan, as warranted. Standard measures include strategies to maintain safe and efficient traffic flow during the construction period.
- Implement measures to reduce adverse effects of construction on visitor safety and experience.
- Implement an interpretation and education program. Continue directional signs and education programs to promote understanding among park visitors.
- Conduct an accessibility study to understand barriers to park programs and facilities. Based on this study, implement a strategy to provide the maximum level of accessibility.

### **Hazardous Materials**

- Implement a spill prevention and pollution control program for hazardous materials. Standard measures could include hazardous materials storage and handling procedures; spill containment, cleanup, and reporting procedures; and limitation of refueling and other hazardous activities to upland/ nonsensitive sites.

### **Noise Abatement**

- Implement standard noise abatement measures during construction. Standard noise abatement measures could include the following elements: a schedule that minimizes impacts on adjacent noise-sensitive uses, the use of the best available noise control techniques wherever feasible, the use of hydraulically or electrically powered impact tools when feasible, and the location of stationary noise sources as far from sensitive uses as possible.

Mitigating measures would be applied to protect the natural sounds in the park. Specific mitigating measures include the following:

- Implement standard noise abatement measures during park operations. Standard noise abatement measures could include the following elements: a schedule that minimizes impacts on adjacent noise-sensitive uses, use of the best available noise control techniques wherever feasible, use of hydraulically or electrically powered impact tools when feasible, and location of stationary noise sources as far as possible from sensitive uses.
- Site and design facilities to minimize objectionable noise.
- Work with \_\_\_\_\_ to find ways to minimize the noise from \_\_\_\_\_.
- Encourage users of snowmobiles and personal watercraft to use the new quieter vehicles currently being produced.
- Explore options to reduce the sounds of \_\_\_\_\_.