



National Park Service  
U.S. Department of the Interior  
**Sand Creek Massacre National Historic Site**  
Colorado

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# **Fire Management Plan**

## **Environmental Assessment**

September 2015



Cover Photo by Jeff Campbell (11/29/2014).

# Fire Management Plan

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## Environmental Assessment

### Summary

Sand Creek Massacre National Historic Site (hereafter SAND) is proposing a new Fire Management Plan (FMP) to include prescribed burning, use of manual and mechanical tools, limited grazing, biological agents, and targeted herbicide application as tools for fuels management and vegetation restoration. A new FMP is needed to better protect and manage SAND natural and cultural resources, to address vegetation changes resulting from land use changes since the historic period, including fire suppression, drought events, and to address updates in national fire policy terminology. In addition, the use of the Healthy Forest Initiative Categorical Exclusion, under which the current FMP was approved, will be discontinued by September 30, 2016. Due to updates in environmental regulations and proposed use of these fire management tools, the National Park Service (NPS) has determined that it is necessary to complete an Environmental Assessment (EA) in support of the new SAND FMP.

This Environmental Assessment (EA) evaluates two alternatives—a No Action Alternative (1), and the action Alternative (2). Under the No Action Alternative, SAND would not have a valid FMP. Emergency wildfire suppression actions would be allowed under the National Fire Policy. Without a valid FMP, no planned projects would be implemented. This lack of a valid FMP would: prevent vegetation restoration efforts to emulate the cultural landscape found during the 1864 historic period of cultural significance; continue to reduce resilience of SAND ecosystems to drought, pest outbreaks, wildfire, and climate change; and continue retention and increased density of hazardous fuels and the associated risk to humans, structures, and to natural and cultural resources. The Preferred Alternative would employ prescribed burning, manual and mechanical tools and equipment for hazardous fuel reduction activities, assisted by limited grazing, biological agents, and targeted herbicide application. Wildfire suppression strategies would be the same as under Alternative 1. Use of these fuel management tools would more effectively restore and protect SAND cultural and natural resource values, increase success in creating and/or maintaining defensible space and fuelbreaks by reducing hazardous fuels, reduce encroachment of sand sage into shortgrass prairie, and reduce the occurrence of exotic plant species. Over time, these tools would alter the vegetation environment and lead to more effective wildfire suppression and better protection of SAND cultural and natural resources and adjacent property. Each alternative is described in more detail in the “Alternatives Considered” section of this document.

This EA has been prepared in compliance with the National Environmental Policy Act (NEPA) to provide the decision-making framework that: 1) analyzes a reasonable range of alternatives to meet objectives of the proposed plan; 2) evaluates potential issues and impacts to the natural and cultural resources of SAND; and 3) identifies mitigation measures that are designed to lessen the degree or extent of adverse impacts. Resource topics determined to potentially be affected by the alternatives include: Air Quality, Soil Resources, Vegetation (including Invasive Weeds), Wildlife, Special Status Species, Archeological Resources, Cultural Landscapes, Ethnographic Resources, Visitor Use and Experience, and Human Health and Safety. All other resource topics were dismissed because they would sustain negligible to less than minor adverse impacts from the evaluated alternatives. No major effects were identified as a result of this proposed project.

Public scoping was conducted to assist with the development of this document and development of the alternatives; comments were received and considered in the evaluation of effects.

### **Public Comment**

If you wish to comment on the EA, you may post comments online at <http://parkplanning.nps.gov/SAND> or mail or hand deliver comments to: Superintendent, Sand Creek Massacre National Historic Site, P.O. Box 249, Eads, Colorado 81036-0249. This EA will be on public review for 30 days. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. Although you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so. Comments will not be accepted by fax, e-mail, or in any other way than those specified above. Bulk comments in any format (hard copy or electronic) submitted on behalf of others will not be accepted.

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## PURPOSE AND NEED

### Introduction

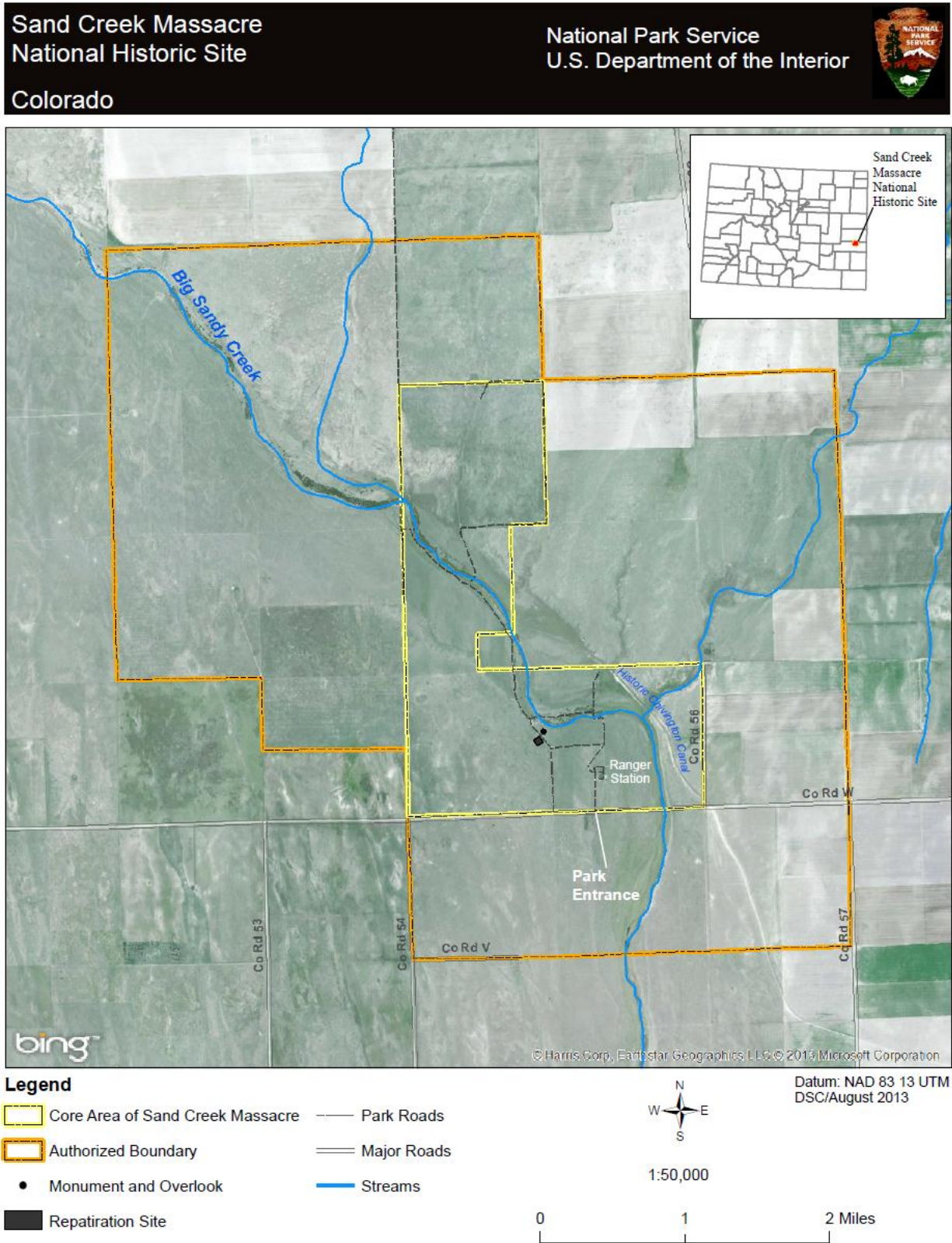
Sand Creek Massacre National Historic Site (SAND) is located in southeastern Colorado about 23 miles driving distance northeast of Eads, Colorado in Kiowa County (Figure 1). The NPS currently manages 2,385 acres within the 12,583 acre authorized unit. SAND encompasses the site of the Sand Creek Massacre of 1864 where more than 200 Cheyenne and Arapaho Indians were killed in the attack by U.S. Army Volunteer Cavalry. The established boundary of SAND is surrounded by agricultural lands and rangelands that are privately owned. SAND was set aside on November 7, 2000 by Congress (*PL 106-465*) “to protect the site where on November 29, 1864 a peaceful village of Cheyenne and Arapaho Indians under the leadership of Chief Black Kettle, along Sand Creek in southeastern Colorado territory was attacked by 700 volunteer soldiers commanded by Colonel John M. Chivington...” The site of the Sand Creek Massacre is also of great significance to descendants of the massacre victims and their respective tribes and commemoration of ancestors at the site. The site is also a reminder of the tragic conflict between the American Indians and U.S. Government concerning the land. SAND is a nationally significant element of frontier history as well as a symbol of American Indian struggles to maintain ancestral homelands.

Historically, natural fire helped to shape the native vegetation and local ecosystems. Very little is known of fire history of the southern Great Plains grasslands prior to European settlement. Recent fire history studies have suggested that the number of fires has decreased due to fire suppression (Ford and McPherson 1996). There is agreement that litter accumulation is relatively slow in short grass prairie, which suggests that fires were relatively infrequent. Estimates for the minimum fire return intervals of short grass prairie range from five to ten years (Joern and Keeler 1995), but this may not be appropriate for all areas. Prior to European settlement, the Plains tribes primarily used fire as a tool for range management, hunting, and communication (Risser et al. 1981). Shortgrass prairie and sand sagebrush vegetation communities of SAND require periodic fires to help maintain their ecological integrity and stability.

In accordance with *2006 NPS Management Policies*, the new SAND fire management plan (FMP) will be designed to protect the health and safety of the public and employees; minimize potential impacts associated with wildfire to properties adjacent to the park and to park facilities and infrastructure; and protect, preserve, and enhance cultural and natural resources. The preservation of cultural and natural resources within SAND is fundamental to its continued use and enjoyment by park visitors as a unit of the National Park System.

The new FMP would affirm firefighter and public safety as the highest priority of every fire management activity. In addition, the new FMP would incorporate updated terminology related to National Fire Policy (Fire Executive Council 2009).





**Figure 1. Vicinity Map of SAND**

### ***Park Description***

The purpose of SAND is to protect and preserve the cultural landscape of the 1864 Sand Creek Massacre site and interpret the associated cultural values to enhance public understanding of the massacre and assist in commemoration of ancestors at the site. The site is also a reminder of the tragic conflict between American Indians and U.S. Government concerning the land. SAND is a nationally significant element of frontier history as well as a symbol of American Indian struggles to maintain ancestral homelands. The purpose statement of SAND reflects the reasons for which it was created and provides the guiding foundation for its management and use.

The significance of SAND:

1. Sacred significance to the Cheyenne and Arapaho, particularly those descended from victims and survivors of the massacre.
2. The site is a reminder of the tragic conflict between American Indians and Euro-Americans over the land that now comprises the United States.
3. The Sand Creek massacre is a symbol of the struggles American Indians had to maintain their ancestral ways of life.
4. The intense distrust resulting from the Sand Creek massacre influenced virtually all subsequent conflicts between American Indians and the U.S. Army.
5. The massacre profoundly disrupted the social, political, and economic structures of the Cheyenne and Arapaho.
6. By eliminating most of the Cheyenne's advocates for peace, the massacre hardened resistance to white expansion and escalated warfare between the army and the Cheyenne, Arapaho, and other plains tribes.
7. The circumstances of the massacre elicited wide national outrage even against the backdrop of the Civil War and forced substantial changes in U.S. Indian Policy.

## **Purpose and Need**

### **Purpose**

The purpose of the proposed project is to comply with Director's Order 18 (DO-18) and Reference Manual-18 (RM-18), which states that "all parks with vegetation that can sustain fire must have a fire management plan", and to replace the use of the Healthy Forest Initiative Categorical Exclusion (CE), per NPS direction to discontinue the use of that CE by September 30, 2016 (NPS 2012a; NPS 2015).

## Need

SAND is proposing a new FMP to provide a management framework for wildland fire activities, both planned and unplanned, that would best meet overall park management goals; and to address changes in the vegetation resulting from land use since the historic periods, fire suppression, and drought events, and to address updates in the national fire policy terminology.

Historically, open grassland with low-density shrubs were maintained by periodic wildfires. The area was grazed by roaming bison and wild horses and later intense domestic livestock grazing. The grazing reduced the density and continuity of herbaceous fuels important to fire frequency and spread. These grazing practices reduced grasslands and favored increased shrub density and introduction of non-native invasive species (Grover and Musick 1990). American Indian land use included hunting the open plains for bison and grazing by roaming bison, which was followed by suppression of wildfires by European Americans, which was followed by cessation of intense livestock grazing. These human actions have resulted in more dense vegetation than conditions existed during pre-contact and historic periods. Species composition changed too, including sand sage encroachment on grasslands. Hazardous fuel loads have increased along SAND's boundary and the riparian corridor with increased shrub densities and accumulation of dead and down woody debris along the Big Sandy Creek riparian area. The current hazardous fuel loads increase the potential for intense wildfires and associated risk to visitors, employees, cultural and natural resources, NPS structures, and neighboring lands. The vegetation needs to be actively managed to reduce hazardous fuel loads and risk to life and property and to help perpetuate the vegetation conditions that developed during the historic period of cultural significance—1864—that NPS is mandated to interpret and protect.

Restoring vegetation communities in the park would also help to restore the ecological integrity of plant communities and their associated wildlife species. Periodic disturbances such as fire contribute to ecological diversity because moderate levels of disturbance provide opportunities for a larger number of species (Connell 1978). A new FMP would provide SAND with a means to use prescribed fire and manual and mechanical vegetation treatments to manage hazardous fuel loads, protect sensitive sites, restore the cultural landscape, and control invasive plant species. SAND is also considering using limited herbicide application and grazing as additional management options to help maintain reduced hazardous fuel loads and to eliminate already present exotic plant species. Biological agents would be used to reduce exotic plant species such as field bindweed (*Convolvulus arvensis*) by a gall mite that feeds on the root buds and plant inhibiting growth and/or killing the plant (Lauriault et al. 2004). The use of prescribed fire, manual treatments, limited herbicide use and grazing, and biological agents as fire management tools would provide a means to continue protecting life, property and resources from unwanted wildland fire in a safe and efficient manner.

In summary the following goals of this proposed action are:

1. Firefighter and public safety is the first priority in all wildland fire management activities.
2. Park investments (infrastructure) and cultural and natural resources will be protected from wildland fire and fire suppression activities.
3. Park management actions will take place to restore and maintain the park's cultural and natural resources to meet park management goals as outlined in park management plans.

4. The park will work toward establishing and maintaining formal cooperative relationships with local, state, federal, and tribal cooperators and partners.
5. The National Park Service (NPS) will consider actions that minimize the threat to adjacent property related to wildfire risks. Adjacent communities will be informed about park fire management activities.
6. Wildfire, whether human caused or from a natural ignition, will be suppressed. This includes suppression actions taken for fires starting on NPS administered lands and for wildfires burning onto NPS administered lands from other lands.

## Impact topics Retained for Further Analysis

Impact topics for this project have been identified on the basis of federal laws, regulations, and orders, including the *2006 NPS Management Policies*, and NPS knowledge of resources at SAND as well as the questions and comments brought forth during internal and external scoping.

Impact topics that are carried forward for further analysis in this EA are those where the proposed action may have a measurable effect. The Park Service defines “measurable” impacts as greater than minor effects. It equates “no measurable effects” as minor or less effects. The use of “no measurable effects” in this EA pertains to whether the Park Service dismisses an impact topic from further detailed evaluation in the EA. The reason the Park Service uses “no measurable effects” to determine whether impact topics are dismissed from further evaluation is to concentrate on the issues that are truly significant to the action in question, in accordance with Council on Environmental Quality (CEQ) regulations at 1500.1(b).

Ten impact topics were retained for further analysis. The rationale for retaining each of these topics is briefly listed below with a description of the existing setting or baseline conditions (i.e. affected environment) within the project area. The impact topics along with the desired conditions and relevant laws, regulations, or policies are listed below in Table 1.

Table 1. Impact Topics Retained for Further Analysis and Relevant Laws, Regulations, and Policies.

Impact Topic	Rationale for Retaining	General Desired Conditions from NPS Management Documents	Relevant Laws, Regulations, and Policies
<b>Air Quality</b>	The Clean Air Act gives the federal land manager the responsibility to protect air quality related values (i.e., visibility, plants, animals, soils, water quality, cultural resources, and visitor health) from adverse pollution impacts. Air quality was retained since smoke is a byproduct of prescribed burning.	Air quality related values should be protected from deterioration, especially on a permanent basis. Perpetuate predominant air quality to sustain human health, scenic vistas, visibility, and visitor enjoyment; and to conserve natural resources and systems and cultural resources.	NPS Organic Act of 1916, as amended; Clean Air Act, as amended; NPS Wildfire Management Reference Manual 18; NPS-77 Natural Resources Management Guidelines; NPS Management Policies; National Environmental Policy Act
<b>Soils</b>	The <i>2006 NPS Management Policies</i>	Natural soil resources and geologic processes function in as	NPS Organic Act of 1916, as amended; NPS-77 Natural

Impact Topic	Rationale for Retaining	General Desired Conditions from NPS Management Documents	Relevant Laws, Regulations, and Policies
	states the NPS will aim to understand and preserve the soil resources and to prevent unnatural erosion, removal, or contamination of them. The proposed action has the potential to impact soil resources.	natural condition as possible, except where special management considerations are allowable under policy.	Resources Management Guidelines; NPS Management Policies 2006
<b>Vegetation (including exotic and invasive plant species)</b>	The construction of fire lines and proposed planned events—herbicide treatments, manual and mechanical treatments, limited grazing, and prescribed burning—would remove or change areas of native vegetation for fuels reduction. Furthermore, associated ground disturbance activity from construction of fire lines, herbicide treatments, manual and mechanical treatments, grazing, and prescribed burning could increase the potential for invasive plant species introduction and spread.	<p>Manage vegetation to achieve greatest diversity and health, foster the health of existing state and federal listed species, and allow for reintroduction of native species where absent.</p> <p>Ensure that allowed activities aid in the recovery or maintenance of natural vegetation communities especially special and unique habitats.</p> <p>Ensure processes continue that sustain support of functional physical processes, biological productivity, and biological organisms.</p> <p>Prevent establishment of non-native vegetation, and remove it when possible.</p>	NPS Organic Act; NPS Management Policies 2006; Resource Management Guidelines (NPS-77); Executive Order (EO) 13112; Federal Noxious Weed Control Act; Executive Order (EO) 13112; Invasive Species (1999)
<b>Wildlife</b>	The Proposed Action could alter or disturb wildlife habitat and individual animals, but would be beneficial by restoring native vegetation and wildlife communities.	<p>Minimize disturbances to native wildlife habitat.</p> <p>Prevent wildlife exposure to contaminants.</p> <p>Minimize human caused mortality to wildlife.</p> <p>Ensure that allowed activities aid in the recovery or maintenance of wildlife habitat.</p>	NPS-77; Migratory Bird Treaty Act, as amended; EO 13186; Lacey Act, as amended; NPS Management Policies 2006
<b>Special Status Species</b>	There are no known federally listed threatened, endangered, proposed or candidate species known to inhabit SAND and no designated critical habitat lies within or near SAND. However, the Proposed Action could potentially restore suitable habitat for special status species. The	<p>Avoid and/or mitigate adverse impacts on state and federally listed threatened, endangered, sensitive, and candidate plant and animal species and their habitats.</p> <p>Manage for the existence or increase of state and federally listed threatened, endangered, sensitive, and candidate plant and animal species and their habitats.</p>	Endangered Species Act, as amended; NPS-77; Migratory Bird Treaty Act, as amended; EO 13186; Lacey Act, as amended; NPS Management Policies 2006; National Environmental Policy Act



Impact Topic	Rationale for Retaining	General Desired Conditions from NPS Management Documents	Relevant Laws, Regulations, and Policies
	Proposed Action could also disturb state-listed species or their habitat, but may be beneficial in restoring native habitats that are critical in maintaining sensitive species populations.	Ensure that allowed activities aid in the recovery of state and federally listed threatened, endangered, sensitive, and candidate plant and animal species and their habitats.	
<b>Archeological Resources</b>	Historic archaeological resources related to Sand Creek Massacre and American Indian occupation have been documented in SAND. Both surface structures and subsurface archeological remains occur within SAND, thus with any ground disturbing activity there is always the potential to impact subsurface materials or features. Fire management activities could potentially disturb archaeological sites that are important in preserving the cultural heritage in SAND.	<p>Protects archaeological resources by preventing human caused, and in some cases naturally caused destruction, alteration, or impairment to all or part of the cultural resource.</p> <p>Prevents isolation from or alteration to cultural resources with its surrounding environment.</p> <p>The qualities that contribute to the eligibility for listing or listing of archeological properties on the National Register of Historic Places (NRHP) are protected in accordance with the Secretary of the Interior's Standards (unless it is determined through a formal process that disturbance or natural deterioration is unavoidable).</p>	National Historic Preservation Act; Executive Order 11593, Protection and Enhancement of the Cultural Environment; Archeological and Historic Preservation Act; the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation; Programmatic Memorandum of Agreement Among the NPS, Advisory Council on Historic Preservation, and the National Council of State Historic Preservation Officers (2008); DO-28; NPS Management Policies 2006; National Environmental Policy Act; DO-28
<b>Cultural Landscapes</b>	The Proposed Action should have beneficial impacts to cultural landscapes, which is important in preserving the cultural heritage in SAND.	<p>The treatment of a cultural landscape will preserve significant physical attributes, biotic systems, and uses when those uses contribute to historical significance. Treatment decisions will be based on a cultural landscape's historical significance over time, existing conditions, and use. Treatment decisions will consider both the natural and built characteristics and features of a landscape, the dynamics inherent in natural processes and continued use, and the concerns of traditionally associated peoples.</p> <p>The treatment implemented will be based on sound preservation practices to enable long-term preservation of a resource's historic features, qualities, and materials. There are three types of treatment for extant cultural</p>	National Historic Preservation Act; Executive Order 11593; Archeological and Historic Preservation Act; the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation; Programmatic Memorandum of Agreement Among the NPS, Advisory Council on Historic Preservation, and the National Council of State Historic Preservation Officers (1995); NPS Management Policies 2006

Impact Topic	Rationale for Retaining	General Desired Conditions from NPS Management Documents	Relevant Laws, Regulations, and Policies
		<p>landscapes: preservation, rehabilitation, and restoration.</p> <p>Cultural landscapes are listed in the National Register when their significant cultural values have been documented and evaluated within appropriate thematic contexts, and physical investigation determines that they retain integrity. Cultural landscapes are classified in the National Register as sites or districts or may be included as contributing elements of larger districts.</p>	
<b>Ethnographic Resources</b>	<p>The Proposed Action would be designed to reduce any impacts to known cultural resources and to the features identified as ethnographic resources. However, both wildfire and fire management activities have the potential to affect ethnographic resources.</p>	<p>Appropriate cultural anthropological research is conducted in cooperation with park-associated groups</p> <p>All agencies shall accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, and avoid adversely affecting the physical integrity of these sacred sites.</p> <p>NPS general regulations on access to and use of natural and cultural resources in parks will be applied in an informed and balanced manner that is consistent with park purposes and does not unreasonably interfere with American Indian use of traditional areas or sacred resources and does not result in degradation of park resources.</p> <p>Other federal agencies, state and local governments, potentially affected American Indian and other communities, interest groups, State Historic Preservation Officer, and the Advisory Council on Historic Preservation will be given opportunities to become informed about and comment on anticipated NPS actions at the earliest practicable time.</p>	<p>DO-28, EO 13007, NPS Management Policies 2006, National Historic Preservation Act; Executive Order 11593; Archeological and Historic Preservation Act; the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation; Programmatic Memorandum of Agreement Among the NPS, Advisory Council on Historic Preservation, and the National Council of State Historic Preservation Officers (1995)</p>

Impact Topic	Rationale for Retaining	General Desired Conditions from NPS Management Documents	Relevant Laws, Regulations, and Policies
		<p>All agencies shall consult with tribal governments prior to taking actions that affect federally recognized tribal governments. These consultations are to be open and candid so that all interested parties may evaluate for themselves the potential impact of relevant proposals. Parks will regularly consult with traditionally associated American Indians regarding planning, management, and operational decisions that affect subsistence activities, sacred materials or places, or other ethnographic resources with which they are historically associated.</p> <p>The identities of community consultants and information about sacred and other culturally sensitive places and practices will be kept confidential when research agreements or other circumstances warrant.</p> <p>American Indians and other individuals and groups linked by ties of kinship or culture to ethnically identifiable human remains will be consulted when remains may be disturbed or are encountered on park lands.</p>	
<b>Visitor Use and Experience</b>	Some temporary disturbance would be visible to visitors, but would be site-specific and would have little effect to visitor experience. However, this topic was retained for further analysis due to the fundamental NPS goal of providing for visitor enjoyment.	<p>Visitor, resident and employee safety and health are protected and considered in all management actions</p> <p>Visitors understand and appreciate park values, resources, and relationships and have the information necessary to adapt to park environments. Visitors have opportunities to enjoy the park in ways that leave park resources unimpaired for future generations.</p> <p>Park recreational uses are promoted and regulated, and basic visitor needs are met in keeping with park purposes.</p>	NPS Management Policies 2006, National Environmental Policy Act; Americans with Disabilities Act



Impact Topic	Rationale for Retaining	General Desired Conditions from NPS Management Documents	Relevant Laws, Regulations, and Policies
		All reasonable efforts will be made to make NPS facilities, programs, and services accessible to and usable by all people, including those with disabilities.	
<b>Human Health and Safety</b>	Wildland fires pose a significant risk to the health and safety of firefighters, NPS employees, and the public. Other planned fire management activities may also pose some risk to staff and visitors. Because activities addressed under the Proposed Action have the potential to impact human health and safety near the fire management projects, this topic was retained.	All reasonable and necessary measures would be taken to minimize human exposure to fire management related hazards. Besides exposure to fire and smoke, this includes related equipment activities, chemical exposure, exposure to heat and environmental hazards, and other work and recreational activities in a rustic, and natural setting.	NPS Management Policies 2006; Director's Orders 58; NPS Wildfire Management Reference Manual 18

## Impact topics Considered, but Dismissed from Further Analysis

### 1) Floodplains

Executive Order 11988 *Floodplain Management* requires all federal agencies to avoid construction within the 100-year floodplain unless no other practicable alternative exists. The NPS guided by the 2006 *NPS Management Policies* and Director's Order 77-2 *Floodplain Management* will strive to preserve floodplain values and minimize hazardous floodplain conditions. According to Director's Order 77-2 *Floodplain Management*, certain construction within a 100-year floodplain requires preparation of a Statement of Findings for floodplains.

Approximately 3.25 miles of Big Sandy Creek are located within SAND, containing both perennial and intermittent reaches. The modern floodplain is near the surface of the active stream channel with a width ranging from 150 to 300 meters. The floodplain is bound by fluvial terraces, thick eolian deposits, or bedrock cliffs. Historically, fire is thought to have been low intensity surface wildfires with a minimum fire frequency return interval of 5 to 10 years (Joern and Keeler 1990). The Proposed Action would not involve the filling or alterations of floodplain areas and their values. Therefore, the topic of floodplains was dismissed from further analysis.

### 2) Water Resources

NPS policies require protection of water quality consistent with the Clean Water Act. The purpose of the Clean Water Act is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." To enact this goal, the U.S. Army Corps of Engineers has been charged with

evaluating federal actions that result in potential degradation of waters of the United States and issuing permits for actions consistent with the Clean Water Act. The U.S. Environmental Protection Agency also has responsibility for oversight and review of permits and actions that affect waters of the United States.

Approximately 3.25 miles of Big Sandy Creek is located within SAND, containing both perennial and intermittent reaches. Other hydrologic features at SAND include Spring Creek, which contributes to Big Sandy Creek's surface water and the riparian habitat; Kern Spring, a perennial water body that contributes to Big Sandy Creek's floodplain; and a portion of Chivington-Brandon Irrigation Canal (1.2 miles). Most of the flow of Big Sandy Creek is subterranean except during heavy precipitation events or where surface features allow a permanent surface flow over short distances (Tilmant et al 2006). It is thought that the perennial flow of Big Sandy Creek is less than it was during historic times; no studies elaborate if this is due to a drier climate, drought, and/or agricultural diversion and wells.

Executive Order 11990 *Protection of Wetlands* requires federal agencies to avoid, where possible, adversely impacting wetlands. Further, Section 404 of the Clean Water Act authorizes the U.S. Army Corps of Engineers to prohibit or regulate, through a permitting process, discharge of dredged or fill material or excavation within waters of the United States. NPS policies for wetlands as stated in 2006 Management Policies and Director's Order 77-1 *Wetlands Protection*, strive to prevent the loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. In accordance with DO 77-1 *Wetlands Protection*, Proposed Actions that have the potential to adversely impact wetlands must be addressed in a Statement of Findings for wetlands.

There are three wetland types identified by the USFWS National Wetland Inventory—Palustrine Emergent Intermittently Flooded/Temporary, Palustrine Forested Intermittently Flooded/Temporary, and Riverine Intermittent Streambed Intermittently Flooded—at SAND (USFWS 2013a). A narrow band of wetlands is located along Big Sandy Creek throughout SAND. All three wetland classifications were determined by use of the "Classification of Wetlands and Deepwater Habitats of the United States" by Cowardin et al. (1979), the system the National Park Service has adopted for wetland determination. Proposed fuel reduction treatments that could occur near water resources may include low intensity ground fires, which are expected to lightly burn streamside vegetation, allowing the streamside vegetation to regrow quickly. Furthermore, the abundant cover of native, herbaceous, and soil-binding riparian species found along Big Sandy Creek would serve as a barrier and/or filter for the increased potential for sedimentation from prescribed fires. Mulching fine fuels along the edge of the cottonwood galleries and chainsaw use should not affect water resources. Prescribed fire and vegetation management in the park are expected to have negligible impacts on Big Sandy Creek and its associated wetlands, thus water resources was dismissed from further discussion.

### **3) Paleontological Resources**

The 2006 *NPS Management Policies* for the National Park Service (NPS) states the paleontological resources (fossils), including both organic and mineralized remains in body or trace form, will be protected, preserved, and managed for public education, interpretation, and scientific research. There are no known paleontological resources at SAND thus the topic was dismissed from further assessment.

#### **4) Museum Collections**

The Director's Order 24 *Museum Collections* states that NPS is required to consider the impacts on museum collections (historic artifacts, natural specimens, and archival and manuscript material), and provides further policy guidance, standards, and requirements for preserving, protecting, documenting, and providing access to, and use of, NPS museum collections. The SAND museum and archival collections consist of 53,817 items. These collections include manuscripts, maps, oral history recordings, and artifacts from the site or associated with the massacre. The museum and archival collections are housed at the Western Archaeological and Conservation Center and at Bent's Old Fort National Historic Site. Therefore, museum collections would not be disturbed or damaged by the Proposed Action; thus, museum collections were dismissed from further analysis.

#### **5) Soundscape Management**

In accordance with the *2006 NPS Management Policies* and Director's Order 47 *Sound Preservation and Noise Management*, an important component of the NPS's mission is the preservation of natural soundscapes associated with national park units (NPS 2006). Natural soundscapes exist in the absence of human-caused sound. The natural ambient soundscape is the combination of all the natural sounds that occur in park units, together with the physical capacity for transmitting natural sounds. The frequencies, magnitudes, and durations of human-caused sound considered acceptable varies among NPS units as well as potentially throughout each monument, being generally greater in developed areas and less in undeveloped areas.

The predominant soundscape at SAND is comprised of mostly natural sounds produced from birds and wind and non-natural sounds from commercial jets (Lynch 2011). Temporary, short-term impacts to the soundscape could occur from equipment (e.g., chainsaw, bush/brush hog) used for reduction of hazardous fuels or fire lines. These impacts should be temporary and site-specific and should not exceed the typical levels of man-made noise present during regular operations. Therefore, soundscape management was dismissed as an impact topic for further analysis.

#### **6) Lightscape Management**

The *2006 NPS Management Policies* states the NPS will strive to preserve natural ambient lightscapes, which are natural resources and values that exist in the absence of human caused light (NPS 2006). SAND strives to limit the use of artificial outdoor lighting to the amount necessary for basic safety requirements. SAND also strives to ensure that all outdoor lighting is shielded to the maximum extent possible, to keep light on the intended subject and out of the night sky. The visitor center and the existing administration offices are the primary sources of light at SAND, but the impact is minimal since the park is not open at night. No exterior lighting is proposed as part of the Proposed Action and no impacts to the SAND lightscape (night sky) are expected; therefore, this topic has been dismissed from further consideration.

#### **7) Prime and Unique Farmlands**

The Farmland Protection Policy Act of 1981, as amended, requires federal agencies to consider adverse effects to prime and unique farmlands that would result in the conversion of these lands to

non-agricultural uses. Prime or unique farmland is classified by the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS). Prime farmland is defined as land that has the best combination of physical and chemical properties for producing food, forage, fiber, and oil seed, and for other uses (e.g., pasture land, forest land, and crop land). Unique farmland is defined as land other than prime farmland that can produce high value and fiber crops, such as fruits, vegetables, and nuts. There are no prime and unique farmlands designated in SAND (NRCS 2014); thus, this topic was dismissed from further analysis.

## **8) Indian Trust Resources**

Secretarial Order 3175 mandates any anticipated impacts to Indian trust resources from proposed project or action by the Department of 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. SAND is a public holdings and is not considered American Indian trust resources and do not have any designated American Indian trust resources. Therefore, Indian Trust Resources was dismissed as an impact topic for further analysis.

## **9) Environmental Justice**

Executive Order 12898 *General Actions to Address Environmental Justice in Minority Populations and Low-income Populations* requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minorities and low-income populations and communities. The Proposed Action would not be expected to have disproportionate health or environmental effects on minorities or low-income populations or communities as defined by the US EPA Environmental Justice Guidance (US EPA 1998). Therefore, environmental justice was dismissed from further analysis.

## **10) Wilderness**

The *2006 NPS Management Policies*, 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.” There are no lands designated as wilderness or proposed wilderness in or near SAND. Thus, wilderness was dismissed for further analysis.

## **11) Park Operations**

Park operations include changes that may affect the current facilities or that may require a new level of maintenance or staffing. The Proposed Action would not require an increase in fire management staff manpower to implement the proposed fire management tools (i.e., prescribed fires, mechanical

and manual vegetation treatments, targeted chemical and grazing treatments, biological agents); thus, park operations was dismissed from further analysis.

## **ALTERNATIVES**

### **Alternatives Carried Forward**

Two alternatives were developed through internal and external scoping, and will be included in this analysis:

#### **Alternative 1: No Action Alternative—Wildfire Suppression Only**

This alternative allows only one management option for the NPS. This alternative requires the NPS to suppress all fire activity on NPS administered lands, including human caused and natural wildfire ignitions. Wildfire occurring within the boundaries of Sand Creek Massacre National Historic Site or wildfire moving onto the historic site from adjacent lands would be aggressively suppressed with primary consideration of human safety. This alternative allows for only emergency response actions to be taken to protect park cultural and natural resources and infrastructure.

The restricted emergency response, and the lack of planned fuel reduction projects under this alternative limits the ability of the National Park Service to reduce risk to park infrastructure and cultural and natural resource values. Planned fuel treatments would be prohibited, limiting the ability of the National Park Service to mitigate risk to adjacent property as well as limit protection, enhancement, and maintenance of park values. Implementing only emergency response actions for wildland fire occurrence may increase risks to firefighters and the public because it would limit management options for protecting the public and employees due to the response time of fire cooperators. Available firefighting resources are approximately 30 minutes from the site and wildfires can be fast moving, wind driven fire events. For safe and effective containment of the fire may mean that suppression actions may be limited to allowing fire to reach existing roads and/or fuel breaks. This means that firefighting activities may be limited to allowing fire to reach existing roads and/or fuel breaks before effective and safe fire suppression activities could be instituted. Aggressive suppression tactics may be required to protect life and property, including the use of road graders, off-road fire engine deployment, and application of fire retardant with Superintendent approval.

This alternative places the primary responsibility of protecting NPS cultural and natural resources and park infrastructure on cooperators providing firefighting capabilities. This alternative reduces the management capabilities of the NPS in maintaining or enhancing the natural and cultural resources of the site.

#### **Alternative 2: Utilize Management Tools to Modify Fuels to Protect and Maintain Park Values**

This alternative allows for a suite of tools to be used to meet park management goals and objectives as outlined in park management plans. The NPS currently manages 2,385 acres of land within the 12,583 acre authorized unit; the administrative boundary also includes the state of Colorado owned, and privately owned land. Private and state landowners that utilize the lands for grazing have expressed the desire for fire suppression to protect active grazing use. To protect all management goals for NPS resource values and infrastructure, suppression activities must occur. Strategically

placed fuels treatments will provide for best available management practices to enhance the protection of NPS values at risk and provide for fire fighter safety.

Timing and placement of fuels treatments would provide more effective means to minimize the potential spread of fire into the historic site as well as from the historic site to adjacent lands. Prescribed fire activities would be planned and conducted to enhance and maintain natural and cultural resources; current management goals are to protect existing cottonwood galleries, reduce the spread/occurrence of exotic plant species, and reduce shrub cover and encroachment to allow for healthy short grass prairie range conditions. Manual and mechanical treatments, limited herbicide, biological agent use, and grazing would be strategically planned to limit fire spread, enhance public safety, protect infrastructure, protect cultural resource values, and protect and enhance natural resources. Mechanical treatment, such as mowing, is proposed around the historic site boundary to reduce fuels. Manual and mechanical treatment and limited grazing is proposed within the cottonwood galleries to reduce dead and down fuel as well as reduce fine fuels, limiting heat buildup and fire spread. Mechanical (mowing), grazing, and prescribed fire treatments are proposed to reduce the cover of sand sage and increase the occurrence and diversity of native short grass prairie species such as blue grama (*Bouteloua gracilis*). Manual, mechanical, targeted herbicide application, and biological agent treatments are proposed to reduce the occurrence of exotic plant species such as puncture vine (*Tribulus terrestris*) and cheatgrass (*Bromus tectorum*). These exotic species currently occur along the county road and limited disturbed sites within the historic site. All treatment options would be utilized under carefully prescribed conditions, through the use of reviewed plans, and approved management objectives to restore and protect SAND values. These values include cultural and natural resources, risk to firefighters, risk to private property, and risk to NPS infrastructure. Not all treatments would occur in the same year and monitoring would take place to evaluate treatment effectiveness and response of vegetation in moving toward management goals. Additional treatments would be designed to build upon successes and maintain risk mitigation standards. Mitigation measures will be included to reduce impacts to identified values and to enhance success in achieving management goals. Adaptive management would be used to improve the fire management program at SAND:

Adaptive management is a decision process that] promotes decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an iterative learning process. Adaptive management also recognized the importance of natural variability in contributing to ecological resilience and productivity. It is not a ‘trial and error’ process, but rather emphasizes learning while doing. Adaptive management does not represent an end of itself, but rather a means to more effective decisions and enhanced benefits. Its true measure is in how well it helps meet environmental, social, and economic goals, increases scientific knowledge, and reduces tensions among stakeholders. (Adaptive Management: The U.S. Department of the Interior Technical Guide 2007)

The principle of adaptive management will be applied to planned actions. Evaluation of success and adjustment of plans will only occur within the scope of this EA. If proposed adjustments to plans fall outside the scope of this EA, additional NEPA will be completed prior to project implementation.

SAND relies on volunteer fire responders from Kiowa County to respond to wildland fire occurrence. Response time may vary but generally requires a minimum of 30 minutes to have personnel and equipment arrive on scene. Firefighters and fire engines are usual personnel and

equipment to respond, but response may also include water tender, earth-moving equipment such as road graders and/or bulldozers. Water and/or fire retardant foam may be applied by the fire engines. In rare cases, aerial fire retardant may be used. Use of heavy equipment will be allowed only by Superintendent approval. The superintendent approves activities within the historic site according to existing land management plans. In rare cases, incident management teams may be called to manage large or more complex fires affecting the historic site, which may increase the number of firefighting resources on the ground to include firefighters, engines, helicopters, and camps. Fire suppression activities may include off-road driving, cutting fence, hauling large quantities of water over road systems, and line construction.

## **Scope and Details Related to Herbicide Treatments**

SAND is committed to its role as natural resource stewards, and is dedicated to protecting the land, waters, wildlife, and its neighbors, staff, and visitors. While utilizing NPS and EPA approval processes, SAND will use the best available science to examine proposed herbicide uses for risk versus benefit.

Herbicide application is only utilized by following NPS Management Policy 4.4.5 and 4.4.5.2, and Director's Order 77-7, which outlines the NPS approval process. To get approval, SAND's Integrated Pest Management Coordinator submits a pesticide use proposal into the NPS Pesticide Use Proposal System. Approval comes only after regional and national level staff consider numerous factors such as the target use, where the application will occur, potential T&E species concerns, potential for surface or ground water contamination, persistence in the ecosystem, safety to employees and the public, and type of application (example, spot spraying). Product approval will depend on the above factors and consideration of other treatment alternatives. An herbicide application map and treatment plan will be developed for each treatment area.

Approved herbicides must have undergone US EPA environmental and toxicological testing, and then must be US EPA approved and labeled, (as required under the Federal Insecticide, Fungicide and Rodenticide Act of 1972—the process to determine whether or not the product is safe for human health and environmental purposes). Application methods and rates will be followed by the NPS as identified on the product label. The SAND staff will utilize the NPS designated recordkeeping system for purchasing, storing, tracking and maintaining each approved product. SAND approved applicators would be trained in spill response procedure, which would include actions to prevent leaks, spills, and accidental exposures.

This alternative includes the use of limited herbicide spraying as a management tool, but allows the flexibility to consider and use improved techniques, technology, and newly approved herbicides in the future if more environmentally acceptable alternatives are developed. Treatment methods would include low-volume spot treatments of individual plants with a backpack sprayer or universal terrain vehicle (UTV) sprayer. All treatments would be done with US EPA approved herbicides and as specified on the label and precautions would be taken to avoid areas of standing waters.

Treatment methods would include basal, cut stump, foliar applications, and hand-pulling. Basal application would paint an 18-inch wide band around the circumference of the tree trunk reaching the ground. Cut stump treatments involve cutting the stump at the base and applying herbicide to the stump. Foliar treatment would involve spraying herbicide directly onto leaves of trees and/or



vegetation. The herbicide should be applied at a volume that wets the crown/leaves, but minimizes runoff and does not affect non-target species. Hand pulling involves the pulling of invasive seedlings out of the ground with the tap root. Pulled seedlings/saplings will be left in a manner that the roots will dry and not re-sprout.

Use of targeted herbicide applications as a follow-up treatment to maintain fuelbreaks and/or defensible space work established by mechanical or manual vegetation cutting treatments would improve the longevity of the fuel reduction, and facilitate maintenance of these treatment areas. Being able to more successfully create and maintain fuelbreaks and/or defensible space removes a significant fuel hazard in prescribed burns or wildfires. This would make prescribed fire and wildfire control more effective, safer, and successful near historic structures and NPS facilities plus improves egress safety in the event of evacuation. This would also help to return vegetation communities to the range of natural variation where prescribed burning could be utilized as the primary natural change and maintenance agent. This would provide better protection than the “No Action Alternative” for visitors, residents, NPS infrastructure, NPS cultural and natural resources, and facilities.

The NPS’s Southern Plains Inventory and Monitoring Network and the Southern Plains Fire Group are collaboratively monitoring vegetation management activities (i.e., prescribed fire, mechanical, herbicide, control areas). Systematic monitoring may occur before and after an area has been treated to determine vegetation mortality and progress toward meeting treatment objectives. Additional targeted herbicide treatments might occur after vegetation re-growth to suppress re-sprouts within the fuel break and/or defensible space.

## Alternatives Considered and Dismissed

Sand considered and dismissed elements of alternatives rather than a wholly developed alternative.

### *Alternative Elements Considered and Dismissed*

One element that could be considered in any alternative, was dismissed during scoping.

The use of **wildland fire for resource objectives** element at SAND was considered. This means that natural (lightning) ignitions would be managed (allowed to burn) under carefully defined conditions to achieve resource related goals and objectives. Resource objectives include resource related goals such as special habitat renewal, reduction of hazardous fuels, wildlife values, and reintroducing fire into fire dependent ecosystems.

This element was dismissed because management of wildland fire is not strategically credible at SAND due to the land configuration, small acreage, nature of the fuels, and adjacent landowner management goals and concerns. Limited staff and equipment, response time, fire regime and fuels, and overall land management goals for the area preclude managing fire for resource objectives. Lightning fires will not be managed to obtain management objectives.

## **Mitigation Measures for the Proposed Action**

The Lake Meredith National Recreation Area Fire Management and SAND staff would work with resource specialists to ensure that cultural and natural resource issues and concerns are considered on all planned projects at SAND. Resource specialists will also be consulted on all emergency incidents, such as wildfire suppression.

Resource Advisors (READ's) should be utilized when wildfire in the area threatens SAND to prevent and reduce adverse impacts from fire suppression actions, and to advise in protecting cultural resources.

The Superintendent has overall responsibility and oversight for all SAND activities and staff; he/she sets goals, approves SAND restrictions and closures, coordinates relations with neighbors and partner agencies, and approves the FMP and other major fire documents and plans.

The Lake Meredith National Recreation Area Fire Management Officer and Incident Commanders assigned by the Superintendent have direct responsibility for public, resident, and staff safety. They would coordinate evacuations and other actions with the appropriate ranger staff, SAND supervisors, and local emergency management agencies.

The following mitigation measures would help minimize the potential effects of SAND fire management activities on resources, staff, and the public. They would be incorporated into the new FMP and fire management work at the SAND. This is a comprehensive list; only appropriate mitigation measures will be applied.

### **General Considerations**

- All prescribed burns would have a written and approved prescribed fire burn plan, as required by NPS *Reference Manual-18* and the *Interagency Prescribed Fire Planning and Implementation Procedures Guide*.
- Firefighters would utilize Minimum Impact Suppression Tactics (MIST) to minimize impacts of fire response operations, when possible.
- Natural, manmade features and/or vegetation change or discontinuities would be utilized for fire lines whenever possible to minimize the need for fireline construction. This helps minimize disturbance (e.g., soils, habitat, vegetation) by mechanical or hand line construction. Indirect/confine type strategies would often be the preferred strategy for most wildfires.
- Water, pumps, and hose lays, when available, would be utilized to create wetlines or to back-up smaller fire lines to minimize the amount of fireline construction and vegetation disturbance.
- Constructed fire lines would be built to the minimum depth and width needed for safe control operations.
- Constructed fire lines would be rehabilitated as soon as possible after fires are out to prevent erosion, negative visual effects, and opportunities for invasive plant establishment.

- Existing roads would be utilized by vehicles and equipment for travel as much as possible. Utilize UTV's, if possible, when off road travel is required. Less sensitive travel routes would be utilized for firefighters, vehicles, and equipment whenever possible.
- After wildfires, Burned Area Emergency Rehabilitation (BAER) would be considered in consultation with regional office and resource specialists.
- Equipment operators would be trained or advised on how to minimize soil and vegetation disturbance, compaction, and displacement, which helps protect cultural resources and prevent establishment of invasive plants. Untrained or new operators would be accompanied by READ's to recommend low-impact operations and techniques.
- When possible, incoming vehicles, engines, and equipment from outside the immediate area would be cleaned (including the undercarriage) before use in SAND to remove invasive weed seeds. They would also be cleaned immediately before/upon leaving the park before going to another assignment, or returning to home unit.
- Equipment with fluid leaks would not be utilized. Refueling or filling or mixing of gas and other fluids would be avoided in the field when possible; when necessary, appropriate precautions would be taken to prevent spills. These actions would be taken away from streams and watercourses.
- Reasonable procedures would be followed to prevent unintended spills of foam and fire retardant chemicals.
- Herbicide would only be utilized after undergoing the NPS national and regional approval process and considering impacts to natural and cultural resources, and public health and safety. Herbicide would not be used during wind exceeding recommended application listed on the chemical label. EPA instructions would be the primary direction that would be followed when applying herbicide.
- An herbicide application map and treatment plan would be developed for each treatment area.
- Herbicide would not be applied within 3 hours of predicted precipitation or in areas of standing or flowing water.
- Herbicide and application devices would be worked on, filled and mixed only utilizing approved leak prevention, and catchment systems. These sites should be away from streams or standing water.
- No visible leakage of chemicals would be allowed from equipment used for transporting, storing, mixing, or applying chemicals.
- Staff utilizing herbicide would be trained in approved procedures related to proper handling, storage, transportation, mixing, spill prevention, and application procedures.

### **Air Quality**

- Fire/park staff would perform agency, public, and neighbor notification procedures for all SAND prescribed burns, focusing on residents and activities that might be impacted by smoke from the burns.
- Coordination with adjacent agencies would occur regarding the total number of prescribed burns simultaneously occurring in the area, to limit cumulative smoke impacts.
- SAND would follow smoke regulations applicable by the State of Colorado related to prescribed burns.

- Coordination with the Superintendent would occur in advance of prescribed burns to fully consider the effects of prescribed fire smoke on visitation during holidays or periods of heavy public use.
- When possible, prescribed burns would be conducted when fuel moistures are relatively low to provide better combustion, more transport and lofting of the smoke column, and less residual burning.
- Smoke transport winds would be assessed by prescribed fire managers to determine smoke impacts to sensitive receptors and populated areas.
- Best management practices would be implemented to reduce potential smoke impacts on sensitive receptors.
- During SAND prescribed burns, smoke monitoring would occur throughout ignition and immediately after; data would be saved as part of the prescribed fire project records.
- On wildfires and prescribed burns, SAND assigned incident commanders/burn bosses would work with fire or public information officers to regularly update local residents on expected smoke impacts.

### **Soils**

- Vegetation would be removed, cut or manipulated along fire lines to the minimum width necessary for fire control and/or to protect human, natural or cultural values.
- Water diversion devices and/or brush and duff covering (after fire is out) would be considered on all sloping and bare soil fire lines to minimize erosion.
- Berms would be removed, and natural ground contours restored during fireline rehabilitation.
- Firefighters would utilize Minimum Impact Suppression Tactics (MIST) to minimize soil related impacts of fire response operations whenever possible.
- Utilize water, pumps, and hose lays when available for wetlines or to back-up smaller fire lines to minimize the amount of fireline construction and soil disturbance.
- Prescribed fire prescriptions would be utilized that minimize widespread intense and long duration surface burning on soil surfaces to prevent soil sterilization.
- Equipment operators would be trained to minimize soil and vegetation disturbance, compaction, and displacement.
- Equipment operation would be avoided on fragile or highly erodible soils.
- When possible, mowing or mastication would be considered to remove vegetation for construction of fire lines to avoid exposing mineral soils.
- Mop-up on fires would be done utilizing methods to minimize widespread soil disturbance.
- If herbicides are utilized, use only types that do not maintain long-term active residue in soils.

### **Vegetation**

- Vegetation would be removed, cut or manipulated along fire lines to the minimum amount necessary for fire control or to protect human, natural or cultural values. Avoid extensive falling and bucking of trees where they are present.
- Leftover vegetative fuels cut from fire lines would be lopped and scattered, or, in developed areas, piled for later removal, or saved for replacement on fire lines to prevent erosion and promote new growth.

- Water, pumps, and hose lays, when available, would be utilized to create wetlines or to back-up smaller fire lines to minimize the amount of fireline construction and vegetation disturbance.
- Stream, arroyo, or water crossings by fire lines should be avoided when possible to minimize riparian vegetation disturbance. If necessary, they should be carefully constructed to minimize disturbance to the banks and watercourse area. Crossings should promptly be restored and rehabilitated in consultation with resource specialists.
- When possible, mowing or mastication would be utilized for fire lines to avoid exposing mineral soils. When scraping is needed, it would be to the minimum depth and extent necessary for safe fire control operations. Minimizing soil exposure provides fewer opportunities for establishment of new invasive plant species, and easier survival of native plants.
- If slash disposal areas are required, they would be located with no sensitive natural or cultural resources, or sensitive vegetation.
- Prescribed burning prescriptions would be developed that meet specific vegetation management objectives for each prescribed burn unit. These prescriptions would consider variables such as live and dead fuel loading and moisture, wind parameters, temperature, seasonal timing of burn, firing methods, and relative humidity. Excessive residual burning would be avoided for maximum survival of native plants.
- Rehabilitate constructed fire lines after fires are out to prevent erosion and promote the re-establishment of native plants.
- Fire and resource specialists would discuss and design systematic monitoring systems related to specific SAND needs to measure the effects of fire related vegetation management activities such as mastication, herbicide use, and prescribed burning.
- Areas disturbed by suppression activities on wildfires or fire lines for prescribed fires will be monitored for establishment of new invasive plants.
- When possible, incoming vehicles, engines, and equipment from outside the immediate area would be cleaned (including the undercarriage) before use in SAND to remove invasive weed seeds. They would also be cleaned immediately before/upon leaving the park before going to another assignment, or returning to home unit.

### **Wildlife/Wildlife Habitat**

- Upon wildfire notification, resource specialists would examine maps and information resources to assess wildlife effects. READ(s) may be assigned to the incident management organization, depending on potential effects on wildlife, especially if sensitive species are involved.
- Utilize water, pumps, and hose lays when available for wetlines or to back-up smaller fire lines to minimize the amount of fireline construction and habitat disturbance by firefighters.
- Stream, arroyo, or water crossings should be avoided when possible by fire lines or equipment. Crossings should promptly be restored and rehabilitated in consultation with resource specialists.
- Utilize existing roads, and minimize off road related travel by vehicles and/or equipment to reduce potential impacts to wildlife resources.
- If needed, identify vegetation slash disposal areas that have minimal sensitive wildlife effects.

- Mastication and brush cutting equipment use may be curtailed during prime avian nesting season, or other sensitive wildlife activity periods.
- Wildlife effects would be fully considered when developing prescribed burn plans and prescriptions, and non-fire fuel reduction projects, through consultation with resource/wildlife specialists.
- Chemical retardant, foam, and gasoline refueling would not occur within 200 feet of standing water or streams to protect aquatic species.
- Retardant or foam would not be dropped or applied within 300 feet of standing water to protect aquatic species.

### **Special Status Species**

- Generally, the same mitigations for special status species would occur as listed above under “Wildlife/Wildlife Habitat”.
- When sensitive species locations, seasons, unique habitat, nesting areas, or other parameters are involved with a fire management project or wildfire, additional consultation with resource specialists and/or specific wildlife experts would occur. Written directions specifying appropriate and reasonable actions and/or mitigations would then be utilized by the fire management staff to make appropriate decisions to minimize disturbance effects or maximize benefits to those sensitive species.
- All appropriate endangered species consultations would be completed prior to any planned fire management activity. Appropriate consultations would be initiated during emergency fire operations.

### **Cultural Resources**

- SAND will consider development of a programmatic agreement (PA) with the Colorado SHPO for all fire and fuels management related activities before implementing any fuel reduction projects to ensure compliance with section 106 of the National Historic Preservation Act.
- Identify cultural sites in advance of wildfire, prescribed fire, or fuels treatment activities in order to plan and devise avoidance/protection and mitigation strategies.
- Utilize water, pumps, and hose lays when available for wetlines or to back-up smaller fire lines to minimize the amount of fireline construction and ground disturbance.
- Educate assigned fire personnel about the significance of cultural sites, how to identify and avoid those sites, and appropriate actions and notifications to be made if new sites are encountered.
- Remind assigned firefighters to never pick up or disturb artifacts or cultural resources.
- Avoid building fire lines and doing any ground disturbance in dense cultural site areas.
- Utilize defensive, protection tactics and indirect attack tactics, and collaborate with cultural specialists, to prevent damage to historic, cultural, archeological, ethnographic, or landscape sites, whenever possible.
- Collaborate and coordinate with SAND affiliated tribes to prevent damage to ethnographic resources, even if unrecorded, before planned projects or during wildfires.
- Flush cut stumps in cultural sites rather than remove them. Avoid ground disturbance as much as possible in and around cultural sites.

- If slash disposal areas are needed, locate them in areas with no cultural resources.
- During wildfires, fire managers would regularly update SAND cultural specialists on initial and extended attack response strategies, ground disturbance, and actual and predicted extent of fire area. This will help facilitate the focus on involved cultural resources.
- SAND cultural and historic site base maps would be immediately available to fire managers and incident commanders to allow them to avoid impacts to cultural sites.
- Special flagging would be utilized to identify archeological and historic sites; flagging must be monitored as fire threat passes and may need early removal to prevent undue attention to cultural sites.
- After major wildfires, Burned Area Emergency Rehabilitation (BAER) activities would be considered in consultation with regional office and resource specialists; cultural resource specialist(s) will need included on the BAER team.
- If fire or fire management activities are to occur in Historic Properties, it is critical to consult immediately with the cultural specialist with knowledge of that landscape to ensure that actions are compatible with the broader purpose of that specific landscape.
- Fire management staff and READs will have access to maps showing SAND cultural landscapes, so that they know when and where to initiate cultural landscape consultation.
- With cultural landscapes, a wider perspective of any fire management ground or vegetation disturbing actions would be taken, with the goal of enhancing the cultural landscape for the long-term.
- After wildfires, Burned Area Emergency Rehabilitation (BAER) activities would be considered in consultation with regional office and resource specialists, and a cultural landscape specialist may be included on the BAER team.

### **Adjacent Landowners**

- Continually emphasize the safety of fire staff, neighbors, and the public as the highest priority in all fire management activities.
- All fire management activities, including wildfires, would fully consider risk and effects to private property at and adjacent to SAND. This consideration would occur on an ongoing basis for the duration of the activity or incident.
- Herbicide would only be used after visitors were out of the immediate area, or informed in advance, and appropriate informational signing was placed at human entries to the spray area.
- SAND neighbors and visitors would be notified of all fire management activities that have the potential to impact them. SAND superintendent would assure that appropriate level/intensity of public information officers are present and informed to ensure responsive level of public information occurs.
- Fire staff/superintendent would ensure adequate public notification procedures occur for all SAND prescribed burns.
- For wildfires, regular media releases would inform locals and visitors about the expected impacts of the fire, especially related to smoke, and closures or restrictions. Signs or notices may be posted at appropriate places to inform incoming visitors of the fire situation. Announcements would also occur during visitor center orientations.
- The superintendent may authorize temporary closure/restrictions in some areas to protect public, neighbors, and visitors.

- SAND would monitor fuel, weather, and fire condition parameters and may limit public access and activities to SAND when extreme conditions develop, as designated in Preparedness Level planning, included in the FMP.
- Initial attack staff would determine the proximity of a new fire to visitors, adjacent landowners, and communities. They would coordinate with rangers and local agencies to inform them of the potential hazards and evacuate as necessary.

### **Human Health and Safety**

- Continually emphasize the safety of fire staff, neighbors, and the public as the highest priority in all fire management activities.
- SAND neighbors, visitors, and local residents would be notified/informed on all fire management activities that have the potential to impact them.
- SAND would monitor fuel, weather, and fire condition parameters and may limit public access and activities in the SAND when extreme conditions develop, as delegated in Preparedness Level planning.
- Defensible space planning and hazardous fuel reduction would be an ongoing and continuous activity for SAND buildings and infrastructure.
- Herbicide would only be used after visitors were out of the treatment area and appropriate informational signing was placed at human entries to the application area.
- Staff would inform other agency and the public for all SAND prescribed burns.
- Prescribed fire burn boss would work with local residents in close proximity to prescribed burns to ensure their safety, both in planning and during implementation.
- The fire management staff would work with staff and local agencies on posting smoke hazard signs if necessary
- For longer duration fires, regular media releases would inform locals and visitors about the expected impacts of the fire, especially related to smoke and closures or restrictions. Signs or notices may be posted at appropriate places to inform incoming visitors of the fire situation. Announcements during visitor orientations at the visitor center would also occur.
- To prevent accidental exposure to hazards, access to treatment areas would be closely managed.
- As burned areas are opened to visitors after a fire, signs would be posted informing the public of potential hazards in the burned areas.

### **Alternative Summaries**

Table 2 summarizes the components of Alternatives 1 and 2, and compares the ability of these alternatives to meet the project objectives (the objectives for this project are identified in the *Purpose and Need* chapter). As shown in the following table, Alternative 2 meets each of the objectives identified for this project, while the No Action Alternative does not meet all of the objectives.



**Table 2. Summary of the Project Objectives and Alternatives**

<b>Project Objectives</b>	<b>Does Alternative 1 - No Action Alternative Meet Project Objectives?</b>	<b>Does Alternative 2 - Utilize management tools to modify fuels to protect and maintain park values Meet Project Objectives?</b>
Firefighter and public safety is the first priority in all wildland fire management activities	No, continued retention and buildup of hazardous fuels would increase risk of larger and/or intense wildfires; the lack of efficient fuelbreaks would reduce ability of fire fighters to control wildfires. Minimal defensible space could lead to increased threat to structures, humans, and adjacent private lands. All this could contribute to less effective suppression that could expose fire fighters and the public to elevated risk.	Yes, ability to use additional fire management tools as described above would decrease hazardous fuels, increase number and quality of effective fuelbreaks, and decrease probability of large and intense wildfires over time. This would increase ability of fire fighters to control wildland fires safely and decrease health and safety risks for visitors, private residents, and NPS employees.
Park investments (infrastructure) and cultural and natural resources will be protected from wildland fire and fire suppression activities	No, SAND would be limited to full wildfire suppression and management options allowed under National Fire Policy. Fire management actions to protect cultural land natural resources would not occur.	Yes, this alternative plans and implements additional fire management activities that would help protect SAND infrastructure and cultural and natural resources. Additional fire management actions would reduce hazardous fuel loadings and increase effective fuelbreaks, decreasing potential for large and intense wildfires over time.
Park management actions will take place to restore and maintain the park's cultural and natural resources to meet park management goals as outlined in park management plans	No, SAND would be limited to full wildfire suppression and management options allowed under National Fire Policy.	Yes, this alternative considers fire management tools for vegetation restoration and hazardous fuel reduction, which would aide in maintaining and restoring cultural and natural resources.
The park will work toward establishing and maintaining formal cooperative relationships with local, state, federal, and tribal cooperators and partners	No, interagency cooperation and coordination would be conducted on as needed basis for wildfire suppression efforts.	Yes, this alternative would allow for continued and increased interagency cooperation and coordination, about SAND fire management activities with more emphasis on restoration, hazardous fuel reduction, and defensible space activities, as they would be a leading component of the program.
The National Park Service (NPS) will consider actions that minimize the threat to adjacent property related to wildfire risks. Adjacent communities will be informed about park fire management activities	No, SAND limited to full wildfire suppression and management options allowed under National Fire Policy. Potential wildfire threats to adjacent properties could increase as hazardous fuel loadings continue to increase and potential for large, intense wildfires increases. SAND will inform adjacent communities about wildfire suppression activities.	Yes, this alternative would allow the use of additional fire management tools—prescribed fire, manual and mechanical fuel reduction, targeted herbicide use, limited grazing, biological agents—that would aid in reducing hazardous fuel loads and establishing defensible space and fuelbreaks. This would decrease the potential for large, intense wildfires and reducing wildfire risks to adjacent properties. SAND will inform adjacent communities about all fire management activities.
Wildfire whether	Yes, this alternative would allow	Yes, this alternative would allow suppression of all

<b>Project Objectives</b>	<b>Does Alternative 1 - No Action Alternative Meet Project Objectives?</b>	<b>Does Alternative 2 - Utilize management tools to modify fuels to protect and maintain park values Meet Project Objectives?</b>
human caused or from a natural ignition, will be suppressed. This includes suppression actions taken for fires starting on NPS administered lands or from fire burning onto NPS administered lands from other lands	suppression of all wildfires.	wildfires.
Does the alternative meet project objectives	No	Yes

**Table 3. Summary of Alternatives**

<b>Components</b>	<b>Alternative 1 No Action</b>	<b>Alternative 2 Proposed Action</b>
Fire Suppression Tactics	All wildfires within SAND boundaries would be suppressed using the appropriate response, utilizing both direct and indirect tactics, depending on the specifics of each fire. Tactical alternatives that require suppression actions on private lands would be coordinated with local fire agencies and landowners. Fire control actions in many areas would be more challenging due to less reduction of hazardous fuels.	Same as Alternative 1, except that fire control actions may be easier over time with allowed reduction of hazardous fuels due to utilization of more active fuel management tools (e.g., prescribed fire, thinning).
Prescribed Burning	Prescribed fires would not be used as a fire management tool. Hazardous fuels would continue to be retained and build up in density, increasing the potential intensity and difficulty to control/suppress future wildfires. SAND's cultural landscape integrity and ecosystems resilience to drought, pest outbreaks, and wildfire would continue to decrease.	Prescribed fires would be used to manage hazardous fuel loads, protect existing cottonwood galleries, maintain the cultural landscape, reduce the spread/occurrence of exotic plant species, and reduce shrub cover to allow for healthy short grass prairie range condition.  Prescribed burning would become safer and more effective as dense brush is reduced. Fuelbreaks and defensible space are initially developed by mechanical treatments, followed by targeted herbicide application and/or grazing, decreasing the risk of prescribed fires, and presenting safer control options for wildfires.
Mechanical and Manual ( <b>Mechanical</b> includes wheeled or	Mechanical and manual tools would not be used to reduce hazardous fuels,	Mechanical and manual treatments would be used to reduce hazardous

Components	Alternative 1 No Action	Alternative 2 Proposed Action
tracked equipment such as mowers, masticators, choppers, skidders,) (Manual includes ax, pulaski, cross-cut saw, pruners, shovel and handheld equipment, such as chainsaws)	to prep units for prescribed burning (including defensible space and fuelbreaks), or to assist on ecological restoration goals. Hazardous fuels would continue to be retained and to build up in density, increasing the potential intensity and difficulty to control/suppress future wildfires. Manual and mechanical tools will be available for use during wildfire suppression actions.	fuels, to limit fire spread, enhance public safety, protect infrastructure, reduce exotic plant species, and to protect and enhance natural and cultural resources Internal NPS and programmatic processes would be utilized to plan in advance and ensure protection of natural and cultural resources.
Chemical	Chemical treatments would not be used as a fire management tool. Reduction of encroaching invasive and/or exotic plant species by fire management would not occur.	Targeted herbicide treatments would be used as a follow-up treatment to defensible space treatments and to reduce invasive and/or exotic plant species following NPS approval processes. This would help to maintain fuelbreaks and defensible space by decreasing woody vegetation resprouts.
Grazing	Grazing treatments would not be used to reduce hazardous fuels or reduce exotic plant species. Grazing may occur at SAND for other NPS objectives (not for fuel reduction).	Limited grazing would occur in the cottonwood galleries to reduce hazardous fuels and to help reduce the cover of sand sage and increase the occurrence and diversity of native short grass prairie species.
Biological Agents	Biological agents could not be used to control/reduce exotic and/or invasive weeds.	Biological agents would be used to reduce exotic plant species such as sand burr and cheatgrass.

Table 4 summarizes the anticipated environmental impacts for alternatives 1 and 2. Only those impact topics that have been carried forward for further analysis are included in this table. The *Environmental Consequences* chapter provides a more detailed explanation of these impacts.

**Table 4. Environmental Impacts Summary by Alternative.**

Resource Topic	Alternative 1 No Action	Alternative 2 Preferred Alternative
<b>Air Quality</b>	The No Action Alternative would have adverse, minor to moderate, localized, short-term impacts on air quality from increased potential for locally severe wildfire effects.	The Preferred Alternative would have adverse, short-term, localized, and negligible to minor impacts on air quality from prescribed burning and mechanical and manual treatments. Targeted herbicide use and biological treatments may have adverse, negligible, localized, and short-term impacts. As well as indirect, moderate, long-term, and beneficial effects to air quality over time from a decrease in hazardous fuels following implementation of planned fuel management tools—prescribed burning, mechanical fuel reduction, targeted

Resource Topic	Alternative 1 No Action	Alternative 2 Preferred Alternative
		herbicide application, and biological treatments.
<b>Soil Resources</b>	The No Action Alternative would have direct, short-term negligible to minor, adverse, and localized impacts on soil resources from wildfire suppression tactics. Indirect impacts would be adverse, moderate, localized, and long-term for the overall soil impacts. Overall soil impacts would depend on the timing, location, severity and extent of the wildfire.	The Preferred Alternative would result in short-term, localized, minor, and adverse impacts from prescribed burns and associated fuel management activities to soils. Beneficial long-term impacts to soils would result from the increased nutrient cycling from prescribed burns, increased stability of the soil strata, increased ground cover, and the reduced threat of severe, higher intensity wildfires.
<b>Vegetation Resources</b>	<p>The No Action Alternative could result in adverse, minor to moderate, long-term, localized impacts to vegetation resources from physical alteration of vegetation structure, composition, and function and increased susceptibility to spread of invasive plants. The intensity of impacts would depend on the intensity, duration, and location of the wildfire(s), and the mitigation efforts that could be implemented.</p> <p>Indirect effects to climate change would be adverse, minor to moderate, short- to long-term, and localized due to increased hazardous fuels and potential for larger, intense fire behavior. Additional long term adverse minor to moderate impacts include reduced ability of plant community to withstand and adapt to climate change conditions.</p>	<p>Overall, the Preferred Alternative would have direct, minor to moderate, beneficial, long-term, localized impacts by restoring the native vegetation structure, composition, diversity, and function of plant communities (e.g., shortgrass prairie). Adverse impacts from mechanical, manual, herbicide, and biological treatments would be negligible due to restoration of native plant community structure and function through the planned treatments and mitigation measures implemented.</p> <p>Indirect effects to climate change would be beneficial, long-term, and localized due to reduced hazardous fuels and fire behavior potential in treated areas, and increased vigor of plant community to withstand and adapt to climate change conditions.</p>
<b>Wildlife</b>	The No Action Alternative would have indirect, adverse, minor to moderate, localized, long-term impacts to wildlife habitat and individuals from increased potential for severe wildfires and reduced habitat quality and displacement.	The Preferred Alternative would have minor to moderate, beneficial, long-term, localized impacts to native wildlife resources from restoring the variety and diversity of native vegetation communities and wildlife habitat present at SAND and reducing the potential for future severe wildfires. Adverse impacts would be short-term and localized due to stress and disturbance for less mobile species and temporary displacement within and near treatment units for mobile wildlife species.
<b>Special Status Species</b>	There would be no effect to the Piping Plover, Least Tern, Lesser prairie-chicken, or Arkansas darter because there are no known individuals or populations that occur within SAND. The No Action Alternative could result in adverse, minor to moderate, short- to long-term and localized impacts to suitable habitat for the Mountain Plover, Burrowing Owl, and	<p>The Preferred Alternative would have no effect to the Piping Plover, Least Tern, Lesser Prairie-chicken, or Arkansas darter because no individuals or populations occur within SAND.</p> <p>Overall, the Preferred Alternative would have beneficial, minor to moderate, long-term, localized impacts to suitable habitat</p>

Resource Topic	Alternative 1 No Action	Alternative 2 Preferred Alternative
	black-tailed prairie dogs.	for the Burrowing Owl, Mountain Plover, and black-tailed prairie dog from prescribed fires and associated fuel reduction activities, and restoration and maintenance of native plant communities.
<b>Archaeological Resources</b>	The No Action Alternative would have long-term, minor, adverse, and localized impacts to archaeological sites due to potential hazardous fuel build up, the increased risk for severe wildfires, and ground disturbing activities related to fire management activities.	The Preferred Alternative would result in adverse, minor, long-term impacts to archeological sites similar to the No Action Alternative, as well as beneficial, minor to moderate, long-term, and site-specific due to reducing the potential for larger, intense wildfires from removing hazardous fuels and maintaining/creating defensible space and fuelbreaks.
<b>Cultural Landscapes</b>	The No Action Alternative would have direct and indirect, adverse, short- to long-term, minor, and localized impacts. Impacts would be due to increased potential for larger, intense wildfires from continued retention and likely increase of hazardous fuels within the cultural landscape.	Impacts to the cultural landscape would be beneficial, minor to moderate, long-term, and localized due to reducing the potential for future severe wildfires as hazardous fuels decrease and defensible space and fuelbreaks are maintained/created, and a more open cultural landscape representative of the historic period is maintained. Planned fuel reduction projects or emergency management response to unplanned wildland fire could also have adverse, long-term, minor, and localized impacts due to inadvertent damage to contributing elements of the cultural landscape. Negligible to minor adverse, as well as minor to moderate beneficial, long-term effects on vegetation characteristics could result from minor trimming or vegetation removal to more intense thinning/removal of shrubs to reduce dense stands around archaeological sites.
<b>Ethnographic Resources</b>	The No Action Alternative impacts could be indirect, short- to long-term, minor, adverse, localized due to increased potential for larger, intense wildfires from continued retention and likely increase of hazardous fuels within and adjacent to archeological sites, and native plants used in traditional ceremonies.	Impacts to ethnographic resources under the Preferred Alternative would be adverse, minor, long-term impacts as well as beneficial, minor to moderate, long-term, and localized due to reducing the potential for future severe wildfires as hazardous fuels decrease and defensible space is maintained/created in consultation with tribal authorities. Restoration of native plant communities would be long term minor to moderate beneficial impact to restore native plants used in traditional ceremonies.
<b>Visitor Use and Experience</b>	Impacts to visitor use would be adverse, minor to moderate, short-term and localized due to public use closures.	Impacts to visitor use and experience would be adverse, short-term, negligible to minor, localized in the immediate area of treatment during the treatment period. As well as indirect, minor to moderate,

Resource Topic	Alternative 1 No Action	Alternative 2 Preferred Alternative
		beneficial, long-term, localized impacts from fuel management activities decreasing the potential for larger, intense wildfires and improving native herbaceous plant communities, and habitat diversity, which would provide more desirable scenery.
<b>Human Health and Safety</b>	Overall, the No Action Alternative would have direct, short- to long-term, minor to moderate, adverse, localized due to potential hazardous fuel build up and the increased risk for larger, severe wildfires.	The Preferred Alternative would have both short- and long-term impacts to human health and safety that would be beneficial and minor to moderate as well as negligible to minor, adverse, and localized.

## Environmentally Preferable Alternative

According to the Council on Environmental Quality regulations implementing NEPA (43 CFR 46.30), the environmentally preferable alternative is the alternative “that causes the least damage to the biological and physical environment and best protects, preserves, and enhances historical, cultural, and natural resources. The environmentally preferable alternative is identified upon consideration and weighing by the Responsible Official of long-term environmental impacts against short-term impacts in evaluating what is the best protection of these resources. In some situations, such as when different alternatives impact different resources to different degrees, there may be more than one environmentally preferable alternative.”

Alternative 2, the Action Alternative, is the environmentally preferable alternative, for several reasons: 1) it would increase successful restoration and protection of SAND natural and cultural values; 2) it would increase the resilience of fire dependent ecosystems to future natural disturbances such as wildfire, drought, insect outbreaks, and wind events; 3) it would restore ecosystems and associated wildlife; 4) reduce a significant fuel hazard posed by dense shrub and ground cover, making prescribed burning safer for employees, provide better defensible space for nearby residents, and make control of wildfire more successful; and 5) it would maintain and preserve the historic scene. For these reasons, Alternative 2 causes the least damage to the biological and physical environment and best protects, preserves, and enhances historical, cultural, and natural resources, thereby making it the environmentally preferable alternative.

By contrast, Alternative 1, No Action, is not the environmentally preferable alternative because 1) it would increase the risk of future high, severity wildfires; 2) reduce the amount, extent, and effectiveness of successful historic landscape and ecological restoration; 3) continue to reduce resilience of SAND’s ecosystem to drought, pest outbreaks, and wildfire; and 4) increase health and safety risks for visitors, adjacent landowners and residents, and NPS infrastructure due to increased wildfire risks. Furthermore, under Alternative 1, No Action, SAND would not be entirely consistent with the NPS Wildland Fire Management directives. This directive states a goal of restoring and maintaining fire-adapted ecosystems using appropriate tools and techniques in a manner that will provide sustainable, environmental and social benefits (RM-18).

## **Preferred Alternative**

No new information came forward from the public scoping or consultation with other agencies to necessitate the development of any new alternatives, other than those described and evaluated in this document. Alternative 2, is the environmentally preferable alternative and better meets the project objectives (Table 2); therefore, it is also considered the NPS preferred alternative. For the remainder of the document, Alternative 2 will be referred to as the preferred alternative.

## AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the affected environment (existing setting or baseline conditions) and analyzes the potential environmental consequences (impacts or effects) that would occur as a result of implementing the proposed project. Direct, indirect, and cumulative effects are analyzed for each resource topic carried forward. Impacts are analyzed based on whether they are significant or not significant, which requires considerations of impact type, context, duration, and intensity:

**Type:** Describes the impact as either beneficial or adverse, direct or indirect:

*Beneficial:* A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.

*Adverse:* A change that moves the resource away from a desired condition or detracts from its appearance or condition.

*Direct:* An effect that is caused by an action and occurs in the same time and place.

*Indirect:* An effect that is caused by an action but is later in time or farther removed in distance, but is still reasonably foreseeable.

**Context:** Describes the location or area where the impacts will occur.

*Site-specific:* Impacts would occur within the location of the Proposed Action.

*Local:* Impacts would affect areas within the location of the Proposed Action and land adjacent to the Proposed Action.

*Regional:* Impacts would affect areas within the location of the Proposed Action, land adjacent to the Proposed Action, and land in surrounding communities.

**Duration:** Unless otherwise specified in this document, the following terms are used to define duration.

*Short-term:* impacts that generally last for the duration of the project. Some impact topics will have different short-term duration measures and these will be listed with the resource.

*Long-term:* Impacts that generally last beyond the duration of the project. Some impact topics will have different long-term duration measures and these will be listed with the resource.

**Intensity:** Describes the degree, level, or strength of an impact. The impacts can be *negligible*, *minor*, *moderate*, or *major*. Definitions of intensity can vary by resource topic and are provided separately for each impact topic analyzed.

### Cumulative Impact Scenario

The Council on Environmental Quality (CEQ) regulations, which guide the implementation of the National Environmental Policy Act of 1969 (42 USC 4321 et seq.), 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 non-federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts are considered for all Alternatives.



Cumulative impacts were determined by combining the impacts of the alternative with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects in SAND and, if applicable, the surrounding region. The geographic scope for this analysis includes SAND's boundaries as no actions or projects would occur on adjacent lands. The temporal scope includes projects within a range of approximately 20 years. Past, current, and foreseeable actions that could potentially contribute to cumulative effects include:

- Wildland fires originating from adjacent lands (other agency prescribed fires and wildfires, private property debris burning)
- Continued maintenance activities and construction within SAND
- Continued acquisition of additional properties to expand the boundary of SAND

## Natural Resources

### Air Quality

#### Affected Environment

The Clean Air Act of 1963 (42 U.S.C. 7401 *et seq.*) established federal programs that provide special protection for air resources and air quality related values associated with NPS units. Specifically, Section 118 of the Clean Air Act requires a park unit to meet all federal, state, and local air pollution standards. SAND is designated as a Class II air quality area under the Clean Air Act, which means emissions of particulate matter and sulfur dioxide are allowed up to the maximum increase in concentrations of pollutants over baseline concentrations as specified in Section 163 of the Clean Air Act. In addition, the Clean Air Act gives the federal land manager the responsibility to protect air quality related values (i.e., visibility, plants, animals, soils, water quality, cultural resources, and visitor health) from adverse pollution impacts.

Ambient monitoring for SO<sub>2</sub>, NO<sub>x</sub>, O<sub>3</sub>, and PM has not been routinely conducted for SAND, but modeling efforts and estimates generated by NPS and based on regional air quality sites indicate that SAND is in compliance with the NAAQS (NPS 2013a). Prior to any prescribed fire, SAND would acquire the necessary state and local air quality clearance and permits. SAND would also follow state and local requirements for reporting on smoke emissions from wildfires. In addition, prescribed burn managers will avoid burning when winds have the potential to carry significant amounts of smoke that could impact local communities and visitor safety.

#### Impacts of Alternative 1 - No Action

Hazardous fuel loadings would be retained and likely continue to accumulate, leading to increased potential for more intense and larger wildfires that could be difficult to control/suppress. Wildfires in areas where little to no hazard fuel reduction has occurred could burn larger areas and more intensely compared to a prescribed fire scenario.

Wildfires are not planned around favorable weather events or meteorological conditions that would allow for dispersion and transport away from sensitive receptors (i.e., local communities, private residents). These large, difficult to control wildfire incidents could produce more smoke in volume than wildfires where the vegetation has been managed for fuel reduction and is likely to produce two to four times greater particulate matter emissions than would be generated by prescribed fire

(Quigley and Arbelbide 1997). The No Action Alternative would result in adverse, minor to moderate, localized, short-term impacts due to increased potential for locally severe wildfire effects on air quality. The severity and duration of impacts would largely depend on the timing, location, severity, and extent of wildfires.

**Cumulative Effects** - Cumulative impacts to air quality would occur from No Action Alternative plus other activities including wildland fires (other agency prescribed fires and wildfires, private property debris burning) originating from adjacent lands, traffic within and outside SAND, routine maintenance of park roads, and potential for private development near the park. The No Action alternative in combination with the past, present, and foreseeable future actions would result in minor to moderate, short-term, adverse, localized cumulative impacts to air quality. Contribution to cumulative air quality impacts resulting from the No Action alternative would be negligible, as most air quality impacts are from other sources.

**Conclusion** - The No Action Alternative would result in adverse, minor to moderate, localized, short-term impacts to air quality from increased potential for larger, intense wildfires. Cumulative impacts to air quality would be adverse, minor to moderate, short-term, and localized.

### **Impacts of Alternative 2 (Preferred) - Utilize Management Tools to Modify Fuels to Protect and Maintain Park Values**

Management responses to wildfires would be the same as the No Action Alternative, although operational responses would likely be less in scale and complexity over time, as planned vegetation management actions on the landscape would decrease the size and/or intensity of wildfires. Effects to air quality would be different due to the impacts (beneficial and adverse) from the planned fuel management tools, and less intense burning. Wildfires managed under this alternative, over time, would likely be less intense with fire effects to air quality falling within the range of naturally occurring wildfires. The use of planned fuel management tools—prescribed fires, manual and mechanical treatments, targeted herbicide use, limited grazing, and biological agents—would indirectly reduce the intensity and size of future wildfires in the long term, resulting in fewer suppression and wildfire impacts to air quality.

Impacts to air quality from particulate matter and smoke produced from prescribed fires would be direct, adverse, minor, short-term, and localized. Negligible amounts of fugitive dust generated from prescribed fire and suppression activities and increased vehicle traffic associated with fire crews would temporarily affect air quality, and would be site-specific where suppression activities were occurring. During and immediately following a prescribed burn, smoke, particulate matter, and dust emissions would impact visibility in SAND and the surrounding area. There may be an intermittent and short-term exceedance of air quality standards (especially particulates) resulting in short-term, localized, and negligible to minor adverse impacts to air quality and visibility. Mitigation measures would include burning during appropriate weather and fuel moisture conditions where fuels are dry and will be consumed; utilizing wind conditions that disperse smoke away from residents; removing larger fuels (e.g., tree boles) from the area prior to burning to minimize available vegetative fuels; and accelerated mop-up to minimize smoldering. Burning under appropriate conditions can take advantage of favorable air column lift and transport conditions, dispersing smoke more quickly.

Each prescribed burn plan will include expected smoke trajectory maps and identify smoke-sensitive areas. Fire weather forecasts will be used to correlate ignitions with periods of optimal combustion

and smoke dispersal. Mitigation measures would be defined in the plan and arrangements made prior to ignition to ensure that designated resources are available if needed to implement the mitigation measures. Prescribed fires will not be implemented when atmospheric conditions exist that could permit degradation of air quality to a degree that negatively affects public health (federal and state air quality standards will be the basis for this decision). Smoke situations that arise and threatens smoke-sensitive areas may trigger suppression and/or mitigation measures that terminate the prescribed burn.

The Preferred Alternative could potentially produce slightly lower smoke emissions over time by effectively reducing the dense ground cover, changing the main fuel load to grass and forbs in some areas, a faster-lighter burning fuel, which creates less smoke. Overall, Alternative 2 would likely lead to lower and less intense wildfire emissions, which would have a beneficial local effect.

Air pollutants and dust would be generated by use of gasoline-powered equipment in mechanical and manual fuel reduction projects. Fugitive dust could also be generated from driving on unpaved roads to treatment sites. The direct adverse effect of these pollutants on air quality, given the small size of the projects and infrequency of activity, would be localized, short-term, and negligible to minor. The indirect and longer-term adverse impacts would be negligible.

Targeted herbicide application, such as utilizing backpack sprayers for foliar application, could result in herbicide temporarily in the air in the immediate vicinity of the work due to spray drift and volatilization (evaporation of liquid to gas). However, mitigation measures (mitigation measures section), and targeted herbicide application would reduce the potential for drift into non-target areas, and the amount of herbicide released into the air through volatilization. Airborne herbicide risks have been shown to be insignificant, even when prescribed fires are applied immediately after herbicide application (McMahon and Bush 1991). The indirect and long-term adverse impacts would be negligible.

Biological treatments would have adverse, negligible, localized, and short-term impacts on air quality associated with animal generated odor and dust, vehicle exhaust used to transport animals, and fugitive dust from driving on unpaved roads to treatment sites.

**Cumulative Effects** - Cumulative impacts to air quality would occur from No Action Alternative plus other activities including wildland fires (other agency prescribed fires and wildfires, private property debris burning) originating from adjacent lands, traffic within and outside SAND, routine maintenance of park roads, and potential for private development near the park. The Preferred Alternative in combination with the past, present, and foreseeable future actions would result in minor, short-term, adverse, localized cumulative impacts to air quality with long-term, moderate, beneficial, cumulative effects due to the reduction in fuels and reduced risk of a catastrophic wildland fire. Contribution to cumulative air quality impacts resulting from the Preferred Alternative would be negligible, as most air quality impacts are from other sources.

**Conclusion** - The Preferred Alternative would result in short-term, localized, and negligible to minor adverse impacts to air quality from prescribed burning. As well as indirect, moderate, long-term, and beneficial effects to air quality over time from a decrease in fuel loading following implementation of prescribed burning, manual and mechanical fuel reduction. Overall, cumulative effects under this alternative would be negligible, short-term, adverse, and localized.

## Soil Resources

### Affected Environment

SAND is located in an area where soils have been impacted by accelerated wind erosion due to arid croplands in the 1930s Dust Bowl era (Struthers et al. 2014). Agricultural practices prior to establishment of SAND, such as irrigation, mechanical cultivation, and livestock grazing have also impacted the soils. The topography at SAND is bisected by Big Sandy Creek and consists of gently undulating hills comprised of sand plains stabilized by vegetation, Aeolian deposits, and smooth plains. Specifically, north and east of the creek the landscape is dominated by smooth plains with grasslands. To the south and west of the creek are irregularly surfaced sand hills stabilized by sand sage shrub lands.

There are seventeen soil-mapping units within SAND as reported by the Natural Resource Conservation Service (NRCS 2014). The predominant soils within SAND consist of Wiley loam, Bankard-Glenberg complex, Fluvaquents, nearly level, and Valent-Vonid complex, totaling approximately 62%. The soils range from loamy fine sand to clay loam in texture and from excessively drained to somewhat poorly drained (NRCS 2014). Rapid soil assessments determined soils in SAND have none to moderate departures from expected soil conditions (Biggam 2013). Areas with slight to moderate departures from expected soil conditions, included the access road area, Ditch Borrow area, and an eroded drainage bank along the Chivington Canal.

### Impacts of Alternative 1 - No Action

Under the No Action Alternative, hazardous fuel loadings would be retained and continue to accumulate, leading to increased potential for intense wildfires that could be of high enough intensity to remove most soil organic matter (duff/litter) from the soil surface as well as most standing vegetation. The potential for damage to nutrient, physical, and biotic soil characteristics by fire is low on the north and southeastern portions of SAND and high on the southern portion primarily due to the soil texture and the amount of rock fragment present (NRCS 2014). High, as defined by NRCS, is that “fire damage can occur because one or more soil properties are less than desirable. Overcoming unfavorable properties requires special design, extra maintenance, and/or costly alteration.” The potential for high intensity wildfires could cause soil sterilization, lower soil pH and nitrogen content, killing rhizomes and mycorrhizae, and/or cause soil to repel water. Removal of ground cover and/or the duff/litter layer exposes the soil surface to precipitation and wind events and would increase the potential for erosion, loss of topsoil, and/or long-term soil changes to occur. Restoration and regrowth of ground cover would depend on the location, severity, and size of intensely burned areas by the wildfire. If any slopes or steep areas were burned intensely, they would be prone to washing and erosion before vegetation recovers. The indirect impacts due to increased potential for locally severe fire effects on soil, including physical alteration of soil structure and development of hydrophobic layers, would be adverse, moderate, localized, and long-term. Overall soil impacts would depend on the timing, location, severity and extent of the wildfire.

Minimum impact suppression tactics (e.g., select procedures, tools, and equipment that least impacts the environment, use waterbars on fire lines to reduce erosion risk, re-contour area) would be used to reduce suppression action impacts; these suppression strategies only impact a small area compared to the total area burned, which would be the primary source of soil erosion. Aggressive suppression strategies used for intense wildfires could include longer lengths of constructed firelines and other

ground impacting suppression actions. Impacts to soils from wildfire suppression tactics would be direct, short-term, negligible to minor, adverse, and localized. Overall soil impacts would depend on the timing, location, severity and extent of the wildfire.

**Cumulative Effects** - Cumulative impacts to soil resources would occur from the No Action Alternative plus other activities including past grazing, agricultural practices, and maintenance activities within SAND, and wildland fires originating from other adjacent lands, which could contribute to the overall disturbance and loss of soils in the area. The No Action Alternative in combination with the past, present, and foreseeable future actions would result in short- to long-term, minor to moderate, adverse cumulative impacts on soil productivity and stability, which would be reduced over time with rehabilitation efforts of burned areas.

**Conclusion** - Direct impacts to soil resources would be short-term, negligible to minor, adverse, and localized from wildfire suppression tactics. Indirect impacts to soils would be adverse, minor to moderate, localized, and long-term with the overall soil impacts depending on the timing, location, severity, and extent of the wildfire. Contribution to cumulative soil impacts under this alternative would be adverse, short- to long-term, and minor to moderate.

### **Impacts of Alternative 2 (Preferred) - Utilize Management Tools to Modify Fuels to Protect and Maintain Park Values**

Management responses to wildfires would be the same as the No Action Alternative, although operational responses would likely be less in scale and complexity over time, as planned vegetation management actions on the landscape would decrease the size and/or intensity of wildfires. Effects to soils would be different due to the impacts (beneficial and adverse) from the planned fuel management tools, and less intense burning. Wildfires managed under this alternative, over time, would likely be less intense with soil fire effects more likely to be within the range of naturally occurring wildfires. The use of planned fuel management tools—prescribed fires, manual and mechanical treatments, targeted herbicide use, limited grazing, and biological agents—would indirectly reduce the intensity and size of future wildfires in the long term, resulting in fewer suppression and wildfire impacts to soils.

Prescribed fires would impact soils by partially removing protective surface vegetation and litter, and organic matter in the soil, thereby temporarily exposing the soils to a higher potential for both water and wind erosion. The potential for damage to occur to soils within SAND is low and high—rating is based on prescribed fire that is intense enough to remove the duff layer and consume the organic matter in the surface layer (NRCS 2014). Following a prescribed fire, wind erosion may temporarily increase due to the removal of some standing vegetation. However, prescribed fires would be designed to not completely consume live and dead vegetation, so the exposure of soils would be less than in high intensity wildfires and as described by NRCS potential fire damage ratings. Properly executed prescribed fires could be beneficial to soil resources by providing a temporary influx of nutrients from burned vegetative material (Rau et al. 2008), which stimulates seed production without sterilizing the soil, and helps to perpetuate vegetation associations and allied wildlife. In addition to some recycling of nutrients back into the soils, raising pH, and increasing minerals and salt concentrations in the soil, the ash, charcoal, and vegetation residue from incomplete combustion aids in soil buildup and soil enrichment by new and partially burned organic matter being added to the soil profile. The added material works in combination with living, dead, and dying root systems to make the soil more porous, better able to retain water, and less compact

while increasing needed sites and surface areas for essential microorganisms, mycorrhizae, and roots (Vogl 1979, Wright and Bailey 1980).

Mechanical and manual equipment used during hazardous fuel reduction treatments (e.g., defensible space, fuelbreaks) could compact soils in localized areas and could increase erosion from removing vegetation. Planned treatments in areas of steep slopes or highly erodible soils will mitigate loss of soil productivity over the long term by restoring and maintaining native plant communities and reducing invasive weed species that can contribute to increased fire occurrence.

Targeted herbicide application—low volume application applied to specific basal or foliar plant areas—could result in herbicide migration into the soil. However, the NPS would use herbicides that do not have short- or long-term residual implications to soils, water, wildlife, or humans. In addition to the mitigation measures, limited use as a follow-up treatment to selected fuelbreaks and defensible space treatments would minimize potential herbicide impacts to the soil. Spot treatments to existing invasive (non-native) plants that may be found after wildfires or in disturbed areas would also be a relatively minor use and would help to minimize chances for overspray and migration into the soil. Therefore, the indirect and long-term impacts to soils would be adverse and negligible.

Domestic animals could cause soil disturbance and compaction, increasing the potential for both wind and water erosion; altering the nutrient cycle by depositing organic urine and feces; or damaging biological soil crusts at treatment sites. The use of domestic animals to help reduce hazardous fuel loads in the grasslands would be excluded from sensitive soils and wetland and riparian areas. Therefore, the indirect and long-term impacts to soils would be adverse and negligible.

Biological control agents would not likely affect soils as soil erosion would not likely increase as targeted weed species would slowly degrade over time. In the long-term, biological control agents would increase the quality and abundance of native plant communities as well as the soil stability.

**Cumulative Effects** - Cumulative impacts to soil resources would occur from the Preferred Alternative plus other activities including past grazing, agricultural practices, and maintenance activities within SAND, and wildland fires originating from other adjacent lands. The Preferred Alternative in combination with the past, present, and foreseeable future actions would be adverse, short-term, minor, and localized as soil impacts would be distributed throughout SAND rather than being concentrated to one large area or conducted all at one time. Cumulative beneficial impacts to soils would be minor and long-term over time due to increased nutrients and increased soil fertility (nutrient recycling, nitrogen availability).

**Conclusion** - The Preferred Alternative would result in adverse, short-term, minor, and localized impacts from prescribed fires and associated vegetation activities to soils. Beneficial, long-term, localized impacts to soils would occur from increased nutrients following prescribed fires, increased stability of soil strata and altering ground cover to more grassy and less dense shrub conditions. A benefit to soils over time would be the reduced threat of larger, more intense wildfires. Cumulative impacts would be adverse, minor, short-term, and localized due to prescribed fireline reclamation efforts and natural revegetation of burned areas, but beneficial over the long-term.

## Vegetation

### Affected Environment

Vegetation at SAND is a mosaic of sand sagebrush shrubland and shortgrass prairie bisected by riparian vegetation along the Big Sandy Creek. Sand sagebrush occurs on the sandhills to the south and west of Big Sandy Creek, while shortgrass prairie occupies the loamier north and east sides of SAND (Neid et al. 2007). The riparian corridor along Big Sandy Creek is comprised of a mosaic of cottonwood woodland, mesic grassland, and wet meadows.

Six vegetation associations—two shrublands, three herbaceous, one woodland - with 110 species were identified in SAND. There are also three non-natural areas—reclaimed agricultural lands, disturbed, and developed—occurring within SAND. Sand sagebrush (*Artemisia filifolia*) shrublands and Blue grama-Buffalograss (*Bouteloua gracilis*-*Buchlow dactioides*) are the dominant vegetation communities (Neid et al. 2007). Sand sagebrush shrubland communities cover approximately 51% (1,215 acres), herbaceous association cover about 22% (515 acres), reclaimed agricultural land covers about 23% (558 acres), and woodlands cover about 2% of SAND. Descriptions of the dominant vegetation communities described below are from the botanical surveys conducted in 2005 (Neid et al. 2007).

#### Shrubland Associations

In SAND, there are two sand sagebrush-dominated shrubland associations—Sand sagebrush-blue grama and sand sagebrush-Sand bluestem (*Andropogon hallii*). The Sand sagebrush-Blue grama association occurs along the ancient terraces, while the Sand sagebrush-Sand bluestem occurs on the bluffs, slopes, knolls, and swales of the uplands. The Sand sagebrush-Sand bluestem association is more diverse with more tallgrass species such as sand bluestem, sand reed (*Calamovilfa longifolia*), sideoats grama (*B. curtipendula*), and greater forb diversity.

#### Herbaceous Associations

The three herbaceous associations found in SAND are comprised of Blue Grama-Buffalograss, Common Threesquare (*Schoenoplectus pungens*), and Alkali Sacaton-Inland Saltgrass (*Sporobolus airoides*-*Distichlis spicata*)—. The blue grama-buffalograss association occurs on terraces adjacent to the cottonwood galleries in the Big Sandy Creek corridor as well as on loamier soils north and east of the creek. Common threesquare and Alkali sacaton-Inland saltgrass associations occur along the drainage corridors, including Big Sandy Creek. Common threesquare occupies the swales and pools in active stream channels. Alkali sacaton-Inland saltgrass occupies terraces adjacent to the stream and tributary channels and has dense vegetation cover and thatch.

#### Woodland Association

Plains cottonwood/Western wheatgrass-Switchgrass association (*Populus deltoids*/*Pascopyrum smithii*-*Panicum virgatum*) occurs along the Big Sandy Creek corridor. There are three age classes of cottonwoods—1865–1885, 1908–1925, and 1949–1960—with little cottonwood establishment since 1960. The dominant herbaceous layer includes Chairmaker's bulrush (*Schoenoplectus americanus*), switchgrass, and inland saltgrass.

#### Non-natural Areas

The reclaimed agricultural land is located in the northern section and consists of mixed grass prairie and weedy patches. Disturbed areas comprise less than 1% of SAND and are dominated by non-

native weedy species, such as *Kochia scoparia* and *Salsola australis*. These areas often occur near areas treated for tamarisk (*Tamarix ramosissima*) and *Salsola*. Approximately 2% of the land cover is classified as enveloped areas, which consists of infrastructure, including roads and homesteads.

**Fire Ecology** - Historically, natural fire helped to shape the native vegetation and local ecosystems. The sand sagebrush dominated associations respond to various disturbance mechanisms and the absence of fire is believed to have contributed to an increase in sand sagebrush density. Sand sagebrush density has increased and is encroaching on grassland areas in SAND. Sand sagebrush is adapted to nutrient poor soils and re-sprouts rapidly after fire (McWilliams 2003).

Fire is less important in maintaining the Blue grama-buffalograss community compared to other disturbance mechanisms like climate (precipitation) and grazing. This short grass prairie community has minimal litter accumulation (Knapp and Seastedt 1986, Hulbert 1988) which likely prevented fire return intervals from occurring more than every five to ten years (Joern and Keeler 1990).

For stands of plains cottonwood, historic fire frequency has been estimated to be between 5 and 200 years depending largely upon the upland vegetation, the abundance of understory vegetation, and the geographic location (Taylor 2001). Fires have been estimated to occur between 20 to 30 years around cottonwood stands along rivers in the northern Great Plains, but the actual riparian vegetation, which would be wetter, may not have burned so frequently (Sieg 1997). The relatively infrequent occurrence of wildfires is supported by certain characteristics of cottonwoods. Cottonwoods are not considered to be fire-adapted as they do not have thick bark that would make them resistant to fire. The ability of cottonwoods to resprout after a wildfire depends on the intensity of the burn. In New Mexico, a light fire killed approximately 50 percent of plains cottonwoods, a moderate burn killed up to 75 percent, and a severe burn could kill an entire stand (Stuever 1997).

**Invasive, Non-native Species** - There are 29 nonnative plant species known to occur in SAND (Foltz-Zettner and Sosinski 2010a,b, 2012a, b, Foltz-Zettner et al. 2012, 2013) with five species—Field bindweed (*Convolvulus arvensis*), Kentucky bluegrass (*Poa pratensis*), cheatgrass (*Bromus tectorum*), white/yellow clover (*Melilotus albus*, *M. officinalis*), and *Kochia* (*Kochia scoparia*)—ranked as high impact. Hiebert and Stubbendiek (1993) ranking system assesses species innate ability to become a pest in conjunction with the current level of impact. Currently, yellow/white clover are being actively managed and are not increasing in population. *Kochia* and Russian thistle (*Salsola targus*) had the highest percentage of survey blocks and were found primarily along road and trail corridors. Fifty-seven percent of the survey blocks had no nonnative, invasive species recorded (Foltz-Zettner 2012a).

### **Impacts of Alternative 1 - No Action**

Existing vegetation conditions would persist with continued retention and likely increase of hazardous fuels—shrub density, dead and downed woody debris, and ladder fuels. Ecosystems would not be maintained and/or restored and could cause a decline in health and vigor of vegetation communities with a decrease in plant diversity and grass and forb understory. The continued retention and increase of hazardous fuels would increase the potential for high intensity wildfires that are difficult to control/suppress. Indirect impacts could be adverse, minor to moderate, localized, and long-term due to physical alteration of vegetation structure, composition, and function, and increased susceptibility to invasive plants. The resilience of SAND ecosystems would also be reduced from the continued stress of drought, pest outbreaks, and wildfire.



High intensity wildfires could also alter soil resources (e.g., soil sterilization, kill rhizomes and mycorrhizae, cause hydrophobic layers), leading to short- and long-term changes in vegetation communities. However, MIST tactics would be used during wildfire suppression to minimize the impact of fire control actions to soils, thus reducing potential adverse impacts to vegetation in fireline areas. High intensity and/or stand replacing wildfires could remove most standing vegetation and soil organic matter (duff/litter) from the soil surface, creating bare and burned soil areas susceptible to increased opportunities for invasive and nonnative plant species to become established.

Potential spread of invasive plants could also occur from equipment used by fire crews on wildfire suppression efforts (i.e., carried in on equipment from outside the area, fireline construction equipment) or naturally distributed by wind or animals. Soil disturbance and bare soil areas from fireline construction could lead to increased opportunities for invasive/non-native plant establishment and potential increase of invasive/non-native plants. Following fire management suppression activities, areas would be monitored for invasive and non-native vegetation. Impacts from the spread of invasive/non-native weed species would be long-term and adverse if viable seeds become established. However, due to mitigation measures that would be used (i.e., cleaning of equipment before and after use, fire lines re-contoured and covered with cut vegetation debris after suppression activities), impacts would be negligible.

**Climate Change** - Recent analysis on fire extent and climate during the past 35 years revealed an increase in frequency of large, high severity fires since the mid-1980's with longer wildfire duration and longer wildfire seasons (Westerling et al. 2006). It is likely that vegetation types that have experienced fuel accumulations and increased vegetation density are more sensitive to climatic variability (i.e., less resilient to fires during drought and warmer years). Based on the current information available for climate change and associated vegetation changes and the fact that interactions between climate change, fire, and vegetation are complex and uncertain, it is unknown whether the same or different vegetation would grow back following a large, severe fire. If repetitive fires occur following a large, severe wildfire, it is thought unlikely that historic vegetation associations would develop as they did in the past.

In addition, there are potential future changes in plant communities from predicted climate change, as individual plant species respond to large and small-scale changes in temperature and precipitation, fertilizing effect of increased carbon dioxide, and changing patterns of inter-specific competition (Shafer et al. 2001). The spread of non-native plant species could be accelerated in response to future climate changes, particularly in those areas where native plant species are unable to adapt to the climate changes. Annual climate variations are driven by interannual variations from the intensity of the summer monsoon precipitation and by variations in El Niño Southern Oscillation cycles (NPS 2007). Annual average temperature and precipitation patterns have shown large fluctuations over the past century with no discernible trend (NPS 2007). However, temperatures have generally become warmer in the past 2–3 decades (NPS 2007). Many future scenarios have been developed and modeled in an attempt to quantify future climate change (Solomon et al. 2007). Annual temperatures for the SAND area are predicted to increase between 4 to 5 degrees Fahrenheit by 2070 (Fisichelli 2013). Small changes in average temperatures can have profound effects on species survival and distribution. Precipitation is predicted to decrease by 3 to 6 percent with greatest decrease in summer (10 to 15 percent) by 2070 compared to the 1971–1999 values (Kunkel et al. 2013). However, at this

time, the models are not sufficiently precise to address increases in temperature and water stress over the short duration of the planning period and the small scale of SAND. In addition to changes in temperature and precipitation, climate changes may result in frequent heat waves, droughts, floods, or extended frost-free season (Fisichelli 2013). Due to increased hazardous fuels and potential for intense wildfire behavior, indirect effects of Alternative 1 would be adverse, minor to moderate, short- to long-term, and localized.

**Cumulative Impacts** - Cumulative impacts to vegetation resources would occur from the No Action Alternative plus other activities including past grazing, agricultural practices, and construction within SAND, fire management activities planned by other agencies, and wildland fires originating from adjacent lands. The No Action Alternative in combination with the past, present, foreseeable future actions would have adverse, minor to moderate, long-term, localized impacts from increased potential for stand replacing wildfires.

**Conclusion** - The No Action Alternative could have adverse, minor to moderate, localized, and long-term due to physical alteration of vegetation structure, composition, and function. Climate change would have adverse, minor to moderate, short- to long-term, localized impacts. Cumulative impacts would be adverse, minor to moderate, long-term, localized.

### **Impacts of Alternative 2 (Preferred) - Utilize Management Tools to Modify Fuels to Protect and Maintain Park Values**

Management responses to wildfires would be the same as Alternative 1, although operational responses would likely be less in scale and complexity over time, as planned vegetation management actions on the landscape would eventually decrease the size and/or intensity of fires. Effects to vegetation resources would be different due to impacts (beneficial and adverse) from the planned fuel management treatments.

Implementing prescribed fires would benefit the native plant communities over the long term by rejuvenating the soils with nutrients; reducing shrub density and encroachment of the herbaceous plant associations; reducing shrub density in the shrubland associations and propagating understory growth of grasslands and forbs; and restoring grasslands, and reducing competition from invasive plants. Prescribed fire could also increase production and/or seed germination of grassland plant species and restore native vegetation structure, composition, and function. Prescribe fire would help to reduce the fuel loads—dead and downed woody debris—in the Plains cottonwood/Western wheatgrass-Switchgrass association and could help to improve the health and vigor of the grasses and forbs. Over the long term, utilizing prescribed fire would be expected to reduce hazardous fuel accumulations and decrease the potential size and intensity of wildfires. Experiencing more traditional fire behavior would lead to increased vigor of fire-adapted vegetation found at SAND.

The use of prescribed fire could result in the loss of individuals and communities of plants in the short-term. However, prescribed fires are designed to be lower in intensity than wildfires, promoting survival of diverse species and seedbeds. Thus, overall impacts would be direct, minor to moderate, beneficial, long-term, localized by restoring native vegetation structure, composition, diversity, and function of historically fire-maintained vegetation associations.

Mechanical and manual treatment impacts would include removal of vegetation near buildings and structures (e.g., cultural sites) to create/maintain defensible space. Mechanical and manual

treatments would also include development of fuelbreaks to help stop wildfires and to assist holding prescribed fires, and reducing/eliminating invasive and/or exotic plants by removing the entire plant and/or minimizing seed production. Mechanical and manual treatments would also be utilized to recreate/maintain historic landscapes, an important component of interpreting the cultural period and scenes found at SAND.

Potential spread of invasive plants could occur from equipment used by crews for fuel treatments (i.e., carried in on equipment from outside the area for prescribed fires, mechanical fuel reduction treatment equipment, fireline construction equipment). Following fire management activities (e.g., prescribed fires, hazardous fuels reduction), areas that were treated would be monitored and invasive vegetation may be removed by follow-up manual or mechanical work. Impacts from the spread of invasive weed species would be long-term and adverse if viable seeds are transported and become established. However, due to mitigation measures that would be used (i.e., cleaning of equipment before and after use, avoid burning when possible in areas at high risk for weed establishment or spread), impacts would be negligible.

Targeted herbicide application, could be used as a follow-up treatment to fuelbreaks and prescribed burns, and to reduce existing nonnative plant species, such as along roads. Limited use by hand application method would reduce chances for over spraying or applying to non-target plants. Thus, potential for impacts to non-target plants would be minimized by following mitigation measures plus application would be limited to small areas, conducted with certified applicators in accordance with the product label instructions, and hand application of herbicides via backpack sprayers and UTV sprayers to specific basal or foliar plant areas, or directly to cut stumps or tree trunks. Thus, indirect, adverse impacts would be negligible.

Biological agents are not expected to have adverse impacts on vegetation as they would be specific to the targeted non-native vegetation. Over time, species composition of the plant community should change as treated non-native plants die and are replaced by native vegetation.

Limited use of domestic animals to reduce hazardous fuel loads could cause soil compaction from trampling, increased soil erosion from loss of plant cover, and loss of biological soil crusts, which play an important role in hydrology and nutrient recycling (Belnap et al. 2001). Impacts to non-target vegetation could occur from trampling or grazing by livestock. The extent of potential impacts would depend on the animal species used, the tolerance of plant species to grazing, management of the grazing system (i.e., timing, intensity, duration), and existing site conditions. With appropriate timing, intensity, and duration of grazing impacts are expected to be negligible.

**Climate Change** - Considered over a broad scale, areas treated with the proposed fire management tools—prescribed fire, manual and mechanical treatments, targeted herbicide use, limited grazing, biological agents—could remove additional environmental stressors and competition on remaining species and allow them to better adapt to climate change. Burn plan prescriptions and real-time fire modeling rely on current meteorological conditions and fuel characteristics, which reflect the uneven progression of longer-term changes. These planning and decision-making processes are an example of short-term adaptive management followed by the fire program under guidance in RM-18, Wildland Fire Management. As additional scientific information becomes available at a useful temporal, spatial, and/or ecological scale, it would also contribute to the longer-term adaptive management process through annual program reviews and revisions to the FMP. Due to reduced

fuels and fire behavior potential in treated areas indirect effects would be beneficial, long-term, and localized.

**Cumulative Effects** - Cumulative impacts to vegetation resources would occur from the Preferred Alternative plus other activities including past grazing, agricultural practices, and construction within SAND, fire management activities planned by other agencies, and wildland fires originating from other adjacent lands. The Preferred Alternative in combination with the past, present, foreseeable future actions would have moderate, long-term, beneficial, and localized impacts. This would be due to the decreasing shrub density, dead and down woody debris, and ladder fuels over time, thus promoting native vegetation restoration with the return of a natural fire regime and an increased trend of resilience to future climate warming or droughts.

**Conclusion** - The Preferred Alternative would have indirect, beneficial, minor to moderate, long-term, localized impacts to vegetation by restoring native vegetation structure, composition, diversity, and function of fire-adapted and fire-maintained plant communities (e.g., short prairie grasslands, sand sagebrush). Adverse impacts to vegetation resources would be short-term, minor, and localized from potential loss of individuals and communities of plants from prescribed fires. Adverse impacts from mechanical, manual, herbicide, and biological treatments would be negligible due to mitigation measures implemented. Cumulative impacts to vegetation would be moderate, long-term, beneficial, and localized.

## Wildlife

### Affected Environment

Riparian and upland shortgrass prairie are the main habitats within SAND with the intermittent Big Sandy Creek, and its associated riparian vegetation, bisecting the site. Shortgrass prairie habitats are in various successional stages, providing a diversity of habitats in different seasons. Common mammals known to occur in and around SAND include mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), raccoon (*Procyon lotor*), gray fox (*Urocyon cinereoargenteus*), American badger (*Taxidea taxus*), and pronghorn (*Antilocarpa Americana*).

Big Sandy Creek runs approximately 3.25 miles within SAND and the associated riparian habitat is comprised of woody species, predominately plains cottonwood and herbaceous vegetation (NPS 2013b). The riparian habitat of SAND supports populations of northern leopard frogs (*Rana pipiens*), tiger salamanders (*Ambystoma tigrinum*), Woodhouse toads (*Bufo woodhousii*), Plains killifish (*Fundulus zebrinus*), and dragonflies and damselflies.

The 2011 bird surveys recorded over 1,500 birds and 39 species at SAND (NPS 2012b). Common bird species observed include western meadowlark (*Sturnella neglecta*), mourning dove (*Zenaidura macroura*), Cassin's sparrow (*Peucaea cassinii*), western kingbird (*Tyrannus verticalis*), and horned lark (*Eremophila alpestris*; NPS 2012b).

SAND provides habitat for birds protected under the Migratory Bird Treaty Act (MBTA). The MBTA makes it unlawful to pursue, hunt, kill, capture, possess, buy, sell, purchase, or barter any migratory bird, including the feathers or other parts, nests, eggs, or migratory bird products. In addition, this act serves to protect environmental conditions for migratory birds from pollution or

other ecosystem degradations. Potential impacts to migratory birds will be avoided by timing fire management activities to fall outside of the migratory bird season (April 15–August 15) when possible.

A survey of reptiles and amphibians has not been conducted for SAND. However, various amphibians and reptiles associated with the high plains grasslands are found within SAND (NPS 2011).

### **Impacts of Alternative 1—No Action**

Existing wildlife habitat conditions would persist with continued retention and increase of hazardous fuels—shrub density, dead and down woody debris, and encroaching woody vegetation. The continued encroachment of shrubs could change species composition and structure of native grasslands, leading to a more homogenous shrubland state that is less diverse and fire-adapted. Increased shrubs and/or hazardous fuels could also reduce wildlife habitat quality and increase the intensity, rate of spread, and extent of potential wildfires. Fire dependent vegetation communities may decrease in prevalence and vigor, leading to negative impacts on wildlife species adapted to those vegetation types. Impacts to wildlife habitat and individuals would be indirect, adverse, minor to moderate, long-term, and localized due to increased potential for locally or widespread severe fire effects.

Wildfire suppression tactics would temporarily increase noise disturbance from human presence and equipment, smoke, fire, and soil disturbance. Additional disturbances to wildlife could result from the use of helicopters for transport of personnel and firefighting control actions. Low level fixed wing aircraft flights and retardant drops could be used in firefighting suppression actions, also disturbing wildlife. In addition, reproduction and survival for individuals could be affected due to increased stress and loss of foraging opportunities after habitat burns in high intensity wildfires. Temporary loss of habitat and displacement may occur for individuals within the burn area. Mortality to wildlife species that are small and less mobile such as, small mammals, lizards, and snakes, may also occur from wildfires, while larger animals may not be able to move out of the fire path in time, becoming disoriented by the wildfire.

In riparian habitats, wildfires alter vegetation that is critical to wildlife species within this vegetation type. Riparian vegetation at SAND consists primarily of cottonwood galleries and wet meadows. The cottonwood galleries are very susceptible to fire and heat impacts, which could kill trees and remove downed woody fuel, which is a component of wildlife habitat. The wet meadows provide a natural fire break during most of the year and would recover rapidly if the meadow becomes dry enough to burn. Cottonwood trees may not recover post fire without direct management action being taken to replant trees.

Big Sandy Creek, a fish bearing water body, could be impacted by wildfires from removal of streamside vegetation, which would increase water temperature until revegetation occurred. Impacts to fish and populations would depend on the severity, size, location, and proximity to fish populations, as downstream reaches could cool rapidly if vegetation is present (Johnson 2004). Water bodies could also experience large pulses of water and an increase in sedimentation from woody debris and ash from wildfires. This could lead to turbidity and degraded water quality, which could adversely affect riparian habitats and fish.

**Cumulative Impacts** - Cumulative impacts to wildlife resources from other activities include loss of habitat from past agricultural practices and grazing, fire management activities planned by other agencies, wildfires originating from adjacent lands, and noise-related impacts from vehicles. The No Action Alternative would result in adverse, minor to moderate, short- to long-term, localized cumulative impacts due to displacement and habitat alteration from wildfires and the likelihood of high intensity and larger wildfires over time.

**Conclusion** - The No Action Alternative would have indirect, adverse, minor to moderate, long-term, and localized impacts to wildlife habitat and individuals due to increased potential for local or widespread severe fire effects and reduced habitat quality and displacement. Cumulative impacts to wildlife would be adverse, minor to moderate, short- to long-term, localized to wildlife and/or their habitat.

**Impacts of Alternative 2 (Preferred) - Utilize Management Tools to Modify Fuels to Protect and Maintain Park Values**

Management responses to wildfire would be the same as the No Action Alternative, but effects (beneficial and adverse) to wildlife would be different from the proposed fuel management tools. The likelihood of larger, intense wildfires would decrease with time as vegetation management actions were completed.

The use of fuel management tools would increase the success rate of restoring fire as an ecological process, thus increasing the prevalence and vigor of fire dependent vegetation and benefitting associated native wildlife species present at SAND. In addition, the ability to reduce dense shrub and brush areas would potentially increase wildlife habitat quality and available ground forage. The potential for wildfires to be lower intensity ground fires, which have less impact on wildlife and their habitat, would increase under the Preferred Alternative. Thus, the Preferred Alternative would have beneficial, minor to moderate, long-term, localized impacts by restoring the abundance and diversity of fire-adapted vegetation communities and wildlife habitat present and reducing the potential for future severe wildfires.

Prescribed fire could benefit individual wildlife species and their habitat by emulating the natural fire regime and creating a more historic and natural vegetation pattern across SAND. Prescribed fire could create localized, but not widespread areas of early succession vegetation and enhance the variety and diversity of vegetation communities and wildlife habitat present. Prescribed burns would increase the amount of nutrients in the soils in the short-term, which could increase plant growth and the amount of ground cover and number of species, and the nutritional quality of the forage for wildlife species. The burned areas generally green up earlier than non-burned areas, thus providing earlier grazing opportunities (Redmon and Bidwell 2003).

Prescribed fires could directly impact nesting resident and migratory birds if conducted during breeding/nesting season (generally between April to August ) through mortality of fledglings that are unable to flee or avoid the burn units. Implementing prescribed fires when possible outside the breeding season and/or avoiding known nesting areas should mitigate these potential impacts.

In riparian habitat, prescribed fires would be low intensity ground fires that would lightly burn streamside vegetation, allowing riparian vegetation to regrow quickly with increased vigor. In addition, prescribed burns could be planned over time to burn adjacent to riparian habitat any given

year. Adverse impacts to Big Sandy Creek riparian habitat from prescribed fires would be short-term and localized from increased sedimentation from ash and increased water temperature due to removal of streamside vegetation. Furthermore, the abundant cover of native, herbaceous, and soil-binding riparian species found along Big Sandy Creek should serve as a barrier and/or filter for the increased potential for sedimentation from prescribed fires.

Impacts on wildlife species that are less mobile from mechanical and manual treatments used for hazardous fuel reduction would be short-term, adverse, and localized due to stress and disturbance. Potential mitigations include avoiding seasons when ground and shrub/tree nesting birds are actively nesting. Short-term impacts on more mobile wildlife species (e.g., deer, mountain lions) would be temporary displacement from the treatment areas.

Targeted herbicide application applied by hand, such as foliar application to specific basal or foliar plant areas, would minimize chances for overspray and applying to non-target plants in wildlife habitat. Thus, mitigation measures (mitigation measures section), limited use, low volume application of herbicide, and conducted by a certified applicator following all label instructions would minimize chances for overspray and impacts to non-target plants. In addition, herbicides commonly used for vegetation management by the NPS (e.g., Garlon 4, glyphosate, imazapyr, sulfometuron, metsulfuron methyl, hexazinone) have been designed to target biochemical processes unique to plants, thus have low levels of direct toxicity or risk to wildlife when used in accordance with label specifications (Tatum 2004). Herbicides commonly used for vegetation management also degrade quickly upon entering the environment and thus are neither persistent nor bioaccumulate (Tatum 2004). Using targeted herbicide as a follow-up treatment to reduce and/or maintain brush regrowth of selected defensible space and fuelbreaks and to reduce/eliminate invasive/noxious weeds would cause a temporary disturbance to wildlife in the treatment areas.

Biological controls are not expected to have adverse impacts to wildlife species as the Animal and Plant Health Inspection Service permits use of biological agents following testing to ensure that they are host-specific and do not affect non-target plant species. Over time, species composition of non-native plant communities (e.g., cheatgrass) would be replaced with native vegetation. This would improve habitat quality for wildlife species that prefer native plant species. Indirect impacts to wildlife resources from use of biological controls would be beneficial, localized, and long-term as native plant communities are restored and hazardous fuel loads are reduced, making future intense wildfires unlikely.

The use of domestic animals to help reduce hazardous fuel loads could affect non-target native plant species. Domestic livestock does allow for treatment of larger areas and may stimulate new growth of native plant species. Domestic animals (e.g., livestock, goats) would be used in moderation, which could alter the productivity and composition of plant communities to benefit wildlife habitat (Payne and Bryant 1998). Use of domestic animals could also help to reduce hazardous fuel loads (i.e., fine fuels in cottonwood galleries, sagebrush) by reducing vegetation height and ground litter. This could decrease the intensity, rate of spread, and flame height of future wildfires, reducing risk of wildlife habitat loss from large, intense wildfires. Domestic animals could cause alteration of riparian channel/wetland morphology by making stream channels shallower and wider. The degree of effect to riparian areas from treatments using domestic animals would be dependent on the timing, duration, and intensity of grazing.

**Cumulative Impacts** - Cumulative impacts to wildlife resources from other activities include loss of habitat from past agricultural practices and grazing, fire management activities planned by other agencies, wildfires originating from adjacent lands, and noise-related impacts from vehicles. The Preferred Alternative would result in adverse, minor, short-term, localized impacts due to increased noise and disturbance to wildlife as well as beneficial, minor, long-term, and localized due to improved habitat quality and restored grasslands from return of a natural fire regime and vegetation management actions.

**Conclusion** - Impacts to native wildlife resources would be minor to moderate, beneficial, long-term, and localized from restoring the variety and diversity of native and fire-adapted vegetation communities and wildlife habitat present at SAND. The potential for future large and intense wildfires would also decrease, as would wildfire suppression efforts. Adverse impacts would be short-term and localized due to stress and disturbance for less mobile species and temporary displacement within and near treatment units for mobile wildlife species. Overall, cumulative impacts to wildlife resources would be beneficial, minor, long-term, and localized due to increased habitat quality with an increased mosaic of habitat types and a decrease in the potential for severe and intense wildfires.

## Special Status Species

### Affected Environment

Under the Endangered Species Act of 1973 (ESA), the NPS has the responsibility to address impacts to federally listed, candidate, and proposed species. The terms “threatened” and “endangered” describe the official federal status and certain species in SAND as defined by the ESA. The term “candidate” is used officially by the U.S. Fish and Wildlife Service (USFWS) to describe species, which sufficient information exists on biological vulnerability and threats to support a “proposed rule to list,” but issuance of the proposed rule has not been completed. NPS policies dictate that federal candidate species, proposed species, and state listed species are to be managed to the greatest extent possible as federal-listed endangered and threatened species (NPS 2006). For the purposes of this analysis, a list of federally listed species that may occur in or near SAND was obtained from the USFWS IPAC website (<http://ecos.fws.gov/ipac/>) on September 18, 2014. A list of state listed species that may occur in or near SAND was obtained from the Colorado Natural Heritage Program (CNHP) website (<http://www.cnhp.colostate.edu/download/list.asp>).

Table 5 summarizes federal and state special status species listed for Kiowa County, species habitat descriptions, and potential for species or species habitat to occur within SAND. Currently, there are no federally listed threatened, endangered, or candidate species known or likely to inhabit SAND and no designated critical habitats occur within or near SAND.

There are 15 Colorado state-listed species with potential to occur in Kiowa County (Table 5). Five of these species are federally protected under the ESA. Currently, there are no state-listed species known to occur within SAND. Of the 15 species, suitable habitat for one state listed threatened species, Burrowing Owl (*Athene cunicularia*) and two species of concern—Mountain Plover (*Charadrius montanus*) and black-tailed prairie dog (*Cynomys ludovicianus*)—could be impacted by fire management activities. The remaining state listed species that are known to occur within Kiowa County do not occur at SAND based on their known habitat preferences and/or they have not been documented in SAND (NPS 2014).



**Table 5. Federal and State Listed Threatened, Endangered, or Candidate Species Known to Occur within Kiowa County, Colorado.**

Species	Status*		Habitat	Potential to Occur
	USFWS	State		
BIRDS				
Bald Eagle <i>Haliaeetus leucocephalus alascanus</i>	—	T	Occurs around large water bodies and eats mainly fish. It nests along forested riparian areas of rivers and lakes, and winters in upland areas, often near large water bodies.	There are no known occurrences in SAND (NPS 2011, 2014).
Burrowing Owl <i>Athene cunicularia</i>	—	T	Inhabits grasslands, deserts, and scrublands that are characterized by low-growing vegetation. Nest and roost in burrows, such as those excavated by prairie dogs. In eastern Colorado, Burrowing Owls are closely associated with prairie dog towns and their burrows.	Burrowing Owls have not been detected since 2009 after the loss of the prairie dog colonies within SAND. Burrows may have started to deteriorate without an active prairie dog colony. Suitable habitat is present and could be used in the future.
Ferruginous Hawk <i>Buteo regalis</i>	—	SC	In Colorado, this hawk typically inhabits shortgrass prairie and lowland cottonwood riparian forests. These hawks are a common winter resident in the eastern plains, and are uncommon during other seasons.	Surveys conducted in 2006 did not identify the presence of this species; Ferruginous Hawks could use SAND for foraging (NPS 2008, 2014).
Least Tern <i>Sterna antillarum athalassos</i>	E	E	Nests are bare or sparsely vegetated sand, shell, and gravel beaches, sandbars, islands, and salt flats associated with rivers and reservoirs.	There are no known occurrences in SAND and Big Sandy Creek in SAND does not provide suitable nesting habitat
Lesser Prairie Chicken <i>Tympanuchus pallidicinctus</i>	T	T	High quality nesting habitat in sand sagebrush is composed of 15–30% sand sagebrush cover, >30% native grasses cover with average grass height >15 inches, and >10% native forbs cover (Hagen et al.	Surveys conducted in 2006 did not identify the presence of this species (NPS 2008). Currently, there is no suitable habitat as previous grazing disturbed potential habitat for lesser prairie chickens (NPS 2011). Furthermore, to have a

Species	Status*		Habitat	Potential to Occur
	USFWS	State		
			2011, Van Pelt et al. 2013, Elmore et al. 2009). Brood rearing habitat consists of 10–25% sand sagebrush cover, >20% native grasses with average grass height >15 inches, and >20% native forbs cover (Hagen et al. 2011, Van Pelt et al. 2013, Elmore et al. 2009). The understory has to be open enough to allow movement of chicks.	viable LPCH population, it is estimated that 25,000 acres of contiguous high-quality native rangelands may be the minimum land required. SAND would have to coordinate with surrounding landowners to help restore and to meet the habitat requirements for a viable LPCH population.
Long-billed Curlew <i>Numenius americanus</i>	—	SC	This bird nests on shortgrass prairie and occasionally in wheat or fallow fields.	There are no known occurrences within SAND (NPS 2011, 2014).
Mountain Plover <i>Charadrius montanus</i>	—	SC	This shorebird occupies arid, short grassland habitats, including heavily grazed areas. Microhabitat variables important for nesting often include large patches of bare ground (> 30% total cover), short grass, and proximity to prairie dog towns.	The Mountain Plover has not been detected since 2009 after the loss of the prairie dog colonies within SAND. The plovers were observed at the northern prairie dog colony and outside SAND adjacent to this prairie dog colony. Suitable habitat is present and could be used in the future.
Piping Plover <i>Charadrius melodus</i>	T	T	In Colorado, piping plovers nest on sandy lakeshore beaches, sandbars with riverbeds, sandy wetland pastures.	There are no known occurrences in SAND and Big Sandy Creek in SAND does not provide suitable nesting habitat.
Western Snowy Plover <i>Charadrius nivosus nivosus</i>	—	SC	Nest on sandy beaches or alkaline flats with little or no vegetation. In Colorado, they are known to nest on the shores of reservoirs near the Arkansas River between La Junta and Lamar.	Habitat not present
<b>MAMMALS</b>				
Black-tailed prairie dog <i>Cynomys ludovicianus</i>	—	SC	Grasslands from low valleys to montane meadows.	Currently, there are no active prairie dog colonies in SAND, but suitable habitat is

Species	Status*		Habitat	Potential to Occur
	USFWS	State		
				present and could be re-colonized in the future (NPS 2011).
Swift fox <i>Vulpes velox</i>	—	SC	Inhabits grassland and desert where soft soils support large populations of rodents, especially kangaroo rats, on which these foxes prey. Shelter is sought in underground burrows, neither rocks nor vegetation being essential for burrow construction.	Surveys conducted in 2006 did not identify the presence of this species (NPS 2008). There are no known occurrences within SAND (NPS 2008, 2011).
<b>FISH</b>				
Arkansas darter <i>Etheostoma cragini</i>	C	T	This fish is endemic to the Arkansas River basin, inhabiting cool, slow-moving, clear, spring-fed streams with abundant aquatic rooted vegetation and sandy bottoms. In Colorado, this fish are known to occur in Fountain Creek tributaries, several tributaries mainly within the Arkansas floodplain near the Kansas border, and the headwaters of Big Sandy, Rush, and Horse Creek systems southwest of Hugo.	Surveys conducted in 2006 did not identify the presence of this species in the portion of the Big Sandy Creek that flows through SAND (NPS 2008). The Arkansas River darter is known to occur upstream and downstream of SAND in the Big Sandy Creek. However, the Big Sandy Creek segment in SAND is an intermittent creek with the flow primarily subterranean except during heavy precipitation events or where surface features allow a permanent surface flow over short distances (Tilmant et al 2006). During normal and dry years, there are long periods when the creek is dry (NPS 2011). The only perennial water is found in three depressions in the riparian area that is fed from the spring located 4,000 feet up hill. The lack of perennial surface flow makes the Sandy Creek segment in SAND unsuitable habitat for the Arkansas darter.

Species	Status*		Habitat	Potential to Occur
	USFWS	State		
REPTILES and AMPHIBIANS				
Massasauga <i>Sistrurus catenatus</i>	—	SC	The massasauga uses a variety of habitats in the Arkansas River drainage, from arid open sagebrush prairie to shortgrass prairie. It is typically associated with shortgrass prairie habitat with sand sage, buffalograss, and blue grama.	There are no known occurrences in SAND (NPS 2008, 2014).
Plains leopard frog <i>Lithobates blairi</i>	—	SC	This frog inhabits plains grassland, sandhills, stream valleys, and canyon bottoms near streams, ponds, reservoirs, creek pools, and irrigation ditches. This frog breeds in permanent, semipermanent, and temporary ponds, and in stream pools and backwaters.	There are no known occurrences in SAND (NPS 2008, 2014). Surveys conducted in 2006 did not identify the presence of this species (NPS 2008).
Texas Horned Lizard <i>Phrynosoma cornutum</i>	—	SC	Inhabit arid and semiarid habitats in open areas with sparse plant cover.	Surveys conducted in 2006 did not identify the presence of this species (NPS 2008). Suitable habitat exists on the inactive prairie dog towns and was surveyed.

Sources: USFWS, last updated September 19, 2013; and TPWD, last updated September 5, 2013.

\*T=threatened, E=endangered, PT=proposed threatened, and SC=species of concern

### Impacts of Alternative 1—No Action

#### Impacts Common to All Species

There would be no direct or indirect impacts to any special status species as currently none are known to occur within SAND. Existing habitat conditions would persist with continued retention and increase of hazardous fuels—shrub density, down and wood debris, ground cover. The continued woody encroachment of grasslands and increase of ground cover could change species composition and the structure of native vegetation and habitats. This would likely lead to a more homogenous habitat state and reduce habitat quality and key habitat requirements for native species, which is needed to maintain viable populations of special status species. The fuel buildup would likely lead to increased potential for uncharacteristic wildfires (e.g., high intensity, stand replacing wildfire) that are difficult to suppress. These stand replacing fires could cause moderate alterations in native habitat that could persist for decades, or longer. As discussed in the wildlife section, increased human presence and noise related to fire suppression tactics during wildfires could temporarily disturb species within or near the wildfire areas.

**Mountain Plover** - Under the No Action Alternative, suitable shortgrass prairie habitat (e.g., patches of bare soils and close to prairie dog colonies) could be encroached by sagebrush and taller grasses and forbs and the prairie dog colony could start to revert back to non-colony conditions (taller, denser vegetation structure) within several years, thus reducing suitable nesting habitat for Mountain Plovers. The risk for large, intense wildfires would increase from the continued retention and likely increase of hazardous fuels, which could cause short- to long-term, adverse impacts on Mountain Plover habitat. A large, intense wildfire could remove large tracts of vegetation that would degrade and/or destroy suitable nesting habitat until revegetation of short grasslands occurs. The increased risk for large, intense wildfires would also increase fire suppression efforts, which could prevent or reduce the potential benefits to Mountain Plover habitat—reducing shrub and general vegetation density, creating additional open areas and patches of bare ground. Impacts on Mountain Plover habitat due to potential habitat destruction would be minor to moderate, short- to long-term, adverse, and localized. Impacts could also be beneficial, long-term, and localized as opening dense sagebrush areas could increase open patches of bare ground and shortgrass prairie; depending on the severity of the wildfire.

The No Action Alternative would result in no effect to the Mountain Plover because no plovers occur within SAND.

**Burrowing Owl** - Under the No Action Alternative, suitable nesting sites (i.e., inactive prairie dog towns) could be degraded and become unsuitable as the vegetation becomes taller and denser around nest sites, and woody encroachment of grasslands continues. The continued retention and likely increase of hazardous fuels could result in intense wildfires that could remove perches and large tracts of grass cover, which are required elements for preferred nest sites (Green and Anthony 1989, Dechant et al. 2002). Intense wildfires could also affect their prey from habitat degradation or removal. Impacts on Burrowing Owl habitat due to potential nesting habitat destruction would be minor to moderate, short- to long-term, adverse, and localized. Severity of impacts would depend on the intensity and extent of the wildfire.

The No Action Alternative would have no impact on the Burrowing Owl because no individuals or populations have occurred within SAND since 2009.

**Black-tailed prairie dog** - Under the No Action Alternative, an inactive prairie dog colony could revert to pre-colony conditions—taller vegetation structure, denser vegetation, and woody encroachment could occur—, thus reducing suitable prairie dog habitat. The continued retention and likely increase of hazardous fuels could result in large, intense wildfires that could remove large tracts of vegetation damaging the root systems for re-growth and changing the physical property of soils (e.g., hydrophobic soil layers, low nutrient soils, sterilization), which could impede re-vegetation with grasses and forbs from a single season to a decade. This could reduce suitable foraging habitat for the black-tailed prairie dog. Impacts on black-tailed prairie dog habitat due to potential habitat destruction would be minor to moderate, short- to long-term, adverse, and localized. Overall, impacts would depend on the severity and extent of the wildfire.

The No Action Alternative would result in no effect to the black-tailed prairie dog because no populations occur within SAND.

**Cumulative Impacts** - Cumulative impacts to special status species from other activities from past agricultural practices and grazing, fire management activities planned by other agencies, wildfires originating from adjacent lands, and noise-related impacts from vehicles. The No Action Alternative would result in adverse, minor to moderate, long-term, and localized impacts due to increased potential for intense wildfires from continued retention and likely buildup of hazardous fuels.

**Conclusion** - Currently, no federally listed species are known to occur within SAND. Therefore, there would be no effect to the Piping Plover, Least Tern, Lesser prairie-chicken, or Arkansas darter. The No Action Alternative could result in adverse, minor to moderate, short- to long-term and localized impacts to suitable habitat for the Mountain Plover, Burrowing Owl, and black-tailed prairie dogs. Cumulative impacts to special status species habitat would be adverse, minor to moderate, long-term, and localized due to increased potential for intense wildfires from the continued retention and buildup of hazardous fuels.

**Impacts of Alternative 2 (Preferred) - Utilize Management Tools to Modify Fuels to Protect and Maintain Park Values**

Management responses to wildfires would be the same as Alternative 1, although operational responses would likely be less in scale and complexity over time, as planned fuel treatments on the landscape would eventually decrease the potential size and/or intensity of wildfires. Effects to the habitat of special status species would be different due to the impacts (beneficial and adverse) from the planned fuel management tools. The likelihood of intense or larger sized wildfires would decrease with time because prescribed burns and vegetation management actions would target areas for hazardous fuels reduction. The use of planned fuel management tools would increase the native vegetation health and vigor, having a positive impact on special status wildlife species adapted to those vegetation types (e.g., grasslands). Habitat quality for special status species would be enhanced over time by promoting a more open vegetation structure with healthy herbaceous ground cover, and reducing shrub density and brush cover. In addition, wildfires would have an increased potential to be lower intensity ground fires that are more beneficial for potential habitat of special status species. Thus, Alternative 2 would enhance the native fire-adapted vegetation and the habitat of special status species over time.

Neither direct nor indirect short-term or long-term effects from planned fuel treatments would be expected for any federally-listed species because SAND does not support any known populations or contain designated critical habitat. Potential impacts to suitable habitat for Burrowing Owl, Mountain Plover, and black-tailed prairie dog that exists within SAND is discussed below.

Prescribed fire would aid in maintaining and/or restoring native vegetation by rejuvenating soils with nutrients, creating openings, introducing fire under milder conditions with lower intensity burning, decreasing shrub density, and aiding in re-establishing more diverse native groundcover. Unlike wildfire, prescribed burns would be limited in size, so annual impacts to vegetation would be localized rather than widespread. This could result in more diverse plant composition for grassland habitat and better native habitat for black-tailed prairie dogs and associated species—Mountain Plovers and Burrowing Owls—by maintaining open, short stature vegetation on colonies and creating more open, sparsely vegetated patches. Recent studies have shown that prescribed fire helps to maintain prairie dog colonies by reducing woody vegetation, suppressing fire-intolerant plants and non-native and noxious plant species, and is conducive to prairie dog colony expansion (Koford

1958, Northcott et al 2008, Archuleta and Ford 2013). Mountain Plovers were found to respond positively to prescribed burns and expanded prairie dog colonies as selected nest sites shifted to areas with bare soil patches and prostrate vegetation created by prescribed fire from moderately grazed areas (Augustine and Derner 2012). This suggests a co-evolutionary relationship that fire and prairie dog grazing may have been important disturbances in the ecosystem. In Colorado, Mountain Plovers chose nesting sites on recent burned areas and occurred at similar densities as on prairie dog colonies (Augustine and Skagen 2014). Furthermore, prescribed burning could create nesting habitat where other disturbances are limited (i.e., prairie dog colonies; Augustine and Skagen 2014). Low intensity prescribed fires could also improve suitable habitat for Burrowing Owls by reducing vegetation around potential nest sites (Green and Anthony 1989). In addition, prescribed fires may increase insect abundance, a primary prey species of Burrowing Owls and Mountain Plovers. Overall, prescribed fire would have beneficial, long-term, localized impacts to special status species' habitat and associated prey habitat.

Non-fire fuel treatments includes manual and mechanical thinning, limited herbicide and grazing of shrubs and ground vegetation to reduce hazardous fuel accumulations, reduce the cover of sand sagebrush and increasing the occurrence and diversity of native short grass prairie species such as blue grama, and reducing the spread/occurrence of exotic plant species. Reducing sand sagebrush encroachment on grasslands and creating more open spaces could improve suitable habitat for Mountain Plovers and Burrowing Owls and their prey habitat. Reducing hazardous fuel accumulations would likely lead to low intensity ground fires that would help to maintain healthy grassland and aquatic habitats and enhance their integrity for future Burrowing Owl, Mountain Plover, black-tailed prairie dog, and Arkansas darter populations.

Neither direct nor indirect short-term or long-term effects of prescribed burns, manual and mechanical fuel reduction, targeted herbicide, or biological treatments would be expected to impact the five federally listed species for SAND because SAND does not support any known populations or contain designated critical habitat. Thus, the Preferred Alternative would have no effect to the Piping Plover, Least Tern, Lesser prairie-chicken, or Arkansas darter because no populations occur within SAND.

**Cumulative Impacts** - Cumulative impacts to special status species resources from other activities include loss of habitat from agricultural and grazing development in surrounding lands, fire management activities planned by other agencies, wildfires originating from adjacent lands, and noise-related impacts from vehicles. The Preferred Alternative would result in minor to moderate, long-term, beneficial, localized cumulative impacts to special status species habitats through improved and restored habitat from simulating the return of a natural fire regime, and reduced potential for uncharacteristic wildfires. The Preferred Alternative would improve and maintain existing habitats suitable for special status species.

**Conclusion** - The Preferred Alternative would have no effect to the Piping Plover, Least Tern, Lesser prairie-chicken, or Arkansas darter because no populations occur within SAND. Overall, the Preferred Alternative would have beneficial, minor to moderate, long-term, localized impacts to suitable habitat for the Burrowing Owl, Mountain Plover, and black-tailed prairie dog from prescribed fires and associated fuel reduction activities. Cumulative impacts would be minor to moderate, long-term, beneficial, and localized.

## Cultural Resources

### Archaeological Resources

#### Affected Environment

SAND preserves a rich, unique cultural record of historic sites including the site of the Sand Creek Massacre of 1864. Nine surveys have been completed on SAND managed lands for the presence/absence of cultural resources. SAND is listed on the National Register of Historic Places with ethnic heritage (American Indian), and military and archeology (Historic-Aboriginal and military) as areas of significance. Over 400 historic artifacts related to both military use and American Indian occupation have been recorded. Five historic archaeological sites have been documented: the massacre site, the Chivington-Brandon canal segment, the Ray Canal segment, the SS Ranch Line Camp, and the Dawson Ranch complex. The massacre site is the only site that is eligible for inclusion on the National Register of Historic Places.

SAND is pursuing a programmatic agreement with the Colorado State Historic Preservation Office (CO SHPO) to conduct Section 106 consultation for all treatments conducted by the SAND fire management program. The programmatic agreement will be specific to fire management actions throughout SAND and will help to streamline the Section 106 process for fire management activities.

The Sand Creek Massacre National Historic Site has implemented a Plan for Action for planned archaeological investigations and inadvertent discoveries of human remains, associated funerary objects, objects of cultural patrimony and sacred objects, as defined by NAGPRA, within the park boundaries. The Plan was developed in accordance with provisions of NAGPRA, its implementing regulations, and consultation with Northern Arapaho Tribe, the Northern Cheyenne Tribe and the southern Cheyenne and Arapaho tribes. In the event of planned archaeological investigations or inadvertent discoveries of human remains and/or associated funerary objects, objects of cultural patrimony and sacred objects, the park will follow the procedures outlined in the Plan of Action in consultation with designated representatives of the Northern Arapaho Tribe, the Northern Cheyenne Tribe, and the southern Cheyenne and Arapaho Tribes.

#### Impacts of Alternative 1—No Action

Hazardous fuel loads would continue to increase within and adjacent to archaeological sites. This could lead to increased potential for larger, intense wildfires that could have extensive impacts on archeological sites. Higher intensity wildfires could cause discoloration of surface artifacts, burning perishable materials, checkering or cracking of glass and ceramic artifacts, spalling of stone, and melting of metals (Ryan et al. 2012). Archeomagnetic dates and pollen counts could also be altered from a severe, high intensity wildfire. Although wildfire has likely impacted SAND in the past, areas with fuel loads outside the range of historic conditions. Impacts to archaeological sites would be adverse, long-term, minor, and localized due to continued hazardous fuel build up and the increased risk for severe wildfires. Overall impacts would depend on the timing, location, severity, and extent of the wildfire.

Wildfire suppression could result in long-term, adverse, localized impacts due to displaced surface materials; exposure of materials due to ground disturbance associated with the activities; or disturbance of materials immediately below the surface by vehicle use due to earth moving or



compaction. Aerial use of retardant could discolor surface artifacts. Mitigation measures (see mitigation measures section) could reduce or eliminate most impacts from wildfire suppression actions, but the need and use of suppression control actions would increase with increased potential for more intense wildfires. Indirect adverse impacts to archeological sites could occur from increased rodent activity as they like previously disturbed and loose soil and soil disturbance from wildfire and associated suppression activities.

**Cumulative Impacts** - Cumulative impacts to archeological sites would occur from No Action Alternative and other activities including past development, park management activities, past grazing, natural erosion, fire management activities planned by other agencies, and wildfires originating from adjacent lands. The No Action Alternative in combination with the past, present, foreseeable future actions would result in adverse, long-term, minor, localized impacts. Impacts would be due to continued increase of shrub density and ground fuels leading to increased potential for future severe wildfires, and lack of creation/maintenance of defensible space.

**Conclusion** - Impacts to archeological sites would be adverse, long-term, minor, and localized. Impacts would be due to the continued retention of hazardous fuels and increased potential for more severe wildfires. Cumulative impacts would be adverse, long-term, minor to moderate, and localized.

### **Impacts of Alternative 2 (Preferred) - Utilize Management Tools to Modify Fuels to Protect and Maintain Park Values**

Management response to wildfires would be the same as Alternative 1, although operational responses would likely be less in scale and complexity over time, as planned vegetation management actions on the landscape would eventually decrease the size and/or intensity of wildfires to archeological sites would be the same as the No Action Alternative. Using proactive fuel management tools—prescribed fire, mechanical and manual fuel reduction, and targeted herbicide—would increase the ability and efficiency to reduce hazardous fuels (shrub density, woody encroachment of grasslands, ground fuels), to maintain/create defensible space and fuelbreaks, and to remove existing noxious weeds. This would increase the potential over time for wildfires to be of lower intensity and shorter flame lengths with lower rates of spread, which makes wildfires easier to suppress/manage; this contributes to reducing the risk of damage to archeological sites. Impacts to archeological sites under the Preferred Alternative would be beneficial, minor to moderate, long-term, and localized due to reducing the potential for future severe wildfires as hazardous fuels decrease and defensible space is maintained/created.

Prescribed fire would allow for advance, carefully considered and planned clearance and mitigation activities at cultural resource sites before engaging with fire activities. Known archaeological sites and historic structures could be excluded from prescribed burn units or local site-specific related mitigation measures could be implemented to protect the cultural resources. Prescribed burning would reduce the probability of severe wildfires, thus reducing the overall potential for damage to archaeological sites and historic structures.

Standard management strategies would be adopted to preclude or minimize impacts (see mitigation section) before or during prescribed fire activities. Should new archaeological resources be identified during prescribed fire related activities, all work would cease in the immediate vicinity of the discovery until the resource could be identified and documented and an appropriate mitigation strategy developed in consultation with the NPS cultural specialists and/or the State Historic

Preservation Officer. Any known archaeological resources would be marked with special flagging and mitigation measures would be taken to protect identified resources from prescribed fire activities. Based upon current information, the Preferred Action Alternative impacts to archeological sites would be beneficial, minor to moderate, long-term, and site-specific by helping to reduce vegetative hazardous fuels and maintain defensible space/fuelbreaks, thus increasing the potential for wildfires to be lower intensity, surface fires.

Manual and mechanical hazardous fuel treatments could result in direct, adverse, long-term, localized impacts due to displaced surface materials and/or augmenting looting of archaeological resources. Mechanical related ground disturbance could expose, disturb, or damage materials immediately below the surface with vehicle use or compaction. Indirect impacts could occur if mechanical hazardous fuel treatments changed the context in which the archeological resource is found, leaving it vulnerable to impacts, such as erosion. With avoidance of known archeological resources and implementation of mitigation actions, the direct and indirect adverse impacts would be minor, localized, and long-term.

Targeted herbicide application applied by hand to specific basal or foliar plant areas would minimize chances for overspray and migration into the soil. In addition, targeted herbicide application would use herbicides that do not have short- or long-term residual implications to soils. In addition to the mitigation measures, limited use as a follow-up treatment to selected fuelbreaks and defensible space treatments would help to minimize impacts to archaeological sites and historic structures by minimizing vegetation cutting and ground disturbance. Spot treatments to existing invasive (non-native) plants that may be found after wildfires or in disturbed areas would also be a relatively minor use. Thus, impacts would be negligible to archaeological sites.

Biological agents are not expected to impact archaeological resources as Animal and Plant Health Inspection Services permits use of biological agents following testing to ensure that they are host-specific and do not affect non-target plant species, including culturally significant native plants. Biological treatments using limited grazing could damage surface artifacts or disrupt surface and shallow subsurface cultural materials. Pre-planning site-specific investigations and avoidance of livestock use in sensitive areas would decrease this possibility.

**Cumulative Impacts** - Cumulative impacts to archeological sites would occur from the Preferred Alternative and other activities including past development, park management activities, past grazing, natural erosion, fire management activities planned by other agencies, and wildfires originating from adjacent lands. The Preferred Alternative in combination with the past, present, and foreseeable future actions would result in beneficial, long-term, moderate, localized impacts due to decreased potential for larger, intense wildfires.

**Conclusion** - The Preferred Alternative would result in adverse, minor, long-term impacts to archeological sites as well as beneficial, minor to moderate, long-term, and site-specific due to reducing the potential for larger, intense wildfires from removing hazardous fuels and maintaining/creating defensible space and fuelbreaks. Cumulative impacts would be beneficial, long-term, moderate, localized impacts due to decreased potential for larger, more intense wildfires.

## Cultural Landscapes

### Affected Environment

Cultural landscapes are “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 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 (DO-28).” SAND encompasses a portion of the Sand Creek Massacre site (Site 5SW28), which is listed in the National Register of Historic Places (Site 5SW28). SAND is considered one cultural landscape with the interpretation focused on the 1864 period when the massacre occurred.

A formal cultural landscape inventory of SAND has not been completed; however, a cultural landscape specialist with NPS has visited the site and provided cultural landscape treatment recommendations (NPS 2004). Recommendations include, but are not limited to removing most of the Dawson Ranch complex; addressing erosion control along the Big Sandy Creek; and determining the likely landscape conditions at the time of the massacre (NPS 2004).

The boundary of SAND encompasses the core area associated with the Sand Creek Massacre. The cultural landscape includes the location of the Indian Village; points from which the Colorado regiments spotted the encampment; the location of Indian pony herds; the general path of battalion advancements, skirmishes, and other associated action; the military bivouac area; locations along the stream banks where Cheyenne dug pits to fight and hide; and locations from which battery salvos were launched into the Indian camp and pits along the stream bank (NPS 2000).

A special resource study was conducted to determine the location of the Sand Creek Massacre and identified primary features, both cultural and natural, of the massacre site. Contributing elements to the cultural landscape at SAND include the following (NPS 2000):

- The area where Indian lodgepole trail crossed Big Sandy Creek. The site of the Sand Creek Massacre was an established Indian encampment area, and was near the point where Indian lodgepole and Big Sandy Creek crossed. The U.S. Army, on its journey to the massacre site, also used this trail.
- The area Colonel Chivington and his U.S. Army troops used to view the Indian village and began their initial approach.
- The Big Sandy Creek streambed area used to deposit the Army troops excess baggage and equipment before reaching the Indian village.
- The areas where the Indian Cheyenne and Arapaho pony herds were gathered prior to attack.
- The village site of the Cheyenne and Arapaho people.
- The sandpits dug by the Cheyenne and Arapaho that survived the initial attack in the banks of Big Sandy Creek to shelter themselves.

- The Indian flight area, which generally extended north of the sandpits area, was the site of the immediate area of flight. In the days following the massacre, Indian survivors continued traveling northeast to the Cheyenne camps along the Smoky Hill River, which is marked by a monument near present-day St. Francis, Kansas.
- The natural spring likely used for drinking water by the Indian village.

In addition, the riparian cottonwood vegetation community was and remains a critical element. Non-contributing features to the Sand Creek Massacre site include the buildings and structures of the former Dawson Ranch complex; the Chivington Canal; the existing 1950s stone monument; and NPS infrastructure—utility poles, fence lines, existing dirt roads.

The NPS continues to study and plan how to restore/develop and interpret the cultural landscapes at SAND. The cultural landscape has been altered by the absence of grazing that was prevalent during the historic period and decades of fire suppression, resulting in increased vegetation growth, encroaching shrublands, and increased dead and down woody debris. All of these factors have changed the prehistoric/historic landscapes and presently reduce the integrity of the cultural landscape. Direction for cultural landscapes management comes from an approved Cultural Landscape Report (CLR), and if there is no CLR as is this case for SAND, guidance comes from interim primary treatment decisions made by the park in coordination with the CO SHPO.

### **Impacts of Alternative 1—No Action**

Under the No Action Alternative, hazardous fuels would continue to be retained and would likely increase within the cultural landscape. The accumulation of hazardous fuels could lead to increased potential for larger, intense wildfires with more potential for stand replacing and widespread vegetation loss and soil compaction from ground disturbances of fire suppression activities (e.g., fire control lines). These intense wildfires could cause the landscape to completely change around SAND cultural sites, leading to the cultural landscape not being representative of the time period of cultural significance, the 1864 Sand Creek Massacre.

Wildfires or damage from suppression activities could remove important landscape elements, alter the Big Sandy Creek streambed, and/or create large amounts of burned and scorched vegetation, and non-vegetated areas from fire lines and or intense burning. Intense wildfires could cause soils to become sterile and hydrophobic, preventing recovery of historic, native vegetation. These potential impacts would diminish the visual integrity of the cultural landscape and could make the adjacent infrastructure (roads, power lines) more visible within SAND, further diminishing the visual integrity. Effects on associated archaeological sites would be the same as discussed above under the analysis of the No Action Alternative on Archaeological Sites. The No Action Alternative, wildfire suppression only, could also lead to reduced integrity of the cultural landscape, as shrubs continue to encroach the landscape. Groundcover and sand sagebrush density has increased compared to the historic period—1864—that represents the cultural significance of the Sand Creek Massacre site. Wildfire suppression fire lines are often straight lines on the landscape and could dissect the cultural landscape by creating unnatural lines between burned and unburned areas. These impacts would be indirect, adverse, long-term, minor, and localized due to increased potential for larger, more severe wildfires from continued retention and increase of hazardous fuels within the cultural landscape. The

intensity of both direct and indirect impacts would depend on the intensity, duration, and location of the fire, fuel loads, and the mitigation efforts that could be implemented.

**Cumulative Impacts** - Cumulative impacts to cultural landscapes would occur from the No Action Alternative plus other activities including past development, park management activities, fire management activities planned by other agencies, and wildfires originating from adjacent lands. The No Action Alternative in combination with the past, present, and foreseeable future actions would result in adverse, minor, long-term cumulative impacts due to increased risk for larger, more intense wildfires and associated vegetation loss and soil or ground disturbance.

**Conclusion** - The No Action Alternative would have direct and indirect, adverse, short- to long-term, minor, and localized impacts. Impacts would be due to increased potential for larger, intense wildfires from continued retention and likely increase of hazardous fuels within the cultural landscape. Cumulative impacts would be adverse, minor, long-term, and localized.

**Impacts of Alternative 2 (Preferred) - Utilize Management Tools to Modify Fuels to Protect and Maintain Park Values**

Management responses to wildfires would be the same as Alternative 1, although operational responses would likely be less in scale and complexity over time, as planned fuels management actions on the landscape would eventually decrease the size and/or intensity of fires. Effects to the cultural landscape would be different as impacts would be both beneficial and adverse from the proposed fuel management tools. Using the proposed fuel management tools—prescribed fire, mechanical and manual fuel reduction, targeted herbicide, limited biological treatments—would increase the ability and efficiency to reduce hazardous fuels (shrub density, dead and down fuels, woody encroachment in grasslands), maintaining/creating defensible space and fuelbreaks, and controlling noxious weeds. The use of these tools would be designed to complement the desired cultural landscape by utilizing cultural landscape objectives in addition to fire management objectives. The proposed fuel management tools would increase the potential for lower intensity wildfires that would more likely be ground fires, thus reducing potential risk of damage to the cultural landscape. Lower intensity ground fires may have been ignited by native peoples who utilized fire for multiple reasons (Pyne 2001) and are likely more compatible with the cultural landscape. These lower intensity ground fires may help maintain a more open cultural landscape and increase abundance of native plants found in the area during the historic period by reducing competition from invasive plants. Impacts to the cultural landscape under the Preferred Alternative would be beneficial, minor to moderate, long-term, and localized due to reducing the potential for future severe wildfires as hazardous fuels decrease and defensible space is maintained/created.

Prescribed fire would allow for advance planning, administrative clearance activities, and thus planned avoidance and mitigation activities in the cultural landscape. Prescribed burning would be used to reduce shrub density, dead and down fuels, and woody vegetation encroachment. Prescribed burning would be planned with NPS cultural experts to enhance protection of cultural resources important to the cultural landscape (e.g., maintaining a more open landscape which historic grazing practices and firewood gathering helped to maintain). The more open, but vegetated landscape would help to improve and create defensible space around historic structures. Reducing the probability of severe wildfires would enhance the protection of the cultural landscape. Known archaeological resources would be marked with special flagging to prevent accidental damage before fire management activities, and mitigation measures would be taken to protect identified resources from

prescribed fires. Based upon current information, the Preferred Action Alternative impacts would be beneficial, minor to moderate, long-term, and site-specific by helping to maintain the cultural landscape.

Manual and mechanical hazardous fuel reduction treatments would be planned with NPS cultural experts to plan and develop defensible space and fuel break clearing compatible with the cultural landscape, so that hazardous fuel reduction work will help to enhance/maintain cultural landscapes. Because the hazardous fuel reduction treatments would be planned, the impacts to cultural landscapes would be negligible to minor, and adverse on cultural landscape vegetation characteristics around archeological sites. These effects could consist of minor trimming or vegetation removal to more intense thinning/removal of shrubs to reduce dense stands around archeological sites in an effort to create and/or maintain defensible space.

Targeted herbicide application applied by hand to specific basal or foliar plant areas would minimize chances for overspray and migration into the soil. In addition, targeted herbicide application would use herbicides that do not have short- or long-term residual implications to soils. In addition to the mitigation measures, limiting the use as a follow-up treatment to maintain and improve longevity of the defensible space treatments would help to minimize additional ground disturbing impacts to the cultural landscape. Thus, impacts would be negligible to cultural landscapes.

Impacts to cultural landscapes from the use of biological treatments would be the same as discussed under the Archaeological Site Section, Alternative 2. Biological agents are not anticipated to impact contributing elements of the cultural landscape. Use of limited grazing would avoid sensitive areas decreasing the potential to damage contributing archaeological sites. Limited grazing in the cottonwood gallery to reduce dead and downed fuel as well as reduce fine fuels would have a beneficial, long-term, localized impact by reducing the potential spread and intensity of future wildfires for the witness trees that were present during the 1864 massacre.

**Cumulative Impacts** - Cumulative impacts to cultural landscapes would occur from the Preferred Alternative plus other activities including past development, park management activities, fire management activities planned by other agencies, and wildfires originating from adjacent lands. The Preferred Alternative in combination with the past, present, and foreseeable future actions would result in beneficial, moderate, long-term, localized impacts due to decreased hazardous fuels (shrub density and woody encroachment of grasslands) throughout the cultural landscape, which reduces the potential for larger, more intense wildfires.

**Conclusion** - Overall, the Preferred Alternative would have beneficial, minor to moderate, long-term, and site-specific by helping to maintain the cultural landscape. Planned fuel reduction projects or emergency management response to unplanned wildland fire could have adverse, long-term, minor, and localized impacts due to inadvertent damage to contributing elements of the cultural landscape. Negligible to minor adverse effects on vegetation characteristics could result from minor trimming or vegetation removal to more intense thinning/removal of shrubs to reduce dense stands around archaeological sites. Cumulative impacts would be beneficial, moderate, long-term, and localized.

## Ethnographic Resources

### Affected Environment

Ethnographic resources are traditional sites, structures, objects, landscapes, natural resources, and other material features associated with contemporary cultural systems or ways of life. SAND is sacred to the Cheyenne and Arapaho Tribes as it is where their ancestors hunted, gathered, held ceremonies, and camped. The massacre site is within the original Cheyenne and Arapaho Reservation. SAND also contains ceremonial sites. Time, elements, and people have changed the site's natural features, but the intangible spiritual qualities of the landscape are important to the practice of traditional Cheyenne and Arapaho spirituality, subsistence, and lifeways.

There are three primary ethnographic features of the Sand Creek Massacre site that the Tribes have identified. A formal ethnographic resources inventory has not been conducted, but the following are features within the Sand Creek Massacre site that have been identified by the tribes as being important to their continuing lifeways.

***Natural Spring***—A natural spring situated within the current boundaries of SAND. The probable location of this spring has been identified through oral histories and consultations with the tribes, an overflight of the park unit in 1997, and military maps and accounts. Having a natural spring near the encampment/village would have been an essential component of survival in this area. Big Sandy Creek itself would have yielded some, but relatively little water, which was probably used for purposes other than drinking. Further, participant testimony at the time of the massacre indicated that the streambed was practically dry; therefore, the spring would have been a steady and reliable fresh source for drinking water. It was undoubtedly the primary reason for the site's traditional use, and it was probably even more crucial given the particular time of year for the encampment in the winter of 1864 (NPS 2000).

***Encampment/Village Site***—This is the encampment or village site of the Cheyenne and Arapaho prior to and during the Sand Creek Massacre. Virtually all sources that consider the position of the village mention that it stood on the north (east) side of Big Sandy Creek, within approximately 50 to 100 yards of the creek. Estimates on the linear extent of the principal village, which contained approximately 100 lodges of the various bands, indicate only that it occupied an area of about one-quarter mile to one-half mile or more in length. The width of the camp is not known. Separated by one-half to three-quarters of a mile downstream from the main camp stood a small group of perhaps as many as eight lodges said to belong to the Arapahos. The approximate location of the original village site at SAND has been conjectured from tribal oral histories and consultation along with military maps and accounts (NPS 2000).

***Big Sandy Creek associated Cottonwood trees, and the Sandpits***—While the entire massacre site is considered sacred, the Big Sandy Creek and the area where defensive “sandpits” were dug into the banks are of extreme cultural sensitivity due to the magnitude of the bloodshed that occurred in 1864 and the continued spiritual presence there today. Although not present at the time of the massacre, the cottonwood gallery that lines the creek bed also holds significant cultural value due in part to oral histories about the survival of some tribal members during the massacre by hiding in hollow logs. Additionally, recent tree ring studies indicate that some of the oldest living trees present today may have been seedlings at the time of the massacre (NPS2000).

Numerous cooperative agreements have been established with the tribes to protect ethnographic resources and to promote continued consultation and partnership. These agreements generally formalize tribal participation in planning for the National Historic Site. These cooperative agreements include:

- Cooperative Agreement between the National Park Service and the Cheyenne and Arapaho Tribes of Oklahoma to be involved in the formulation of general management plans and educational programs for the national historic site.
- Cooperative Agreement between the National Park Service and the Northern Cheyenne Tribe to be involved in the formulation of general management plans and educational programs for the national historic site.
- Cooperative Agreement between the National Park Service and the Northern Arapaho Tribe to be involved in the formulation of general management plans and educational programs for the national historic site.

The ethnographic resources listed above are a part of the cultural landscape at SAND, and protection of this landscape is one of the reasons for establishing the park unit.

### **Impacts of Alternative 1—No Action**

Under the No Action Alternative, hazardous fuels would be retained and would likely continue to accumulate within and around archaeological sites and ethnographic sites that are all considered to be ethnographic resources. Impacts to archaeological sites are as described in the archaeological site analysis of alternatives section. Wildfire suppression actions such as fire control line construction and water or retardant drops could impact plants traditionally used by American Indians. Since there is often sensitivity to the location of these ethnographic sites, and some may be undocumented, there may not be enough advance notice to avoid impacting these sites by firefighting resources during emergency suppression actions. Individual plants or specific locations of spiritual significance could also be impacted by wildfire, equipment and crew staging, and post-burn mop-up and rehabilitation actions. Specific locations/archaeological sites that hold spiritual significance could be impacted by alterations to the viewshed or temporary closure from a wildfire event occurring during ceremonial events or in nearby areas.

Various plants and trees are used traditionally by the affiliated American Indian tribes. Wildfire impacts that occur on the landscape level may also impact vegetation traditionally used in ceremonies, thus effects on cultural landscapes and contributing elements would be the same as discussed above under the analyses of the No Action Alternative on Archaeological Sites and Cultural Landscapes. Impacts to ethnographic resources would be indirect, short- to long-term, minor, adverse, localized due to increased potential for larger, intense wildfires from continued retention and increase of hazardous fuels within and adjacent to archeological sites, ethnographic sites, and the cultural landscape. The intensity of impacts would depend on the intensity, duration, and location of the fire, and the mitigation efforts that could be implemented.

**Cumulative Impacts** - Cumulative impacts to ethnographic resources would occur from the No Action Alternative plus other activities including continued maintenance activities in SAND, fire



management activities planned by other agencies, and wildfires originating from adjacent lands. The No Action Alternative would result in adverse, minor, long-term cumulative impacts due to increased risk for larger, intense wildfires and associated vegetation loss and soil or ground disturbance.

**Conclusion** - The No Action Alternative impacts would be indirect, short- to long-term, minor, adverse, localized due to increased potential for larger, intense wildfires from continued retention and likely increase of hazardous fuels within and adjacent to archeological sites, and native plants used in traditional ceremonies. Cumulative impacts would be adverse, minor, long-term, and localized.

### **Impacts of Alternative 2 (Preferred) - Utilize Management Tools to Modify Fuels to Protect and Maintain Park Values**

Management responses to wildfires would be the same as Alternative 1, although operational responses would likely be less in scale and complexity over time, as planned fuel management actions on the landscape would eventually decrease the size and/or intensity of fires. Effects to ethnographic resources would be different due to the impacts (beneficial and adverse) from the proposed fuel management tools. Using fuel management tools—prescribed burning, mechanical and manual fuel reduction, targeted herbicide, and biological treatments—would increase the ability and efficiency to manage and protect ethnographic resources by reducing hazardous fuels (general ground cover and shrub density, dead and down woody debris), maintaining/creating defensible space and fuelbreaks, and controlling existing noxious weeds. This would increase the potential for wildfires to be less severe and near the ground surface, which are easier to suppress/manage and of lower intensity, thus reducing the potential risk of damage to ethnographic resources (e.g., native plants, archeological sites, ethnographic sites). These lower intensity ground fires may help to maintain more open landscapes representative of the 1864 historic period, increase native plants significant to ethnographic resources by reducing competition from invasive plants, and to protect and maintain the cottonwood trees along the Big Sandy Creek that were present during the 1864 Indian encampments and the massacre. Impacts to archeological sites and cultural landscapes considered ethnographic resources from planned fuel management tools are as described above in archaeological sites and cultural landscapes sections. Because the fuel management actions are planned in advance, the NPS would be able to consult with affiliated tribes and peoples. Appropriate protective mitigation measures would be implemented in consultation with tribes to avoid damage to ethnographic sites and locations. Impacts to ethnographic resources under the Preferred Alternative would be beneficial, minor to moderate, long-term, and localized due to reducing the potential for future severe wildfires as hazardous fuels decrease and defensible space is maintained/created. In addition, consultation with tribes before fuel management projects could provide protection that would not likely be able to occur under Alternative 1.

**Cumulative Impacts** - Cumulative impacts to ethnographic resources would occur from the Action Alternative plus other activities including continued maintenance activities in SAND, fire management activities planned by other agencies, and wildfires originating from adjacent lands. These actions combined with the Preferred Alternative would result in beneficial, moderate, long-term, site-specific impacts due to decreased potential for larger, intense wildfires as shrub density, encroaching woody vegetation and dead and downed woody debris is reduced.

**Conclusion** - Impacts to ethnographic resources under the Preferred Alternative would be adverse, minor, long-term impacts as well as beneficial, minor to moderate, long-term, and localized due to reducing the potential for future severe wildfires as hazardous fuels decrease and defensible space is maintained/created in consultation with tribal authorities. Cumulative impacts to ethnographic resources would be beneficial, moderate, long-term, site-specific impacts.

## Human Resources

### Visitor Use and Experience

#### Affected Environment

Total visitation to SAND during the period of 2010 to 2012 was approximately 12,000 with about 4,300 visitors in 2012 (NPS 2013c). Peak visitation months are May to October (NPS 2013c), but the park is open weekdays year-round and on weekends from April 1 through November 30. Common visitor activities include sightseeing, hiking along self-guided bluffs trail to view the High Plains landscape, wildlife viewing, visiting the repatriation burial area, and ranger-led tours to learn about the massacre.

#### Impacts of Alternative 1—No Action

Shrub density, ladder fuels, and dead and downed woody debris would be retained and would likely continue to increase as a hazardous fuel. This could increase the potential for larger, intense wildfires that are difficult to suppress/manage. Larger and intense wildfires could require more frequent and longer public use closures and restrictions. Increased more intense suppression efforts for large and/or intense wildfires and associated local smoke emissions would reduce access, all of which would negatively impact the experience of visitors using SAND and surrounding lands. Depending on the size and severity of the wildfire, large tracts of vegetation could be removed changing the natural environment, cultural landscape, and scenery, reducing the quality of the visitor experience. Lack of vegetation management would allow historic grasslands and landscapes to be invaded by sand sage further altering the vegetation conditions that developed during historic period of cultural significance that SAND was set aside to protect and interpret and visitors come to see. Impacts to visitor use and experience would be adverse, minor to moderate, short- to long-term, and localized.

**Cumulative Impacts** - Cumulative impacts to visitor use and experience from other activities include fire management activities planned by other agencies, wildfires occurring on adjacent lands, noise-related impacts from vehicles, and maintenance activities (e.g., road, facility) within SAND. The No Action Alternative in combination with the past, present, and reasonably foreseeable future actions would result in adverse, short- to long-term, minor to moderate, cumulative impacts to visitor experience.

**Conclusion** - Impacts to visitor use would be adverse, minor to moderate, short- to long-term and localized due to public use closures. Public closures would result from increased potential for larger and intense wildfires, longer duration fire control activities; increased potential for stand replacing wildfires that could change shrubland and cottonwood gallery to grasslands and remove large tracts of vegetation. Cumulative impacts would be adverse, short- to long-term, minor to moderate, cumulative impacts to visitor experience.

### **Impacts of Alternative 2 (Preferred) - Utilize Management Tools to Modify Fuels to Protect and Maintain Park Values**

Management responses to wildfires would be the same as Alternative 1, although operational responses would likely be less in scale and complexity over time, as planned fuel management actions on the landscape would eventually decrease the size and/or intensity of fires. Effects to visitor use and experience would be different due to the impacts (beneficial and adverse) from the planned fuel management tools. The likelihood of intense or larger wildfires would decrease with time as prescribed burns and vegetation management actions were completed. As the likelihood of larger, intense wildfires decreased over time, the chance of visitation disruptions by wildfire and related suppression activities would decrease.

The use of planned fuel management tools would increase the ability to reduce shrub and ground cover density; maintain/create defensible space and fuelbreaks around structures, cultural sites, and SAND boundaries; and reintroduce fire as a natural ecological process in SAND natural areas. This would facilitate the success of ecological restoration efforts to fire-adapted ecosystems and other unique habitats by opening the closed canopy and ground cover vegetation layers. Successful ecological restoration would increase the probability for lower intensity ground fires in place of stand replacing intense wildfires that are easier to manage/suppress and increase growth and germination of native herbaceous plant communities (grasses, forbs, and wildflowers), and habitat diversity.

Over time, vegetation treatments would restore vegetation conditions to be like those during the historic period of cultural significance and as the historic and prehistoric people saw it, enhancing the visitor experience. The perpetuation of native vegetation communities and native wildlife would enhance both cultural and natural landscapes, thus enhancing the visitor experience.

There would be temporary visitor use restrictions in specific sections of SAND to assure that no visitors are near where fuel management actions are actively being applied (i.e., prescribed burns, mechanical treatments, herbicide application, grazing). In the short-term, such restrictions may negatively impact the visitor experience of those people who are prevented from accessing an area. Noise associated with mechanical tools such as chainsaws or masticators could temporarily disrupt the visitor experience.

Prescribed fire could also produce smoke altering or obstructing the scenic views, odors, and the presence of limited blackened areas could affect some visitor experiences. Many of the areas where fuel treatments are planned receive little or no visitor use, or visitors only see the vegetation treatment areas from a distance (highways, viewpoints). Thus, these adverse impacts would be localized, short-term, and negligible to minor. The presence of fire, smoke, and blackened areas may present an opportunity for education and interpretation of natural values and processes or restoration of cultural landscapes, which may provide a minor, long-term, beneficial impact. Overall, this alternative would have direct, short-term, negligible to minor, adverse impacts in the immediate area of treatment during the treatment period and is expected to have indirect, minor to moderate, beneficial, long-term, localized impacts. Vegetation management activities would minimize the potential for larger, more severe wildfires as the amount of areas is restored and fuel hazard reduction increases (i.e., dense shrub, ground cover).

**Cumulative Impacts** - Cumulative impacts to visitor use and experience resources from other activities include fire management activities planned by other agencies, wildfires occurring on

adjacent lands, noise-related impacts from vehicles, and maintenance activities (e.g., road, facility work) within SAND. The Preferred Alternative in combination with the past, present, and reasonably foreseeable future actions would result in short-term, adverse, and minor cumulative impacts to visitor use and experience as well as beneficial, long-term, minor cumulative impacts to visitor use and experience.

**Conclusion** - Impacts to visitor use and experience would be adverse, short-term, negligible to minor, localized in the immediate area of treatment during the treatment period. As well as indirect, minor to moderate, beneficial, long-term, localized impacts from fuel management activities decreasing the potential for larger, intense wildfires and improving native herbaceous plant communities, and habitat diversity, which would provide more desirable scenery. Cumulative impacts would be short-term, adverse, and minor as well as beneficial, long-term, minor cumulative impacts to visitor use and experience.

## **Human Health and Safety**

### **Affected Environment**

The health and safety of visitors, employees, and surrounding residents and landowners of the SAND area is a primary objective of the NPS. Fire management activities and wildfires can pose unplanned, unforeseen risks to the public and employees, but firefighters and park staff face direct risks when engaged in suppression related activities. Smoke on roads in and adjacent to the park is a visibility concern for traffic. In addition, smoke emissions from prescribed burns or wildfires can be an air quality issue to surrounding residents and the visiting public. The flaming front of a fire can put members of the visiting public, residents, park employees, and firefighters at risk. Accidents and unintended consequences can be more prevalent in chaotic, emergency wildfire situations. For this reason, risk areas from wildfires or prescribed fires will be closed to the public; mitigations will be implemented as soon as recognized and practical, such as media information issuances, closures and/or restrictions, and traffic control for smoke visibility.

Wildfires represent a health and safety concern for local communities and visitors to SAND. In 1995, a lightning caused fire burned about 60 acres of the wetland and associated riparian zone north of the Arkansas River. In March 2002, the Old Trail wildfire in Bent's Old Fort National Historic Site approximately 58 miles southwest of SAND consumed 500 acres of the 800-acre park unit. The Old Trail wildfire destroyed boundary fences and gates, a domestic water supply, small structures, stands of mature cottonwoods, and impacted archeological sites.

The past and current fire management program in SAND has worked to mitigate the long-term threat to the safety of visitors, employees, and surrounding landowners. These actions include defensible space work around the immediate SAND buildings, fence boundaries, and interior access roads, reducing hazardous fuels, and additional manual and mechanical fuel reduction treatments to remove the dead and downed cottonwoods. These activities would continue under Alternative 2, but would be discontinued under Alternative 1.

### **Impacts of Alternative 1—No Action**

Under the No Action Alternative, SAND hazardous fuel loads would continue to accumulate and the risk of larger and intense wildfires would stay high and continue to increase with time. No new defensible space around cultural sites, boundary fences, or structures would be created, and no

significant fuelbreaks would be developed or maintained. Direct impacts to firefighter health and safety include increased or more intense exposure to heat, smoke inhalation, and injuries from the use of numerous fire-fighting crews and resources for fire control activities on larger, severe wildfires. In addition, the risk of damage to properties outside SAND could be higher as larger, severe wildfires that are difficult to control and the safety of the adjacent residents would be at a higher risk. Larger, harder to control wildfires could result in damage or loss to buildings (e.g., facilities), injury or loss of life if area residents were unable or refused to leave in advance of a high intensity wildfire, exposure to heavy smoke, and loss of quantity and quality of adjacent vegetated areas. High volumes of smoke or burning vegetation adjacent to roadways during wildfire incidents could affect or close nearby travel corridors including park roads and adjacent county roads. Area recreation activities could be curtailed due to closures, including sightseeing, hiking, birding, and visiting the repatriation burial area. Overall, these effects for the No Action Alternative would be direct, short- to long-term, minor to moderate, adverse, localized due to potential hazardous fuel build up and the increased risk for larger, severe wildfires.

In the event of a potentially hazardous wildfire within SAND, the park staff would coordinate public notification, restrictions, closures, and evacuation efforts with park law enforcement staff and local emergency response agencies. The extent of public notice would depend on the specific fire situation. Assuring visitor, local residents, and park staff safety would take priority over other NPS activities.

**Cumulative Impacts** - Cumulative impacts to human health and safety from other activities include continued land acquisition of parcels bordering SAND. Such actions would have an adverse, minor to moderate, and short- and long-term impact because an expanded boundary could add additional hazardous fuel loadings, and increase the number of homes and structures at risk, thus increasing the risks to firefighters and the public in protecting those areas and people in an intense wildfire. The No Action alternative in combination with the past, present, and foreseeable future actions would result in direct, minor, short- to long-term, adverse, and localized impacts due to increased potential for more severe future wildfires as hazardous fuels continue to increase.

**Conclusion** - The No Action Alternative would have direct, short- to long-term, minor to moderate, adverse, localized due to potential hazardous fuel build up and the increased risk for larger, severe wildfires. Cumulative impacts would be direct, minor, short- to long-term, adverse, and localized due to increased potential for future severe wildfires as shrub density and downed woody debris continue to increase.

### **Impacts of Alternative 2 (Preferred) - Utilize Management Tools to Modify Fuels to Protect and Maintain Park Values**

Human health and safety impacts would be the same as the No Action Alternative in regards to the direct effects of fire suppression and fire control activities. However, the use of fuel management tools—prescribed burning, mechanical and manual fuel reduction, targeted herbicide, and biological treatments—would increase the ability to reduce shrub density and ground cover, and to create/maintain defensible space around structures and fuelbreaks. This would result in increased success over time in reducing hazardous fuel loads and increase the potential for wildfires to be of lower intensity, with reduced flame lengths, and lower rates of spread. Less intense wildfires would likely be easier to suppress/manage, thus less risk to human health and safety. This provides better protection than the “No Action Alternative” for firefighters, adjacent landowners as well as for

visitors and SAND employees. Thus, the Preferred Alternative would have direct, minor to moderate, beneficial, long-term, localized impacts by reducing the potential for future severe wildfires as the quantity of acres restored/maintained increases, and reflects the historic scene of the 1860s. The acres of hazardous fuels (dense shrubs and ground cover) decreases over time with the implemented actions of this alternative.

Prescribed fire, mechanical and manual hazardous fuel reduction (thinning, defensible space work), targeted herbicide use, and biological treatments would involve more pre-planning and implementing activities under defined conditions. This normally allows for better health and safety protections and precautions under more planned and controlled workplace conditions than the inopportune times often occurring when wildfires burn, which is usually during more severe meteorological and fuel conditions. Health and safety of staff would be enhanced when additional fire personnel would be brought in, as needed, from other NPS areas or interagency cooperators for prescribed burns. Human safety is the primary objective for prescribed burns and all park activities; additional staff brought in would help to ensure safety mitigations were implemented. Therefore, the potential for direct and indirect impacts associated with management actions (though it is not possible to eliminate all risk) would be reduced overall. The impacts to health and safety because of vegetation management actions would be short-term, negligible to minor, adverse, localized with minimal human health and safety concerns for fire fighters and the public.

Prior to the ignition of any prescribed fire at SAND, all the burn parameters of the approved prescribed burn plan must be met to ensure a safe and effective prescribed fire. SAND would implement prescribed fires under the coordination of the Fire Management Office at Lake Meredith National Recreation Area and other partners to be determined at the time of the prescribed fire, to ensure qualified personnel are on the scene for burn implementation. Neighboring landowners and residences adjacent to prescribed fires will be notified prior to implementation of the prescribed fire. Visiting public will be informed and educated by various methods before and during prescribed fires.

All herbicide treatment areas would have individual treatment plans and would only use US EPA approved herbicides. NPS herbicide use approval may be given only after considering numerous factors including: the target use, type and effects of the specific herbicide, location where the application will occur, potential threatened and endangered species concerns, potential for getting into ground water, persistence in the ecosystem, safety to employees and the public, type of application (example, spot spraying), etc. Herbicides would only be used after visitors were out of the area and appropriate informational signing was placed at all entryways to the spraying area. All staff utilizing herbicide would be trained in approved procedures related to proper handling, storage, transportation, mixing, spill prevention, and application procedures. Furthermore, federal FIFRA regulations and federal agency water quality monitoring indicate that use of herbicides in forestry practices constitutes low risk to humans (Shepard et al. 2004). The areas to be treated would be relatively small and targeted small scale spraying for noxious/invasive plant species, so the risk to human health and safety would be minimal.

**Cumulative Impacts -** Cumulative impacts to human health and safety from other activities include continued development on lands adjacent to the park. Such actions would have an adverse, minor to moderate, and short- and long-term impact because expanded WUI areas would add additional area residents, increase the number of homes and structures at risk, thus increasing the risks to firefighters and the public in protecting those areas and people in an intense wildfire. The Preferred Alternative

in combination with the past, present, and foreseeable future actions would result in direct, negligible, short-term, adverse, localized impacts due to potential exposure to associated fire risks (e.g., heat, smoke inhalation). As well as direct, beneficial, minor, long-term, and localized impacts by reducing the potential for future severe wildfires as the amount of hazardous fuel reduction increases (i.e., shrub density, brush and ground cover).

**Conclusion** - Short- and long-term impacts to human health and safety under the Preferred Alternative would be beneficial and minor to moderate, as well as negligible to minor, adverse, and localized impacts. Overall, cumulative impacts would be beneficial, minor, long-term, and localized.

## **CONSULTATION AND COORDINATION**

### **Internal Scoping**

Scoping is a process to identify the affected environment that may be impacted by the proposed project, and to explore possible alternative ways of achieving the proposal, while minimizing potential adverse impacts. Internal Scoping was conducted on April 25, 2013 by an interdisciplinary team of professionals from SAND and the NPS Intermountain Regional Office including representatives from fire management, resource management, NEPA specialists, and the private contractor working on the EA. The interdisciplinary team discussed the purpose and need for the project, discussed potential alternatives to address these needs, did preliminary determination of potential environmental impacts, and discussed past, present, and foreseeable projects that may have cumulative effects, and potential mitigation measures. The team members also conducted a site visit to view and evaluate the existing conditions of cultural and natural resources and hazardous fuels.

### **External Scoping**

External scoping was conducted to inform the public about the proposal to implement a new FMP for SAND and to generate input on the preparation of this EA. This effort was initiated by distributing a scoping letter dated November 18, 2013 to various stakeholders describing the project and asking for comments (Appendix A). In addition, the letter was posted on the PEPC website and made available at the ranger station. A press release was also sent to local and regional media and posted on the park website. The public was given 30 days to comment on the project.

During the 30-day external scoping period, SAND received one letter from an interested individual. The individual voiced support for grazing and mechanical fuel reduction and herbicide use, and concern about prescribed burning, due to ability to control fire and post-fire soil erosion. These comments were considered in the analysis section.

### **Agency Consultation**

#### **Endangered Species Act**

In accordance with the Endangered Species Act, the NPS consulted the USFWS with regards to federally listed species. A copy of the EA will be sent to the USFWS for review along with a request for their concurrence with SAND's determination of effects on federally listed species.

In accordance with NPS policy, the Colorado Division of Wildlife was contacted by letter dated November 18, 2013 during the public scoping period asking for information with regards to state listed species. No comments were received as of the date of the EA. A copy of this EA will be sent to Colorado Division of Wildlife for review and comment.



## **Section 106 of the National Historic Preservation Act**

In accordance with Section 106 of the NHPA, as amended in 1992 (16 USC 470 *et. seq.*), NPS contacted the Colorado State Historic Preservation Office (SHPO) by letter dated November 18, 2013 during the public scoping period asking for information concerning historic properties. NPS is pursuing a Programmatic Agreement with Colorado SHPO to conduct Section 106 consultation on all treatments implemented by SAND fire management staff. A copy of this EA will be sent to Colorado SHPO for review and comment.

## **American Indian Consultation**

NPS contacted the following three affiliated American Indian tribes - the Arapaho Tribe of the Wind River Reservation, Wyoming; the Cheyenne and Arapaho Tribes, Oklahoma; and the Northern Cheyenne Indian Reservation, Montana – at the beginning of this project to determine if there were ethnographic resources in addition to identified ethnographic resources, in the project area. As of the date of this EA, no comments were received. The Northern Cheyenne Tribe and Cheyenne and Arapaho Tribes of Oklahoma that are traditionally associated with the lands of SAND will have an opportunity to review and comment on this EA.

## **Environmental Assessment Review and List of Recipients**

The EA is subject to a 30-day public comment period. To inform the public of the availability of the EA, NPS will publish and distribute a letter to various agencies, tribes, and the mailing list, as well as place an ad in the local newspaper. The document will be available for review on the PEPC website at <http://parkplanning.nps.gov/sand> and at SAND's ranger station. Copies of the EA will be provided to interested individuals, upon request.

During the 30-day public review period, the public is encouraged to submit their written comments to NPS, as described in the instructions at the beginning of this document. Following the close of the comment period, all public comments will be reviewed and analyzed, prior to the release of a decision document. The National Park Service will issue responses to substantive comments received during the public comment period, and will make appropriate changes to the EA, as needed.

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The following persons assisted with the preparation of the EA.

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## APPENDIX A: GLOSSARY OF FIRE TERMS

**These definitions are derived from various wildland fire related documents and policies and are utilized in or related to this analysis. A more extensive glossary has been prepared by the National Wildfire Coordinating Group (NWCG) and can be found at <http://www.nwcg.gov/pms/pubs/glossary/>.**

*Appropriate Response* Actions tailored to the specific circumstances of a wildfire in reaction to incident related safety, protection, resource, land management, and cost objectives.

*Burned Area Emergency Rehabilitation (BAER)* This is an agency process following wildfires where emergency restoration and damage prevention actions are planned, authorized, and funded to minimize post-fire damage to resources, structures, and values. The funding and actions are limited to prioritized activities; funding constraints are often prime consideration in determining which actions can occur.

*Benefits* Fire effects with positive value or that contributes to organizational goals. Benefits should be explained as a desired outcome focusing on successfully meeting resource or protection objectives, depending on location and conditions.

*Biological Control* Using biological organisms (e.g., domestic animals, insects, nematodes, mites, pathogens) to control targeted invasive and nonnative plant or animal populations.

*Burn Plan (AKA Prescribed Fire Burn Plan)* A written plan required for each prescribed fire, which is a planned ignition by managers. It must be prepared by qualified personnel (Burn Boss) and approved by the appropriate agency administrator (Superintendent) prior to implementation. Each plan will follow agency (and interagency) direction and must include critical elements described in policy manuals.

*Burning Period* The part of each 24-hour period when fires spread most rapidly; typically from 10:00 AM to sundown. A fire may extend into the night during extreme conditions, such as dry vegetative fuel during drought conditions.

*Categorical Exclusion (CE)* Certain pre-defined exceptions to the National Environmental Policy Act (NEPA) that allow specified activities to occur without full, detailed environmental analysis, or where a general analysis for certain actions has been done in advance. The original FMP at Pecos NHP was approved utilizing a national CE that the NPS will no longer utilize as of 2015.

*Chipping* Process by which woody debris and slash is put into a piece of mechanical equipment and reduced to wood chips.

*Sand Creek Massacre Historic Site (SAND)* Applies to the land under the jurisdiction of this unit of the National Park Service, or the management staff of this NPS unit.

*Cultural Values* These values includes all affiliated resource values, historic structures, ethnographic values, cultural landscapes, and archeological areas and objects. May be documented or

undocumented, may be a site where something occurred with no physical remains. May be site specific or more general in location.

*Defensible Space* Refers to the size and/or type of vegetation clearing, thinning and/or fuel reduction needed to protect a structure or other identified value from wildfire during defined fire conditions. It does not mandate clearing of all vegetation, but strategically changes the vegetation to reduce reasonable risk and spread from wildfire. The work needed varies widely depending on type and amount of vegetation, vulnerability of the structure materials, and value of the structure or site, and the range of fire conditions expected. Good defensible space is not an absolute guarantee that the value will not burn, but greatly increases the likelihood that it will survive a wildfire. Defensible space usually must be maintained over time as vegetation tends to grow back after reduction.

*Direct Attack* Fire tactic where firefighters take actions right on the edge of the fire to stop its advance as close to the burning vegetation as possible, sometimes using water, retardant, or dirt to extinguish the fire, or putting in fireline to prevent additional vegetative fuels from burning. Direct attack is not feasible for firefighters on the ground when flame lengths exceed 4 feet, or in thick vegetation where firefighter safety zones are not present. Heavy equipment such as bulldozers, fire engines with unlimited water source, or air attacks are the only direct attack options with higher flame lengths.

*Environmental Assessment (EA)* A NEPA document that is prepared to (a) help determine whether the impact of a proposal or alternatives could be significant; (b) aid NPS in compliance with NEPA by evaluating a proposal that will have no significant impacts, but that may have measurable adverse impacts; or (c) evaluate a proposal that either is not described on the list of categorically excluded actions, or is on the list but exceptional circumstances apply.

*Escaped Prescribed Fire* Prescribed fires are a planned ignition that burn under specified conditions defined in a written plan. If the fire burns outside the specified conditions, the Contingency Plan within the Burn Plan is activated. If it is successful in bringing the fire back within the scope and objectives of the Burn Plan, the project may continue. If burn plan objectives continue to be exceeded or no longer met, the fire could be converted to a wildfire and appropriate suppression occurs.

*Fire Adapted Ecosystems* Inter-related habitat relationships where the plants and animals are adapted to periodic wildfires. Some species depend on fire to initiate their renewal, growth, or propagation. Numerous species exploit the changed conditions after a fire to expand their range or increase their numbers due to change in the status of resources, space, or other changed environmental factors after fires.

*Fire Adapted Species* Plant or animal species that depend on fire to initiate their renewal, growth, distribution, or propagation. Some species cannot exist without periodic fires to change the vegetative or physical environment. Some fire adapted species have vanished in areas where fire suppression has prevented periodic fire.

*Fire Management* All activities related to the management of wildland fires. Includes wildfire management, fuels management, planning, preparedness, prevention, fire and public information,

rehabilitation, and other related activities.

*Fire Management Officer (FMO)* NPS official under the direction of the Park Superintendent with responsibility to implement the Fire Management Plan and supervise fire management activities including, preparedness, prevention, and response. Ensures all NPS and national safety standards are followed, and develops and maintains communications with interagency cooperators.

*Fire Management Plan (FMP)* A plan that identifies and integrates all wildland fire management and related activities within the context of approved land/resource management plans and objectives. It defines a program to manage wildland fires (wildfire and prescribed fire). The plan may be supplemented by operational plans, including but not limited to preparedness plans, preplanned dispatch plans, prescribed fire burn plans and prevention plans. Fire Management Plan's assure that wildland fire management goals and components are coordinated.

*Fire Management Units* Designated areas within a park unit where similar fire management activities, constraints, and responses occur. Helps fire managers determine pre-planned response actions and fuels management work within the constraints of the FMP, fire policy, park objectives and values, protection of private property, etc.

*Fire Regime* A generalized description of the role natural fire plays in a specific ecosystem. It is characterized by fire frequency, predictability, seasonality, intensity, duration, scale (patch size), as well as regularity or variability.

*Fire Retardant* In wildland firefighting, a compound made by mixing chemicals with water to form slurry that is dropped on vegetation to reduce flammability or delay their combustion. Dropping is usually performed by fixed wing air tankers, but can also be done by helicopter if a mobile retardant mixing station is set up nearby. Typical retardant now in use consists of ammonium phosphate compounds dyed red to aid in determining effectiveness of drops. To be effective in suppressing wildland fire, retardant must be followed up by ground firefighting resources. Fugitive retardant does not contain the red dye, and is used when available in many NPS areas to avoid staining significant landscape or cultural values.

*Foam* Chemical or dispersant additive to water, usually detergent based, that allows the water-foam mix to be a more effective fire suppressant when used on vegetation, and dead vegetation debris. The mix smothers or cools the fire, allows it to better penetrate the fuels, prevents ignition, and/or does direct extinguishment of flame. Usually applied either by fire engines with automatic mixing equipment, helicopter bucket drops, or (rarely) ground pumps using fixed water sources.

There are additional products now being used where some engines can apply "structural foam" directly to structures in advance of wildfire impact to prevent fire from igniting the structure. It is usually longer lasting, and is usually washed off the structure after the fire threat is over.

*Fuels Management Activities* Often used interchangeably with vegetation management activities (see below).

*Hazard Fuels* Excessive live and/or dead wildland fuel accumulations (either natural or created), having the potential for the occurrence of intense wildland fire.

*Hazard Fuel Reduction* Hazard fuel reduction projects remove excessive live or dead fuel to protect life, property, cultural, and natural resource values. This could include structures and private properties; natural resources, including critical native plant communities and their processes, and threatened and endangered species; and important cultural, historic, and/or archaeological resources. Hazard fuels may also be managed to bring the natural fuel complex (such as forest) back into a natural range of variability. These treatments, a variety of fire and non-fire techniques, include prescribed fire and wildfire managed for resource objectives, mechanical vegetation cutting and removal, targeted herbicide application, and manual methods.

*Herbicide Use* In this analysis targeted herbicide application is used as a follow-up treatment to fuel breaks or defensible space work created by mechanical or manual fuel reduction treatments. This would help to slow regrowth of vegetation to help maintain the fuel breaks or defensible space. It may also be used to control invasive exotic plants.

*Incident Objectives* Incident specific guidance and direction that supports the land, human, and/or resource goals that is important to managing an area. Once established, they assist in selecting the appropriate strategies and tactics to manage a fire.

*Indirect Attack* Tactic utilized to stop fire advance away from the current fire perimeter, but defines a limit to a fire's advance. Indirect fireline tactics include but is not limited to constructing fireline, utilizing existing roads or natural barriers, and changes in vegetation type. Often safer in thick fuels or where flame lengths are high as it allows firefighters and equipment sufficient time to construct fireline to stop the fire's advance. Another indirect tactic is burning out fuels in advance of the fire's arrival, thus depriving the fire of fuels, and halting its movement. Distance from the fire depends on vegetation, fire behavior, anticipated and actual weather, values at risk, time, available firefighting resources, etc.

*Initial Attack* First action(s) taken to put the fire out, consistent with firefighter and public safety, and values to be protected. Describes the initial actions taken on the ground on most fires where the intent from the onset is to suppress the fire as quickly, safely, and cost effectively as possible. Usually the focus is on full perimeter control and extinguishment as soon as reasonably possible.

*Initial Response* Immediate discussions, decisions, and actions related to new unplanned ignition. All fires receive a response, which may not involve taking action on the ground, but may include a management or initial decision to postpone taking action on the ground to a later time based on conditions, safety, and competing priorities. A planned response, based on fire management objectives, initiated on every fire.

*Manual Treatments* Activities that occur through the use of hand tools (ax, pulaski, cross-cut saw, pruners, shovel, etc.). It is a method of reducing hazardous accumulations of wildland fuels, and may be used to create defensible space near structures or values, or to work in areas where large equipment is inappropriate. May include handheld equipment, such as chainsaws, in some areas.

*Mechanical Treatments* Vegetation management activities that include using wheeled or tracked equipment (mowers, masticators, choppers, skidders, bulldozers, etc.). It is a method of reducing accumulations of wildland vegetative fuels, and is used to thin dense vegetation or to clear areas of certain fuels, to create fuel breaks and to create defensible space near structures and values.

*Minimum Impact Suppression Techniques (MIST)* Minimum Impact Suppression Tactics (also referred to as Minimum Impact Techniques) are guidelines that assist fire personnel in the choice of procedures, tools, and equipment used in fire management activities. These techniques reduce soil disturbance, impacts to water quality and wildlife, noise disturbance, intrusions in the wilderness, and cutting or trampling of vegetation. MIST policy is a primary firefighter guidance in most NPS managed areas.

*National Environmental Policy Act (NEPA) Process* The objective analysis of a proposal to determine the degree of its environmental and interrelated social and economic impacts on the human environment, alternatives and mitigation that reduce that impact, and the full and candid presentation of the analysis to, and involvement of, the interested and affected public.

*National Fire Policy* The interagency policy that guides management of all aspects of wildland fire for all federal agencies and most states. Includes direction on safety, ecosystem sustainability, response, use of wildland fire, rehabilitation and restoration, protection priorities, WUI, planning, science, preparedness, suppression, etc.

See [http://www.nifc.gov/policies/policies\\_documents/GIFWFMP.pdf](http://www.nifc.gov/policies/policies_documents/GIFWFMP.pdf) for more details.

*National Park Service (NPS)* A bureau of the Department of the Interior, which manages a nationwide system of units dedicated to protecting and preserving areas with diverse natural, historical, and cultural values while allowing for visitor use and enjoyment that does not impair those values.

*Planned Ignition* The intentional initiation of a prescribed fire in the wildland by hand-held, mechanical or aerial devices (see prescribed fire).

*Prescribed Fire* Fires originating from a planned ignition to meet specific objectives identified in a written, approved, prescribed burn plan. NEPA must have been met prior to ignition (see planned ignition). Any fire intentionally ignited by management under an approved plan to meet specific incident objectives.

*Protection* The actions taken to limit the adverse environmental, social, political, and economical effects of fire.

*Rehabilitation* Efforts undertaken within three years of a wildland fire to repair or improve fire damaged lands unlikely to recover to a management approved conditions or to repair or replace minor facilities damaged by fire.

*Resource Advisor (READ)* Assigned position on many longer and larger wildland fire incidents. Usually a resource specialist who assists the incident commander and fire organization by providing focus and specialized knowledge related to protecting and preventing damage to unit natural and



cultural values and resources, within the context of the incident objectives.

*Response to wildland fire* The mobilization of the necessary services and responders to a fire based on ecological, social, and legal consequences, the circumstances under which a fire occurs, and the likely consequences on firefighter and public safety and welfare, natural and cultural resources, and values to be protected.

*Restoration* The continuation of rehabilitation beyond the initial three years or the repair or replacement of major facilities damaged by the fire.

*Superintendent* In the context of these documents, the senior NPS management official with responsibility for managing an NPS unit (park). Also approves the Fire Management Plan (and other fire planning documents), and ensures that the FMP receives annual review and update. Provides reasonable review and oversight of fire management program and operations, and ensures that they are integrated with other park goals and objectives. Has other fire related responsibilities such as approving retardant use in the park, approving heavy equipment use, approving prescribed fire burn plans, fiscal oversight, etc.

*Suppression* All the work of extinguishing a fire or confining fire spread. This tactic can be used on a whole fire or part of a fire, and different techniques and tactics may be applied to different sections of the same fire.

*Unplanned Ignition* The initiation of a wildfire by lightning, volcanoes, unauthorized persons (arson) and accidental human-caused fires (see wildfire).

*Use of Wildland Fire* Management of either wildfire or prescribed fire to meet resource objectives specified in the Fire Management Plan.

*Vegetation Management Activities* Actions taken to reduce or thin the amount of vegetative fuels available for burning. Vegetative fuels include dead vegetation and logs, live trees, brush and shrubs, grass and all live and dead vegetation that can burn. Actions can be by hand tools (ax, pulaski, cross-cut saw, pruners, shovel, etc.), handheld equipment (weed eaters, chainsaws, leaf blowers, etc.), and wheeled or tracked equipment (mowers, masticators, choppers, skidders, bulldozers, etc.). Activities may also include prescribed fire and herbicide use. The type of activity available is usually set by policy and the Fire Management Plan. Vegetation removed in NPS areas is done to restore native vegetation habitat. The specifics of an activity are usually laid out in a written site-specific treatment plan or prescribed burn plan.

*Wildfire* Unplanned ignition of a wildland fire (such as a fire caused by lightning, volcanoes, unauthorized persons, and accidental human-caused fires), and escaped prescribed fires. (See unplanned ignition and escaped prescribed fire).

*Wildland Fire* A general term describing any non-structure fire that occurs in the wildland; includes wildfires and prescribed fires. Wildland fires can spread to and damage structures.

*Wildfire Managed to achieve Resource Objectives* A term used to describe a fire started by lightning (unplanned ignition) and allowed to burn under written, defined conditions for resource management goals. Examples of resource objectives include returning fire to a fire adapted ecosystem, reduction of vegetative fuels, opening up areas for fire adapted species, decreasing brush, renewing grassland habitat for herbivores, opening up the tree canopy for endangered bird species, reducing the chance of stand replacing fire in more extreme conditions, etc. Utilizing this tool is only permitted where pre-planned in a NEPA analysis with an approved FMP. Use may also be limited by availability of firefighting resources, safety, weather, vegetation conditions, fire behavior, national and regional fire preparedness levels, values at risk (natural, cultural, and private property), and other factors. If an allowable strategy for an area, a fire may be managed for resource objectives in one area of the fire, while being suppressed in another area of the same fire.

*Wildland Urban Interface (WUI)* An area where structures and other human development meet or intermingle with undeveloped wildland/vegetation fuels at risk of wildfires.



## APPENDIX B: PUBLIC SCOPING BROCHURE

**Sand Creek Massacre National Historic Site**

**Eads, Colorado**

**National Park Service**

**U.S. Department of the Interior**



### Public Scoping and NEPA Process for Sand Creek Massacre National Historic Site Fire Management Plan

**Project Scoping for Environmental Assessment**

**November 18, 2013**

The National Park Service (NPS) is starting the process to update the Fire Management Plan (FMP) for Sand Creek Massacre National Historic Site (SAND). Before this update occurs, the NPS is preparing an Environmental Assessment (EA). This EA is part of the process to update management strategies, manage vegetative fuels, and update terminology. A focus of this planning is to protect and enhance Park cultural and natural resources, and to create and improve defensible space. This process will be utilized to gather public input and suggestions for this planning effort. This brochure initiates the public scoping for the EA.

#### Background

SAND encompasses the site of the Sand Creek Massacre of 1864 where more than 200 Cheyenne and Arapaho were killed in the attack by U.S. Army Volunteer Cavalry. The site of the Sand Creek Massacre is of great significance to descendants of the massacre victims and their respective tribes and commemoration of ancestors at the site. The site is also a reminder of the tragic extremes reached during the 500 years of conflict between Native Americans and the U.S. Government. SAND was established to help protect, memorialize and enhance cultural understanding about the site of the 1864 Sand Creek Massacre. SAND is a nationally significant element of frontier history as well as a symbol of Native American struggles to maintain ancestral homelands.

During these historic periods, the vegetation of the area was more open as a result of intense human activities; wood gathering by Cheyenne and Arapaho had removed most trees near the site. As human use of the land changed after 1864, dead and down woody debris, sand sage, and exotic species increased, due to the suppression of wildfires and increased domestic livestock grazing practices. The increased vegetation has developed fuel loading that lends itself to high severity wildfires that could threaten visitors, staff and firefighters, cultural sites, park structures, and neighboring lands. The NPS wants to take planned steps to manage the vegetation in a responsible way. A new FMP will assist the NPS in meeting SAND management goals.

SAND plans to continue to suppress all wildfire ignitions on its 1,200 acres of federal land, and also to engage in active vegetation management activities. These active measures will better protect cultural sites, facilities, neighboring properties, and natural resource values. A new FMP will also include current national fire policy

and terminology. The Categorical Exclusion that was utilized in support of the 2006 FMP is no longer available. This EA will be completed in support of a new Fire Management Plan.

#### Updating the Fire Management Plan

SAND plans to adhere to the following broad goals as it updates its Fire Management Plan:

1. Firefighter and public safety is the first priority in all wildland fire management activities.
2. Park investments (infrastructure) and cultural and natural resources will be protected from wildland fire and fire suppression activities.
3. Park management actions will take place to restore and maintain the park's cultural and natural resources to meet park management goals as outlined in park management plans.
4. The park will work toward establishing and maintaining formal cooperative relationships with local, state, federal, and tribal cooperators and partners.
5. The NPS will consider actions that minimize the threat to adjacent property related to wildfire risks. Adjacent communities will be informed about park fire management activities.
6. Wildfire whether human caused or from a natural ignition, will be suppressed. This includes actions taken for fires starting on NPS administered lands or from fire burning onto NPS administered lands from other lands.

The EA process started with internal scoping by NPS specialists and staff on April 25, 2013. The NPS is preparing this EA in compliance with the National Environmental Policy Act (NEPA) to provide the decision-making framework that: 1) explores management alternatives to meet Park objectives, 2) evaluates potential impacts to Park resources and values, and 3) identifies mitigation measures to minimize the degree of these impacts.

A "No Action Alternative" includes suppression of all wildfires. Under this alternative, no planned projects would occur. Potential adverse effects of implementing

the “No Action Alternative” could include continued accumulations of hazardous fuels and the associated risk to human structures, people, and to park natural and cultural resources.

Elements of a “Proposed Action Alternative” could include:

- prescribed burning in designated areas for the purposes of maintaining defensible space around improvements and cultural sites, protecting existing cottonwood galleries, restoring natural habitat, and controlling invasive plant species;
- utilizing manual and mechanical equipment and limited grazing for fuel reduction work for the same purposes; and
- targeted herbicide use and bio-agents to reduce existing non-native plant species.

Additional objectives and mitigation tactics would be developed as part of this EA process to minimize impacts to people, park resources and manmade improvements. Prescribed burn projects would have formal objectives developed under a separate burn plan, and would only be implemented by qualified fire personnel.

There are two formal opportunities for the public to comment: during this initial project scoping, and again following the release of the EA document for public comment. You are invited to participate in this scoping process by voicing your ideas, suggestions, comments, or concerns related to SAND fire management activities. These comments will be considered during preparation of the EA and FMP.

## Overview of the Process

The basic steps of the NEPA process for this project include:

- Public scoping period (November 18, 2013–December 18, 2013)\*
- Preparation of the EA
- Public Comment Period during review of the EA\*
- Analysis of public comment on the EA
- Preparation of decision document
- Announcement of decision

\* indicates formal opportunities for public comment

## Resources and Concerns

The Environmental Assessment will analyze potential impacts to a preliminary list of resources including:

Human Health and Safety, Vegetation, Species of Special Concern, Archeological Resources, Cultural Landscapes, Ethnographic Resources, and Visitor Use and Experience.

## Ideas to Consider

Following are a few ideas to consider as you develop comments on this project:

- Are there any missing issues or concerns that should be addressed in the EA?
- Are there other options, alternatives, or information that you think should be considered?
- Do you have other comments and suggestions for us to consider in the SAND Fire Management Program?

## How Do I Comment on This Project?

Please submit your comments online at the NPS Planning, Environment, and Public Comment website:

<http://parkplanning.nps.gov/sand>

Comments may also be sent via email to the superintendent, [alexa\\_roberts@nps.gov](mailto:alexa_roberts@nps.gov). If you are unable to submit comments electronically, then you may submit written comments to:

Attention: Superintendent  
Sand Creek Massacre National Historic Site  
P.O. Box 249  
Eads, CO 81036-0249

You may also hand-deliver written comments to the Sand Creek Massacre National Historic Site ranger station at 910 Wansted Street, Eads CO 81036-0249.

Please provide all public scoping comments by **December 18, 2013.**

If you wish to be added to or removed from the Park’s mailing list for future correspondence, please indicate that in your response.

