# A. Wichita Mountains Wildlife Refuge Comprehensive Conservation Plan Environmental Assessment

# Chapter 1 – Purpose of and Need for Action

## 1.1 Introduction

The United States Fish and Wildlife Service (Service) proposes to implement a Comprehensive Conservation Plan (CCP) for the Wichita Mountains Wildlife Refuge (Refuge), which would guide management on the Refuge for the next 15 years. This Environmental Assessment (EA) is being prepared to evaluate the effects associated with this proposal and complies with the National Environmental Policy Act (NEPA) in accordance with Council on Environmental Quality regulations (40 CFR 1500-1509) and Department of the Interior (516 DM 8) and Service (550 FW 3) policies (a list of additional regulations with which this EA complies will be provided later in this EA). NEPA requires examination of the effects of proposed actions on the natural and human environment. In the following chapters, we describe three alternatives for future Refuge management, the environmental consequences of each alternative, and our preferred management direction. Each alternative was designed to contain a reasonable mix of fish and wildlife habitat prescriptions and wildlife-dependent recreational opportunities consistent with the National Wildlife Refuge System Improvement Act (Refuge Improvement Act) and specific Refuge purposes.

The environmental consequences of each alternative are described here and form the basis for selection of the proposed action. This Environmental Assessment was designed to cover the environmental consequences for most future management actions and current facilities on the Wichita Mountains Wildlife Refuge. However, some future actions, such as the construction of major facilities, will require further environmental documentation.

## 1.2 Planning Area

The planning area for the Comprehensive Conservation Plan is the entire 59,020-acre Wichita Mountains Wildlife Refuge located in Comanche County in southwest Oklahoma. The Refuge's south border is shared with the Fort Sill Military Base. Other surrounding land uses or landowners include the City of Lawton, the Village of Medicine Park, Lake Lawtonka, and privately owned lands.

The Wichita Mountains Wildlife Refuge is located on the border of The Nature Conservancy's Central Mixed-Grass Prairie and Crosstimbers and Southern Tallgrass Prairie Ecoregions. The Refuge's setting hosts a rare piece of the past—the largest remnant of mixed-grass prairie. The Refuge also provides habitat for large native grazing animals such as American bison, Rocky Mountain elk, and white-tailed deer. Texas longhorn cattle also share the Refuge rangelands as a cultural and historical legacy species. More than 50 mammal, 240 bird, 64 reptile and amphibian, 36 fish, over 1,000 invertebrate, and 806 plant species thrive on this important refuge.

## 1.3 Background

The National Wildlife Refuge System Improvement Act of 1997 requires each national wildlife refuge to have a comprehensive conservation plan. The mandate is to develop and implement a CCP for the Wichita Mountains Wildlife Refuge. The purpose of the CCP is to determine management direction for the Refuge that best achieves the purposes, vision, and goals; contributes to the National Wildlife Refuge System (Refuge System, NWRS) mission; addresses

the significant issues and relevant mandates; and is consistent with principles of sound fish and wildlife management. The CCP will identify a set of goals, objectives, and strategies for Refuge management for the next 15 years.

## 1.4 Purpose of Action

The purpose of the proposed action is to specify a management direction for Wichita Mountains Wildlife Refuge over the next 15 years. The purpose of the EA is to select a management direction for the Refuge that best achieves the Refuge's purposes, vision, and goals; contributes to the mission of the National Wildlife Refuge System; is consistent with principles of sound fish and wildlife management; addresses relevant mandates and major issues during scoping; and assesses the impacts associated with the proposed management actions. The proposed management direction is described in detail through a set of goals, objectives, and strategies in the CCP.

## 1.5 Need for Action

The CCP is needed to provide guidance and rationale for management actions. Management is now guided by various general policies and some short-term plans that do not reflect current conditions or recent scientific knowledge. The action is also needed to address current management issues and to satisfy the legislative mandates of the National Wildlife Refuge System Improvement Act of 1997, which requires the preparation of a CCP for all national wildlife refuges in the United States.

## 1.6 Decision to be Made

The Regional Director for the Southwest Region (Region 2 of the U.S. Fish and Wildlife Service) will select which alternative the Refuge will implement. The Refuge's proposed action is Alternative B. Assuming no significant impact is found, the final CCP will include a Finding of No Significant Impact (FONSI), which is a statement explaining why the selected alternative will not have a significant effect on the quality of the human environment. This determination takes into consideration the Service and Refuge System mission, the purpose(s) for which the Refuge was established, and other legal mandates. Once the FONSI is signed, the CCP will be implemented, monitored annually, and revised when necessary.

## 1.7 Regulatory Compliance

National wildlife refuges are guided by the mission and goals of the National Wildlife Refuge System, the purposes of an individual refuge, Service policy, and laws and international treaties. Relevant guidance includes the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, Refuge Recreation Act of 1962, and selected portions of the Code of Federal Regulations and the U.S. Fish and Wildlife Service Manual.

The CCP's overriding consideration is to carry out the purpose for which the Refuge was established. Refuge purposes are stated in the laws that established the Refuge and provided the funds for acquisition. Fish and wildlife management is the first priority in Refuge management, and the Service allows and encourages public use (wildlife-dependent recreation) as long as it is compatible with, or does not detract from, the System mission and Refuge purpose.

This EA was prepared by the Service and represents compliance with applicable Federal statutes, regulations, Executive orders, and other compliance documents. Appendix A of the CCP contains a list of the key laws, orders, and regulations that provide a framework for the proposed action.

Further, this EA reflects compliance with applicable State of Oklahoma and local regulations, statutes, policies, and standards for conserving the environment and environmental resources such as water and air quality, endangered plants and animals, and cultural resources. An ESA Section 7 Consultation was completed for inclusion in the CCP.

Comprehensive conservation plans include a review of the appropriateness and compatibility of existing refuge uses and of any planned future public uses. If a use is determined to be an 'Appropriate Refuge Use' by a refuge manager, it is then taken through the 'Compatibility Determination' process. For more information on Compatibility Determinations and a list included in this CCP, see Chapter 5 of the CCP.

## 1.8 Public Involvement

In accordance with Service guidelines and NEPA recommendations, public involvement has been a crucial factor throughout the development of the CCP and EA. The formal scoping period began with publication of a Notice of Intent to prepare a CCP and EA, which was published in the *Federal Register* on November 5, 2008 (Volume 73, Number 215, pp. 65872-65873). When the Notice of Intent was published, the team distributed a Planning Update requesting public feedback and informing community members of upcoming public scoping meetings. The planning team solicited public comments on Refuge issues to aid in CCP development.

Public involvement included holding four public meetings in the surrounding communities of Medicine Park, Saddle Mountain, Cache, and Lawton. Approximately 100 people attended these meetings, and about 120 written comments were received due to these meetings and information distribution. The Refuge also held a landscape-level ecoregion meeting on December 2, 2009, with other Federal, State, and local government agencies and non-profit organizations with a land management responsibility or interest. During this meeting, all stakeholders identified ecoregion issues and discussed what efforts each land manager was leading to work toward resolving these issues. The Refuge also met with the Oklahoma Department of Wildlife Conservation on January 27, 2010. All affected tribes were invited to meet one-on-one with the Refuge. One meeting was held between the Refuge and the Delaware Nation on February 10, 2010.

In addition to the scoping meetings, the Refuge held an open house at the Refuge Visitor Center on January 25, 2011. The purpose of this open house was to introduce the new Refuge Manager and to give the public an opportunity to discuss various Refuge projects and programs, including the planning process.

Collectively, all stakeholders expressed a wide range of issues, concerns, and opportunities during the planning process, and the alternatives selected for analysis reflect the issues, concerns, and opportunities expressed by the planning participants. Input and comments received ranged

from recommendations that the Refuge be minimally managed (i.e., custodial state) to very intensive management and expanded public uses. These issues and concerns provided the basis for developing the Refuge's management direction and played a role in determining desired conditions for the Refuge. The following issues, concerns, and opportunities were consolidated into the following broad categories: Ecoregion, Habitat, Wildlife, Public Use, Facilities, and Administrative Areas. See CCP Chapter 2 for more information.

### 1.8.1 Ecoregion

The Refuge held a landscape-level meeting in December 2009 with Federal, State, and local agency and non-profit organization land managers to outline concerns regarding managing for habitat, wildlife, and/or public uses. Seventeen individuals participated in a day-long discussion on land management issues and threats and shared ideas and advice on how these issues might be resolved. Not surprisingly, most concerns were shared by all. These included climate change and its potential for alterations to habitat components and wildlife migrations, and habitat fragmentation from the development of sprawling communities or other land use developments. The participants discussed their concerns about the health and productivity of riparian areas, which has resulted from increased development adjacent to rivers and river corridors. Air and water quality and the management of water resources were also identified as issues of concern. Most land managers indicated that they deal more with the adverse effects resulting from surrounding land developments rather than effects from any habitat or wildlife management actions generated within the land manager's jurisdictions. Other relevant issues included invasive species, recreation, and wind energy. Many concerns expressed by the participants were directly related to Refuge's own management. As a result, the Refuge selected the most pressing Refuge-related issues to address in this Environmental Assessment, as follows.

**Climate Change**

Concerns regarding climate change indicated a need to gather more local data. Data and information needs, often needed for baseline information, were a common topic during the ecoregion meeting.

**Air Quality**

The most prominent ecoregion-wide air quality concerns were related to the prescribed burns many land managers conduct for habitat management. People living adjacent to public lands are frequently bothered by fire and smoke associated with prescribed burning. Concerns were also expressed about the damage to Refuge resources from air pollution blowing in from surrounding large cities or industrial plants.

**Fragmentation and Land Protection**

Fragmentation of habitat was also presented as a prominent concern at the ecoregion meeting. Habitat fragmentation has reduced the quality of habitat overall and reduced its value to species of greatest conservation need (including that caused by current land management practices, utility right-of-ways, energy developments, urban sprawl). All entities attending the ecoregion meeting were advocates of protecting additional acres of land from development.

**Riparian Areas**

Riparian zones were identified as a limited, fragile habitat segment that are easily disturbed or modified and are subject to invasive plant encroachment.

**Water Quality**

Water was an intricate, complex issue discussed during the ecoregion meeting. Topics included water quality, spring modification, water conservation, and water rights. One concern is groundwater withdrawals and reduction of spring and stream flow. It was suggested that the Refuge determine the effects of its land management practices on downstream water supplies and quality. Similarly, the question about land managers' effects to springs was raised, as many springs throughout the State have been modified and do not function as they did historically. At least one land manager suggested that the Refuge and other land managers participate in water conservation efforts across the State. Additionally, the need for water basin studies and water law reform was discussed. Water rights was acknowledged as an area where more information is needed as well. For organizational purposes all water resources concerns except 'Water Quality' will be discussed under the 'Habitat' section.

### 1.8.2 Habitat

Wichita Mountains Wildlife Refuge received numerous comments from all stakeholder groups on habitat management and quality in regards to fire ecology, habitat fragmentation (discussed under the Ecoregion issue heading), invasive flora, and habitat restoration. Members of the general public and ecoregion stakeholders expressed concern over habitat restoration, as well as the change in Refuge's natural fire regime and the corresponding habitat response. The public, ecoregion stakeholders, tribal entities, and the Service each raised the issue of habitat fragmentation and land protection, some showing interest in future Refuge expansion. All parties commented to express concern over the increased spread of invasive and non-native flora throughout the natural habitat of Wichita Mountains. Other habitat issues included lake and stream management, which are incorporated into the umbrella category of 'Water Resources'.

**Special Use Area**

Most public comments on the Special Use Area reflected the public's desire to continue the closure of this area to the general public. Justifications included the need to protect wildlife from human impact and to continue the Refuge's objectives of preservation.

**Water Resources**

Most comments regarding Refuge water management were focused on fishing opportunities. (These comments are detailed under the 'Public Use Opportunities' issue heading.) Other aquatic management concerns, as expressed by the State, were the need to improve native fish diversity. Suggestions to improve diversity included restoring stream habitats (specifically, the passage at the Fort Sill boundary on West Cache Creek) and mimicking natural stream flows using reservoir volumes. There was also a concern over maintaining aquatic vegetation on the Refuge by maintaining adequate water levels.

**Fire Ecology and Management**

Comments from the public, the State, and at the ecoregion meeting were focused on the management of the prescribed fire program on the Refuge. Most comments indicated a desire to

continue the program to burn off excess fuels and eastern red cedar infestations while stimulating native grasses. Some also wanted to ensure that the Refuge was working to recover the natural fire regime in order to maintain woodlands relative to their historic conditions. In addition to the desire for the Refuge to implement a sound program, some preferred maintaining the current fire and grazing interaction, while others were concerned there was too much grazing allowed immediately after burns that resulted in slowing plant succession.

**Invasive Flora**

Invasive, exotic, and nuisance species (e.g., eastern red cedar, saltcedar, introduced grasses, etc) were a subject raised by all comment groups, including the public, State, and the ecoregion meeting invitees. All comment groups indicated that the Refuge needs to continue to treat invasive flora. Eastern red cedar, in particular, significantly increases fire danger and threatens the indigenous habitat and public safety should a wildfire occur.

**Restoration**

Habitat management and restoration efforts were raised by the public, State, and ecoregion meeting invitees. Comments received urged the Refuge to maintain its prairie and woodlands in a condition as close as possible to that which existed pre-settlement. The Refuge was encouraged to focus on species diversity, health and vigor of high successional plants, and woody encroachment from eastern red cedar and oak. Another topic of concern was the need for a balance between public use and associated impacts on plants and animals, with many favoring the Refuge for habitat and wildlife needs over those of humans. Additionally, the State encouraged the Refuge to act as a model for surrounding landowners and to share its habitat management techniques with its neighbors.

### 1.8.3 Wildlife

All stakeholders expressed concern over native fauna at Wichita Mountains Wildlife Refuge. Members of the public commented on numerous concerns, including the priority for managing wildlife ahead of public use opportunities, maintaining bison populations, conditions of native fish populations, managing prairie dog populations, and protecting insects and invertebrates. Ecoregion concerns centered on data needs and increased understanding for species of greatest conservation need. Oklahoma Department of Wildlife Conservation expressed their support of placing a priority on native wildlife. Other wildlife issues discussed among all stakeholders included concern over non-native fauna, such as feral hogs and longhorns. Members of the public also recommended that the Refuge consider reintroducing many species, including pronghorn antelope, mustangs, and wolves.

**Native Fauna**

Public comments were received on all prominent Refuge species, including bison, elk, deer, and the black-capped vireo. Some comments related to previously occurring Refuge species, pronghorn antelope and wolves as examples, were also submitted. Most comments urged the preservation and management of the bison herd, including habitat management. Some favored bison management (a native species) over longhorn management (a non-native species). Others mentioned a desire for the continued management of other native grazers as well, including elk and deer. The Refuge was praised on its management of the black-capped vireo and was encouraged to continue endangered species management. Reintroductions of pronghorn antelope

and wolves were mentioned as being feasible now that climatic conditions are now more conducive to their needs.

**Non-Native Fauna**

Most non-native comments concerned longhorn cattle and feral hogs. Most longhorn comments viewed the presence of longhorns unfavorably on the Refuge, with some calling for the complete removal of the herd. These comments expressed the views that it was inappropriate to continue the management of longhorns on a wildlife refuge in which the presence of native species should be emphasized. Fewer comments wanted to see more longhorns (and bison) and the maintenance of the pure bred herd. Other comments urged the Refuge to do what it could to remove feral hogs from the Refuge.

### 1.8.4 Public Use

Over 1.5 million people visit the Wichita Mountains Wildlife Refuge annually. Visitors appreciate the natural beauty of the area and take advantage of the many recreation activities which the Refuge has to offer. Because of this, members of the public provided numerous comments on issues relating to wildlife-dependent and supportive recreation uses. Many of the public's wildlife-dependent recreation comments focused on wildlife observation and photography opportunities and the need to improve interpretation and environmental education (EE) programs. Comments related to supportive recreation (i.e., those that are not considered wildlife-dependent according to the 1997 Refuge Improvement Act) issues centered on the need for a greater number of bicycle trails, camping opportunities, hiking trails, and picnicking facilities. Some public comments recognized the necessity of achieving a balance among the roles of protection of natural resources and public uses and acknowledged the necessity of limiting some recreational activities. However, most comments indicated a desire for maintaining current public use activities. In order to better manage public uses, some are willing to accept an increase in the number and scope of rules, restrictions, and/or education initiatives, such as Leave No Trace, while others advocated only minimal changes or restrictions. Members of the public also requested that some activities that are currently prohibited or restricted, such as horseback riding and swimming, be allowed on the Refuge. Rock climbing, which occurs in both the Public Use Area and Wilderness, is a major concern for many stakeholders. The size of a visitor group was also considered by members of the public and the planning team as an issue relating to many public use opportunities. Overall, public comments reflected care and concern over this unique area of Oklahoma, providing not only unique wildlife viewing and educational activities, but also extraordinary recreational opportunities.

**Hunting**

Generally, comments related to hunting activities expressed the public's desire to maintain these activities as they now exist, with no significant change in the current level of use or in the scope of regulations and restrictions on use. Further, both the public and the Oklahoma Department of Wildlife Conservation (ODWC) expressed concern about the increase in the feral hog populations. ODWC proposed a hunt, potentially during another deer or elk hunt, for feral hog. The addition of a turkey hunt was also suggested. ODWC also favored the maintenance of the current hunt partnership and the existing level of hunting. However, the agency also suggested an analysis of the current hunt's administration, including the potential for reducing the amount of resources needed to carry out a hunt.

**Fishing**
General comments related to fishing activities indicated the public's desire to maintain the activity as it currently exists. Many comments proposed an increase in current use level and no changes in the type or scope of regulations and restrictions on use. ODWC expressed its concerns about the quality of fishing on the Refuge. According to the agency, the major concerns for this activity are litter, maintaining access, improving lakes, and the possibility of opening the Special Use Area to fishing through a lottery system.

**Wildlife Observation and Photography**
Most public comments reflected a desire for the Refuge to continue to allow and provide opportunities for high-quality wildlife observation and photography. Some suggested that these activities be supplemented by opportunities for education through interpretive signs or talks. Others expressed a desire for expanded viewing (and increased interpretation) and photography opportunities through the creation of a wildlife designated area around the Visitor Center or a hacking tower constructed in the Special Use Area.

**Interpretation**
While most public comments on Refuge learning opportunities focused on environmental education activities, some individuals suggested there is a need to increase and improve interpretive signage designed to inform visitors about their natural and cultural surroundings. Some comments included the desire to have more signage in and around Holy City or, at a minimum, to provide a handout on its history.

**Environmental Education**
Public, State, and tribal comments included ideas for expansion of the environmental education program for all age levels with foci on wildlife and habitat management, workshops in photography and plant identification, the historical value of the area, and Leave No Trace land ethics. Some suggested these programs should be directed toward younger children and college students, while others felt the programs should be available to the larger public. Several individuals suggested that the Refuge could help with bussing students to and from the Refuge to attend environmental education programs; others thought that the Friends of the Wichitas could offer programs to local schools and the public to help with this demand. However, one of the most common concerns about the environmental education program was the need to incorporate more outreach into the environmental education program to make local teachers, college professors, and tribes aware of the educational opportunities and/or tools the Refuge provides this area and also to highlight the positive effects of Refuge management.

**Bicycling**
General bicycling comments reflected a wide range of interests, almost all of which favored maintaining or expanding current use levels. Some suggested new bike routes, including re-opening the Burma Road. Although the continuation of large events such as the Race for Survival Marathon, Tour of the Wichitas, and Tour de Meers Bike Ride was favored, some comments acknowledged the strain and challenges of holding large events on the Refuge. Many suggested that the organizers of these large events be responsible for implementing them in compliance with Refuge policies.

**Boating**
Boating is a small, though relevant, concern of the Refuge. All boating activity can cause disturbance to wildlife and aquatic habitat. Erosion occurs around boat ramps. There are occasional increased law enforcement needs to prevent unauthorized use or to manage litter and safety issues. Boating, however, does have a place on the Refuge as a use supportive of wildlife-dependent uses, particularly fishing, photography, and interpretation.

**Camping**
General camping comments also included a wide range of interests, from maintaining the activity as is to expanding opportunities for new camping activities. Most public comments indicated a desire to keep existing camping sites open, and some expressed a desire for new sites; however, others did not want any new camping developments built. Those wanting additional camping opportunities indicated their desire for particular locations, such as in the vicinity of Lake Jed Johnson. Further, they listed specific reasons for suggesting new sites, including an increase in revenues for the Refuge. At least one comment suggested converting some picnic areas to camping or at least allowing this use there. Comments frequently encouraged the Refuge to increase its Leave No Trace education efforts, particularly in the Charons Garden Wilderness Area. Also, in regard to backcountry Wilderness camping, the Refuge was urged to keep permits as they are today—no more and no less. Some law enforcement issues were also mentioned, including the need to control the cutting of live branches for firewood in or near campground; RV's hooking up to water hydrants in disregard of regulations, campers "reserving" sites, and the use of alcohol.

**Group Size**
Several public comments were received in regard to group size at sites around the Refuge. Some indicated that the recreational activities themselves are not problematic, but the large groups that arrive to participate in a particular activity at the same time and the potential for associated impacts on resources, user conflicts, and exceeding facility capacities. Group size is of particular concern to the Refuge when large groups enter the Wilderness and cause negative impacts to wilderness character. Several suggested group size limits regardless of previous permission such as through a Special Use Permit (SUP). Some suggested that the Refuge implement policies to require groups over a certain size to obtain a SUP so that the numbers or densities of people in any one area might be controlled. Particular areas were mentioned for control of use numbers including the Narrows and Forty-Foot Hole.

**Hiking**
General hiking comments from the public included a range of interests from maintaining the activity as it is currently, expanding it and spreading the use to new areas, or adding no new hiking trails. A couple of comments suggested establishing a program for trail conservation and service projects. Sites for new trail locations included the east side of the Refuge needing more marked hiking trails and the maintenance of the well-trodden (unofficial) trails on the top of Elk Mountain. Some also suggested the need for the placement of sign-in registers at all backcountry trailheads to monitor backcountry use.

**Horseback Riding**

Only one public comment was received in regard to horseback riding. The commenter wanted to see a program whereby horseback riding clubs could take guided tours through the Refuge.

**Military Flyovers**

A couple of comments regarding the possibility of restricting military aircraft flyovers were received. Public comments indicated that flyovers negatively affect wildlife and hold the potential of damaging the environment, wildlife, and humans.

**Picnicking**

General picnicking comments reflected a desire to continue picnicking as it is, with the exception of the aforementioned suggestion of allowing camping at picnicking sites. Promotion of Leave No Trace concepts could also occur at picnic sites.

**Rock Sports**

General rock sports comments (including climbing, rappelling, and bouldering) from the public reflected a desire to continue these activities as they exist today. Most suggested that there was no need for new or no additional restrictions or prohibitions, with the consideration that while there may be impacts on natural resources due to these activities, they are relatively slight. Some comments also indicated wanting these uses expanded or wanting new areas opened (with the exception of rappelling) to these activities. Others wanted the Refuge to ensure that there were no habitat or wildlife impacts as a result of these activities. At least one comment suggested that rappelling be managed by managing for group size and also prohibiting this activity at Forty-Foot Hole. Equipment used for rock sports was a common topic, including the use of fixed anchors, hammers, pitons, other professional gear, and crash pads. Fixed anchor comments were predominantly in support of this use, when properly managed, for climbing. The rationale for this position is that this use predated the establishment of Charons Garden Wilderness Area and that the Refuge has never found this use to be incompatible. However, now that the Wilderness has been established, the Refuge is concerned that the use of fixed anchors does not coincide with the purpose of wilderness areas. Recommendations were made to restrict crash pads to hard surfaces only, including rock, gravel, or compacted soil. Some suggested prohibiting the use of hammers, pitons, and other non-clean climbing equipment on the Refuge, unless previously authorized. Others suggested that hammers and other climbing devices be managed through a permit and with the concurrence of the Wichita Mountains Climbers Coalition Advisory Bolting Committee in a manner similarly required for the use of fixed anchors. Incorporation of Leave No Trace land ethics were common responses. Ideas for incorporating Leave No Trace on the Refuge included showing proof of training prior to using particular areas and discouraging bolting (per Leave No Trace policy) and chalk. Some also emphasized safety concerns (and the associated impacts of rescue efforts that might result) and offered tactics such as encouraging at least one person per group to be trained in Wilderness first aid. Some also suggested the need for the placement of sign-in registers at all backcountry trailheads to monitor backcountry use and keep track of use for safety. Finally, special interest groups or climber representatives, specifically the Wichita Mountains Climbers Coalition and the Access Fund, a national climbing advocacy organization, wanted to maintain communication or collaboration with the Refuge. This collaboration would allow these activities to continue in an area where climbing

opportunities are not otherwise available in this region of the country in a way that minimizes natural resource impact concerns.

**Special Use Area**
Most public comments on the Special Use Area reflected the public's desire to continue the closure of this area to the general public. While some did comment on adding public use to the area, those additions were very small, including by holding an annual lottery for hiking in restricted areas, similar to the lottery for the annual elk hunt.

**Special Uses**
The Refuge expressed concerns over special use activities, including commercial and non-commercial activities, all of which need to be managed more effectively. Special use activities that are currently occurring but need to be permitted and administered include scuba diving instruction, tours, tournaments, commercial photography, and filming.

**Swimming**
A few public comments on swimming in the Refuge's lakes were received, specifically in Lake Jed Johnson and in Lake Elmer Thomas Recreational Area (LETRA) on the Refuge side.

### 1.8.5 Facilities

The planning team reviewed comments on public use facilities, administrative facilities, and Refuge access issues. In regard to public use facilities, members of the general public commented on issues such as creating more user-friendly visitor facilities, utilizing green infrastructure, increasing availability of trash cans and recycling stations, and increasing the use of interpretative signs. The planning team determined that the needs for administrative facilities include maintenance of signs, roads, and buildings, and accessibility updates. Refuge access concerns were raised by the public, who would like to see public access expanded. Also, members of the public and the planning team expressed concern over the location of Holy City on the Wichita Mountains Wildlife Refuge.

**Public Use and Administrative Facilities**
Most comments on facilities were related to the Visitor Center or hiking trails, signs, or other developed public recreation sites. Others called for improved accessibility and increasing green infrastructure. Comments received on the management and condition of the Visitor Center included making it more user friendly, ensuring displays and exhibits are kept up-to-date and in good working condition, and expanding the function of the Visitor Center to include a research facility. Some wanted more trails, picnic areas, campsites, or bike paths. Others were concerned about impacts to habitats and wildlife and wanted developments capped or built in a way that minimized their impact. There were also requests for improved or increased amenities and infrastructure, including restrooms, emergency phones, trash bins, trail and interpretive signs and kiosks, sign-in registers, and cell phone towers. A few comments on the use of all-terrain vehicles (ATVs) were received that urged the Refuge to continue to prohibit this use.

**Holy City**

Comments on Holy City included leaving the site as is in its current location and function, removing the statue associated with the site, and statements that the site should not exist on the Refuge. Of those wanting the site to remain as is, some wanted the Refuge to highlight Holy City through signs and interpretation. These comments also illuminated on the history and cultural significance of it. Some suggested that the church itself should stay due to its history and significance to visitors but that removal of the statue is appropriate as it stands out and distracts from the purposes of the Refuge. Some of the comments in disagreement with the site's location on the Refuge cited the need for separation of church and state; the deteriorating condition of the structures, and, in at least one case, a land exchange was suggested.

**Job Corps**

Very few comments were received regarding the Treasure Lake Job Corps site on Refuge property. One commenter suggested moving Job Corps to a more appropriate location.

**Cultural Resources**

Cultural resources, as described in this document, include both archaeological and historic sites and other artifacts. Most comments on these resources emphasized a need for increased monitoring and improved preservation or protection efforts. Some called for more information on these sites, specifically a new survey of archaeological and historic sites. Suggestions were made calling for the restoration of historic sites and nomination of sites to the National Register of Historic Places, including Buffalo Lodge, Boulder Cabin, and the Observation Tower at Lake Jed Johnson. There was also mention of the parallel forest being preserved as a historic site. Some also asked that the historic buildings be used by the Refuge and interpreted for the public.

# Chapter 2 – Description of Alternatives

## 2.1 Formulation of Alternatives

Alternatives are different approaches or combinations of management actions designed to achieve a refuge's purposes and vision, the goals identified in the CCP, the goals of the Refuge System, and the mission of the Service. Alternatives are formulated to address the significant issues, concerns, and problems identified by the Service and the public during public scoping. Alternatives are combinations of wildlife and habitat management with corresponding levels of pubic use and services. The Refuge staff determined that each biological component required an equal or consistent public use element, e.g., restoring habitats would require that environmental education and interpretation activities be geared towards support and understanding of current management.

Three alternatives were considered in this EA. Six additional alternatives were considered but eliminated from detailed analysis. The remaining three alternatives cover a reasonable range of actions. These alternatives represent different approaches or management scenarios for the future protection, restoration, and management of the Refuge's fish, wildlife, plants, habitats, and other resources, as well as compatible wildlife-dependent recreation. Refuge staff assessed the biological conditions of Refuge habitats and analyzed the external relationships affecting each

Refuge unit. This information contributed to the development of Refuge goals and, in turn, helped formulate the alternatives, summarized in Table A-1, Summary of Alternatives. Alternatives will be examined in five broad issue categories and one administrative category: Ecoregion, Habitat, Wildlife, Public Use, Facilities, and Administrative Areas.

## 2.2 Alternatives Considered But Eliminated From Detailed Analysis

The alternatives development process under NEPA and the Refuge Improvement Act are designed to allow the planning team to consider the widest possible range of issues and develop feasible management solutions that respond to these issues. These management solutions are then incorporated into one or more alternatives evaluated in the EA process and considered for inclusion in the CCP.

Actions and alternatives that are not feasible or may cause substantial harm to the environment are usually not considered in an EA. Similarly, an action (and therefore, an alternative containing that action) should generally not receive further consideration if:

- It is illegal (unless it is the No Action Alternative, which must be considered to provide a baseline for evaluation of other alternatives, even though it may not be capable of legal implementation).
- It does not fulfill the mission of the National Wildlife Refuge System.
- It does not relate to or help achieve one of the goals of the Refuge.
- Its environmental impacts have already been evaluated in a previously approved NEPA document.

However, if such actions or alternatives address a controversial issue or an issue on which many public comments were received, they may be considered in detail in a NEPA document to demonstrate clearly why they are not feasible or would cause substantial harm to the environment.

During the alternatives development process, the planning team considered a wide variety of potential actions on the Refuge. The following actions were ultimately rejected and excluded from the alternatives proposed here because they did not achieve Refuge purposes or were incompatible with one or more goals.

### 2.2.1 Horseback Riding

Based on public comment, the Refuge considered allowing horseback riding on the Refuge, whereby the public would be allowed to bring their horses and participate in self-guided trail rides in certain areas of the Refuge. This alternative was not considered further because the Refuge controls, to the extent possible, wildlife disease transmission on the Refuge through vaccination, monitoring, and testing of horses, bison, and longhorn. Allowing horses on the Refuge is a concern for the risk of disease spread to Refuge wildlife. Bringing horses onto the Refuge from surrounding lands may also pose a risk of spread of invasive flora. Due to all of these concerns and the increase in management this activity would cause, this alternative was eliminated from further consideration.

### 2.2.2 Military Overflights

The Refuge considered an alternative that would restrict or redirect Fort Sill's military overflights, particularly over the Refuge's Wilderness areas, as suggested by public comments. This alternative was not considered further because according to the Refuge Improvement Act and other laws, regulations, and policies, the military has jurisdiction over the airspace above the Refuge, and the Refuge cannot influence or mitigate this. Therefore, this alternative is outside the scope of this CCP and was eliminated from further consideration.

### 2.2.3 Habitat Restoration

Habitat restoration was considered as an alternative as a result of public and ecoregion comments. However, restoration-type activities are considered in this CCP and EA through specific Refuge programs, including fire management, native and non-native fauna, and invasive species treatments. Therefore, this alternative was not considered independently.

### 2.2.4 Swimming

Based on public comment, the Refuge considered allowing swimming on certain lakes within the Refuge. A previous decision on swimming, however, determined that this activity does not support wildlife-dependent recreation on the Refuge and has been prohibited on the Refuge since. Furthermore, the Refuge had concerns of erosion potential where trampling of vegetation occurs on lake shorelines, as well as concerns for public safety. Additionally, there is an abundance of available swimming opportunities adjacent to the Refuge. Therefore, this alternative was not considered further.

### 2.2.5 Developed Camping Expansion

Based on public comment, the Refuge considered an alternative to expand developed camping sites on the Refuge. Expansion of developed camping opportunities was not considered further due to a previous decision on not enlarging current facilities or building new facilities. The Refuge currently has over 100 camp sites and is surrounded by communities that also offer camping opportunities. In addition, the Refuge can meet demand most of the time, with the exception of some holiday or other busy weekends. Therefore, this alternative was eliminated from further consideration.

### 2.2.6 Night Access

The Refuge considered an alternative that would open the Refuge to some recreational activities, in addition to fishing, at night. The Refuge has a previous decision to prohibit night access and use of the Refuge due to concerns for safety and management needs during nighttime hours. The decision allows for developed camping, permitted camping in the Charons Garden Wilderness Area, and fishing access only. All other uses need not be considered further because of the decision to prohibit this use. For these reasons, this alternative was considered but eliminated from further analysis.

## 2.3 Management Direction Common to All Alternatives

Some management actions would remain the same under each alternative and are summarized under the following categories: Spring Modification, Water Conservation, Water Rights, Fire Ecology and Management, and Invasive and Non-Native Flora and Fauna.

### 2.3.1 Spring Modification

The Refuge would continue current management utilizing modified springs for animal management under all alternatives. The Refuge would work toward developing a Water Resource Inventory and Assessment study to determine the effect of downstream users and drawdown and what affect that might have to Refuge water resources.

### 2.3.2 Water Conservation

The Refuge contributes information to and participates in State water planning. Refuge efforts in water resources planning would continue under all alternatives. As in Spring Modification, the Refuge would work toward developing a Water Resource Inventory and Assessment study to determine the effect of downstream users and drawdown and what affect that might have to Refuge water resources.

### 2.3.3 Water Rights

The Refuge would maintain existing water rights (State rights) under all alternatives. As in Spring Modification, the Refuge would work toward developing a Water Resource Inventory and Assessment study to determine the effect of downstream users and drawdown and what effect that might have to Refuge water resources, and determine whether the Refuge water rights are adequate and evaluate the need for more.

### 2.3.4 Fire Ecology and Management

Prescribed burning would continue to be initiated according to the Fire Management Plan (USFWS 2008) with a strategy to manage for or mimic natural fire occurrence and grazing interaction (i.e., pyric herbivory). The goal of the Fire Management Plan (FMP) is to promote naturally-occurring and historic habitat conditions to sustain biological diversity and heterogeneity. All wildfires would continue to be evaluated, and an appropriate strategy and/or tactic would be applied that considers wildfire intensity and behavior, public and firefighter safety, values at risk, possible resource benefits, and cost containment. In consultation with the U.S. Fish and Wildlife Service Ecological Services and in accordance with Section 7 of the Endangered Species Act, the official Biological Opinion identifies that an annual maximum of 7,200 acres of black-capped vireo habitat can be burned. A total of 14,000 acres may be burned per year (a combination of black-capped vireo and non-black-capped vireo habitat).

The heterogeneity produced by the variation in fire intensity, season of fire occurrence, grazing distribution, and vegetation response cannot be matched by any other combination of management practices. It is through heterogeneity that biological integrity and resiliency is maintained. The greater the biological resiliency, the better suited the habitat is to meet environmental changes. With increased resiliency and biodiversity comes the greater probability that an individual best suited for future conditions exists in the biome.

Fire management would also include prevention, preparedness, and suppression. Prevention and preparedness programs are both internal and external, ranging from marshalling of equipment to public meetings and environmental education. Suppression may be direct and/or indirect, depending on public and firefighter safety and values at risk. These actions are detailed in the FMP (USFWS 2008).

### 2.3.5 Invasive and Non-Native Flora and Fauna

Invasive and non-native flora and fauna would be managed according to the Refuge's Integrated Pest Management Plan (IPMP) under all alternatives. The IPMP is expected to be completed in 2013. Management of invasives and non-native flora and fauna would be managed on a site-specific or project-specific basis until the IPMP's completion. The IPMP would include mechanical control for treating native invasive species, including juniper, and chemical treatment of non-native invasives. Treatments would primarily be conducted along roadsides and around public use areas but occur Refuge-wide where necessary in order to reduce juniper densities in Crosstimbers habitat. In 2009, approximately 900 acres were treated for invasive and non-native flora, but acres treated would increase under the IPMP.

The Refuge would also promote the health of native species on the Refuge while containing, controlling, or eradicating non-native or invasive fauna when and where possible. Non-native/invasive fauna populations would be reduced through trapping or gunning or prevented by implementing restrictions aimed to avert introductions.

## 2.4 Alternatives Analyzed in Detail

The following alternatives were developed to comply with NEPA and to provide ways to represent a number of issues, concerns, and opportunities that were identified during the public and internal scoping process. Though the alternatives may have different emphases, habitat maintenance, restoration, and preservation are common elements of each alternative. The alternatives are intended to provide a range of public uses and access and respond to significant issues or concerns identified during the planning process. Each alternative is described according to a management area, as the Refuge initiates variable management techniques depending on Refuge location (e.g., Wilderness actions are usually different than the Public Use Area's actions). The management areas are: Refuge-Wide, Public Use Area, Special Use Area, Wilderness Area, and the Holy City. See Figure A-1.

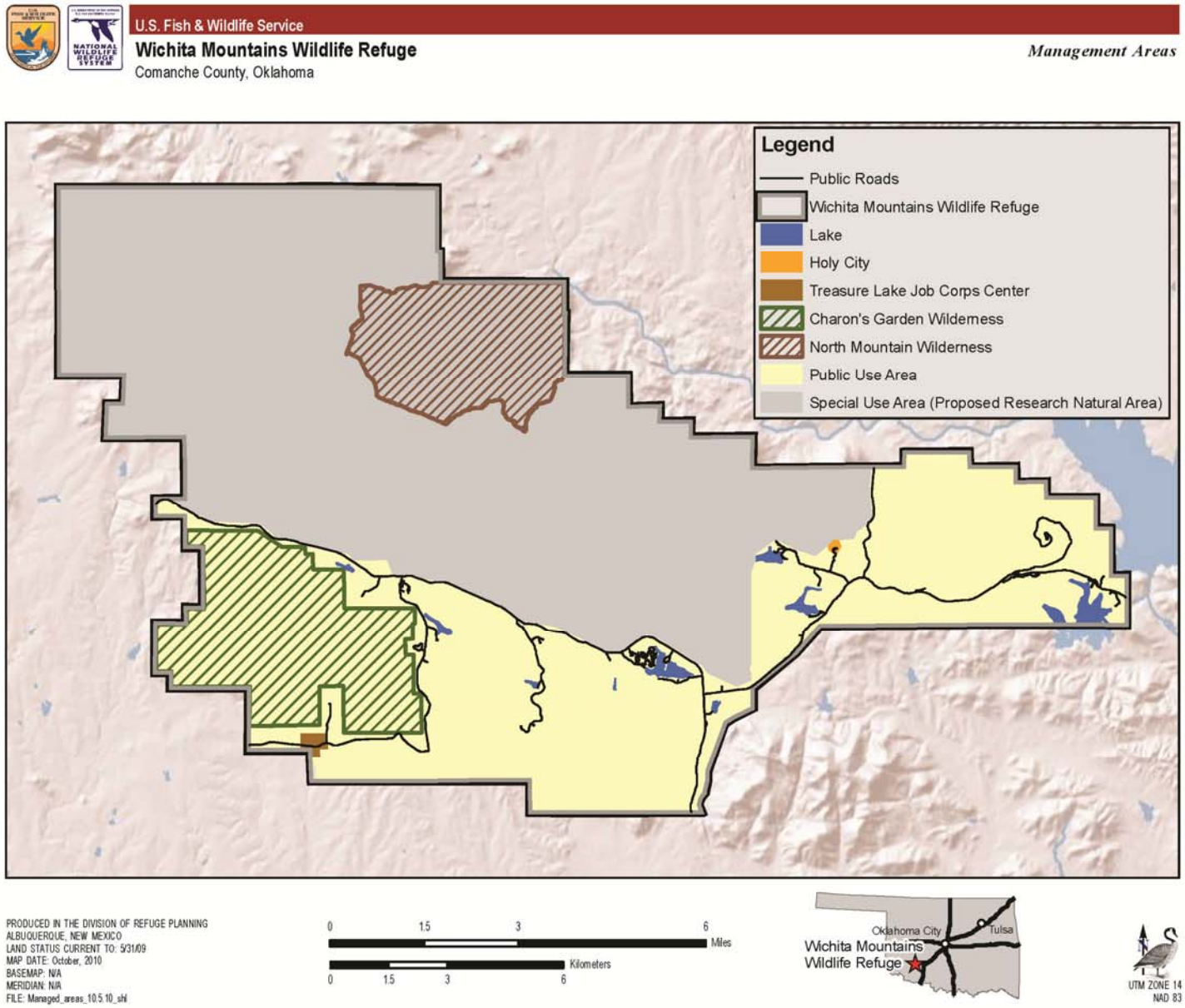


Figure A-1. Management Areas on Wichita Mountains Wildlife Refuge

## 2.5 Alternative A: No Action (Current Management)

This alternative is the baseline for comparison with the action alternatives because it does not involve change from current management programs and emphases. It represents biological management and public use activities presently occurring and those that have occurred on Wichita Mountains Wildlife Refuge during the last 10 or so years. Activities such as prescribed fire, wildlife management, photography, interpretation, environmental education, hunting, and fishing would continue without any major changes.

### Refuge-Wide Management

#### Climate Change

In accordance with Service policy, the Refuge would manage for climate change by incorporating adaptation, mitigation, and education strategies to reduce its carbon footprint. The Refuge would participate in the Great Plains Landscape Conservation Cooperative's or other partner's climate change-related studies and initiatives as opportunities arise. Refuge resources would be managed appropriately and adequately toward biological integrity, particularly for habitat resiliency and connectivity. The Refuge would continue to pursue energy conservation projects by improving the efficiency of fleet and facilities and by participating in a recycling program. Water use would continue to be minimized in administrative buildings through the retrofitting of water conservation equipment.

#### Air Quality

Refuge management activities that may affect air quality would continue to include prescribed fire, invasive species management, construction and maintenance of roads, and emissions from vehicle exhaust. Prescribed burns would continue to be initiated according to an approved Fire Management Plan (USFWS 2008) that includes smoke management criteria, and implemented according to Oklahoma's Voluntary Smoke Management Guidelines (Oklahoma Forestry Services 2010). The Refuge would continue to treat invasive flora and pests wherever they occur throughout the Refuge through chemical and mechanical means in accordance with the Integrated Pest Management Plan (2013). Chemical treatment is applied with a boom or wand; no aerial herbicide spraying would occur. Mechanical treatments would continue to be associated with facility or roadway maintenance and habitat management and would be conducted on a limited basis. Other habitat management activities, such as bison and longhorn roundups, would continue to be scheduled during periods when negligible fugitive dust is produced. All paved Refuge roads would continue to be heavily used by the public; most dirt roads would continue to be used sporadically by Refuge staff, resulting in low amounts of dust and vehicle emissions. The Refuge would continue to coordinate with the Service's Denver Air Quality Branch to ensure appropriate and consistent air quality monitoring at, but not limited to, the IMPROVE station to ensure protection of the Refuge's Class I Airshed status.

#### Fragmentation and Land Protection

The Refuge would implement and participate in the Great Plains Landscape Conservation Cooperative. The Refuge, located in the Central Flyway, would continue to provide migratory stop-over habitat during seasonal migration for Neotropical migrants, and limited habitat for shorebirds and waterfowl. The limited waterfowl and shorebird habitat occurring on the Refuge

primarily results from the construction of reservoirs. However, these habitats would continue to have limited species diversity because these reservoirs are primarily deep water habitat. Neotropical migrant habitat continues to persist because of the Refuge's efforts toward habitat management, such as through prescribed fire and grazing. Habitat for bats would continue to naturally occur on the Refuge for some bat species. Seasonally, bats forage and roost during migration. Some hibernation would continue to occur over winter and some breeding during spring and summer. Within and across the Refuge, distinct habitat and connections would persist and be only minimally impacted by Refuge management and infrastructure. Most megafauna would continue to travel within the Refuge. Bison (and Texas longhorn cattle) are restricted from leaving; however other species would continue to travel through and would not be restricted by fencing. The Refuge would remain a core habitat block, both a source and a destination for wildlife. Corridor connections that currently allow for plants and animals to move from the Refuge to adjacent or nearby habitat fragments would not be specifically identified or protected. There would also be no Land Protection Plan (LPP) to support land acquisition or Refuge expansion.

**Riparian Areas**

Riparian areas would continue to be a component of the ecosystem they occur in and would be managed in accordance with that ecosystem. Where roads cross streams, concrete low water crossings or bridges have been constructed to protect riparian resources and would be maintained to prevent or minimize erosion. High priority riparian areas adjacent to the Refuge or off-Refuge have not been identified and would not receive any special protection, with the exception of some areas on the Fort Sill Military Base, where riparian and wetland protection would be integrated into management and operations.

**Water Quality**

The Refuge would continue monitoring water quality through the Blue Thumb partnership with the Oklahoma Conservation Commission, mercury monitoring through OKDEQ, the EPA long-term Mercury Deposition Network program, and other partnerships. In being cognizant of public health and safety, the Refuge would continue to provide public outreach for and warnings of mercury contamination.

**Special Designations**

The Refuge would continue to maintain large habitat blocks by concentrating public use on the southeast portion of the Refuge. The northwest portion of the Refuge would be reserved as a Special Use Area where public use would largely be prohibited with the exception of facilitated hunts and interpretive tours. The Refuge would continue to reserve this area to facilitate the maintenance of an unencumbered habitat for resident and migrating wildlife; wildlife research; species management, including animal breeding; and species preservation activities, including efforts to protect the black-capped vireo.

**Water Resources**

Generally, lakes would be managed at full capacity with a focus on providing recreational fishing and water sources for herd management. Occasional drawdowns would be conducted to control aquatic invasive species, to manage fisheries, and to improve recreational fishing opportunities as described in the current Fisheries Management Plan (USFWS 2002). Drawdowns would also have the potential to provide habitat for waterbirds and migratory waterfowl and shorebird species. On

occasion, the Refuge would stock fish in the public use lakes and install fish structures in a few lakes where appropriate.

**Permitted Grazing**

Permitted grazing occurs on five small allotments on a total of 430 acres outside of the Refuge boundary fence. The north Refuge boundary fence was located south of the true boundary in some instances due to difficult terrain or incorrect mapping data. Grazing allotments occur on Refuge lands only where the boundary fence is incorrectly located. The Refuge permits this use, not to exceed 216 Animal Unit Months (AUMs), according to the terms of a Special Use Permit, renewable every year. The intent of this use is to promote and sustain grassland conditions outside of the Refuge boundary, reducing the opportunity for woody plant encroachment.

**Native Fauna**

Native fauna would continue to be managed at an established carrying capacity as described in the Bison Management Plan, Deer Management Plan, and Elk Management Plan, utilizing the Soil Conservation Service forage survey and range evaluation to determine carrying capacity. The 1985 Grasslands Management Plan identifies that the Refuge utilizes a maximum of 33 percent of available forage by weight from low forage production as determined in a 1971 range evaluation. In accordance with the Elk Management Plan, elk would be managed at no fewer than 380 individuals. White-tailed deer would be kept above a minimum of approximately 450 individuals as outlined in the Deer Management Plan. Bison would be managed at a minimum of 480 individuals according to the Bison Management Plan. Bison would be monitored for brucellosis and basic herd and genetic health. Public auctions for bison would continue to be held annually to remove excess animal populations; generally; 150-250 individuals are sold. Public white-tailed deer and elk hunts would continue to be used to manage population levels. For management of black-capped vireo, the Refuge would follow objectives identified in the 1991 Black-Capped Vireo Recovery Plan. Such objectives include working with other agencies and organizations for protection of areas, addressing cowbird threat and control, determining and developing methods for managing vireo habitat, and monitoring populations within areas deemed necessary for recovery.

**Non-Native Fauna**

Longhorn would be managed at an established carrying capacity as described in the Grasslands Management Plan and Longhorn Management Plan, utilizing the Soil Conservation Service forage survey and range evaluation to determine carrying capacity. In accordance with the Longhorn Management Plan, longhorns would be managed at approximately 285 individuals. They would also be monitored for brucellosis and basic herd health. Public auctions for longhorns would continue to be held annually to remove excess animal populations. Anywhere from 125-180 individuals are typically sold.

Feral hogs would be managed under the Refuge’s 2013 Integrated Pest Management Plan, which allows for trapping, aerial gunning, and opportunistic shooting. The Refuge would monitor its lakes for zebra mussels; none currently occur in these lakes.

### Hunting

Hunting would continue to occur throughout the Refuge and would be dependent upon population management objectives. The Refuge would hold white-tailed deer and elk hunts to prevent overpopulation and to alleviate habitat degradation. Hunts would occur from November through January and would be tightly controlled four-day events managed as a cooperative effort between the Refuge and Oklahoma Department of Wildlife Conservation. Hunters would be selected by random drawing and would have to obtain a State issued hunting license prior to applying. The number of permits and hunt days would vary each year, depending on the relationship between population levels and habitat conditions, but have averaged about 100 deer permits and 250 elk permits annually.

### Special Uses

*All public uses of a National Wildlife Refuge must support the purpose of that refuge and the mission of the National Wildlife Refuge System. Members of the public can request permission for special activities or events not included in the wildlife-dependent and supporting recreation use categories. Before a Special Use Permit can be issued for a new activity or use, the proposal must pass a determination of appropriate use, be evaluated for resource impacts in a Compatibility Determination, and may need to be submitted for public review as required by the National Environmental Policy Act (NEPA). Special use activities and associated permit issuance would continue on the Refuge according to these three broad categories:*

*Refuge Management Special Uses.* Administrative special uses would include research activities and specimen collections by universities. A Special Use Permit would continue to be required but not an appropriate use evaluation, a Compatibility Determination, or a NEPA document. In 2010, 13 permits were issued for research activities.

*Economic/Commercial Special Uses.* Economic or commercial special uses that support wildlife-dependent recreation would continue to include activities such as photography instruction, scuba instruction, and guided interpretive tours. These activities have historically been allowed to occur but have not been permitted. Commercial activities that support the purpose of the Refuge and mission of the Refuge System, and that pass appropriateness, compatibility, and NEPA reviews, may be allowed, including the bison and longhorn auctions. There are currently 12 annual commercial use permits issued to commercial operators—seven permits issued for rock climbing instruction and five permits issued for grazing of Refuge periphery lands.

*Non-Commercial Special Uses.* Non-commercial special uses would include events for which the Refuge partners with local communities and organizations such as the Tour de Meers and the Tour of the Wichitas bicycle events. These events have been evaluated in an appropriate use review and a Compatibility Determination but historically have not been issued permits. The Refuge issued seven Special Use Permits for cultural (including tribal) and religious (Holy City) purposes in 2010.

### Facilities

Facilities for administrative and public use would remain at current numbers (including the Headquarters Office building, maintenance and residential buildings, wildlife management facilities, and all public use facilities mentioned under Public Use Opportunities); they would

undergo only routine upkeep and maintenance. The majority of Refuge roads would continue to be well-maintained. Roadway shoulder expansions would continue on the Refuge and would create additional six- to eight-foot shoulders along State Highways 49 and 115 through the Refuge. Law enforcement would continue to patrol roads, pullouts, and parking areas, mainly for speed limits, illicit substance use or possession, and occasional vehicle theft or vandalism. Annual inspections would occur on dams and would be performed by the Refuge and others. The Refuge would maintain appearance and placement of hundreds of roadway directional and regulatory signs according to Service Sign Handbook guidance. The Refuge would use three portable variable message signs for special events like hunts and auctions. The Refuge would maintain 14 existing interpretive signs.

| Facility Type | Alternative A |
|---|---|
| Visitor Center | Built in 1997. Good condition but slightly outdated exhibits. |
| Environmental Education Center | Built in 1934. Good condition but slightly outdated. New roof in 2009. |
| Campgrounds | 2 Developed campgrounds – Doris and Fawn Creek. |
| Picnic Grounds | 4 Developed picnic grounds – Mt. Scott, Lost Lake, Boulder, and Sunset. |
| Wildlife Observation Blinds | 1 blind at EE Center. |
| Lake Jed Johnson Tower | Built in the 1930s. In disrepair and not currently open to the public. |
| Roads, Pullouts, and Parking Areas | 50 miles of paved roads, 13 miles of unpaved roads, and 89 pullouts and parking areas in Public Use area. 96 miles of unpaved roads in Special Use Area. |
| Trails | 9 trails Refuge-wide totaling 15.5 miles. |
| Fences | 90.3 miles of big game fence. Not along true Refuge boundary. |
| Gates | 5 public access gates are always open and include Medicine Park Gate and West Gate (OK-49), Cache Gate and Meers Gate (OK-115), and Indiahoma Gate. 119 administrative gates. |
| Dams | 20 lakes with dams. |
| Fishing Piers and Boat Ramps | 2 accessible fishing piers. 3 unhardened boat ramps. 1 paved boat ramp. |
| Kiosks | 4 trailhead kiosks. 2 entrance kiosks. |
| Signs | Hundreds of roadway directional and regulatory signs. 3 portable variable message signs. 14 interpretive signs. |
| Headquarters | Built in 1969. Good condition but outdated, includes Fire Office built in 1937. Maintain volunteer RV pads and old horse barn. |
| Residences | Residence 5 built in 1913; Residence 11 in 1932; Residence 2 in 1934; Residences 3, 4, and 8 in 1937; Residence 1 in 1938; Residences 7 and 12 in 1973. Most in fair condition. |
| Corrals | Auction corrals constructed in 1987. Other 2 corrals constructed in 1989. All in good condition but space is limited. |
| Storage Buildings | 15 total. Dates constructed vary. |

*Treasure Lake Job Corps*

The Job Corps site would continue to be managed according to a Memorandum of Agreement and easement with the U.S. Department of Labor and U.S. Department of Agriculture Forest Service.

The site would be jointly administered as an educational and vocational training site for youth in the southwestern portion of the Refuge.

### Cultural Resources

The Refuge would manage cultural resources according to law, regulation, and policy. The Refuge would protect known archaeological sites from human disturbance through active law enforcement. A Refuge-wide survey was conducted by the Museum of the Great Plains in 1964 and 1965, and five sites were identified as eligible and are listed on the National Register of Historic Places (NRHP). They are Boulder Cabin, Buffalo Lodge, the Cedar Creek Arrastra Site, Ferguson House, and Ingram House. Other facilities on the Refuge that were evaluated but were not identified as eligible for listing on the NRHP or facilities that were not evaluated but that may be eligible for inclusion would be maintained by the Refuge to preserve their historic character.

### Staffing and Budget

Base funding and staffing would continue at current levels, maintaining approximately 29 full-time staff (including four Law Enforcement officers) and several temporary employees, with the budget evenly divided between staff, operation, and maintenance. Further, the Refuge would continue to provide a headquarters for the Oklahoma/North Texas Fire Management District, maintaining around 11 full-time staff.

## Public Use Area Management

### Fishing

Twelve lakes totaling approximately 500 acres are located in the Public Use Area and would remain open to the public (with a State fishing permit) for fishing 24 hours a day. Paved and unhardened boat ramps, fishing piers, signs (including mercury warnings), and other facilities would occur throughout the Public Use Area for this activity. Most fishing would occur along Refuge banks and from impoundments. Stocking of resident fish species to enhance sport fishing opportunities would occur periodically in cooperation with the Oklahoma Department of Wildlife Conservation. Stocking, primarily with channel catfish, would occur on a limited and sporadic basis as funds and fish are available. Law enforcement of fishing activities would occur to monitor littering, possession of alcohol, and proper licensing. See Boating section.

### Wildlife Observation

Wildlife observation, particularly driving observation, would continue as the most popular public use of the Refuge. The Refuge receives about 1.5 million visits a year, all of which are considered wildlife observation visits. The Refuge would continue to offer world-class wildlife viewing opportunities at developed public use sites, along roadways, and on hiking and biking trails. The Public Use Area would continue to be open to public access via foot and vehicle. The entire Refuge would continue to be closed to public use after sunset with the exception of Doris Campground and night fishing. Foot and vehicle travel on arterial roads and trails in the Public Use Area would be prohibited during fall and winter permit hunts. Temporary access restrictions would occasionally be used to protect sensitive sites from harassment in the Public Use Area. The Refuge would continue to maintain two developed observation sites: Turkey Creek prairie dog town viewing area, which has a paved pullout parking area and two interpretive signs; and the

accessible nature trail at Quanah Parker Lake that offers waterfowl and wetland wildlife viewing, four interpretive signs, and accessible restrooms. The Refuge would also continue to maintain 89 pullouts and parking areas scattered along the Refuge road system to facilitate driving observations, one of which offers two interpretive panels.

**Photography**

The Refuge would provide numerous photography opportunities at developed public use sites, along roadways, and on trails. Photography opportunities, use patterns, and restrictions would be identical to those described in the previous Wildlife Observation section.

**Interpretation**

Active interpretation would consist of Ranger talks and nature walks on the Refuge and staffing at event booths off-Refuge. Contacts made annually number around 60,000 or more. Of that total, about 25 percent are primary and secondary students who visit the Refuge as a field trip destination, and over 1,000 are participants in the popular interpretive bus and hiking tours staffed by the Friends of the Wichitas. Over 150,000 people visit the Refuge Visitor Center per year, where most experience a passive form of interpretation provided by the many displays and exhibits. Countless thousands are contacted informally by roving staff members at popular observations areas such as Mt. Scott and Turkey Creek prairie dog town.

**Environmental Education**

In contrast to interpretive contacts, environmental education contacts would generally be longer (more than 2 hours) or involve a series of contacts based on the education curriculum of the school or organization requesting the service. Only about six percent of the contacts (about 9,300 people) made by the Visitor Services staff are considered environmental education and are generally comprised of college classes and alternative education classes. Environmental education classes would generally be held on the Refuge, and the Refuge would continue to partner with its Friends group to provide transportation assistance for students when needed. These classes would generally involve complex topics such as climate change, resource conservation, and endangered species and would be taught with a focus on what one individual can do to affect change.

**Bicycling**

Bicycling would be allowed on the 50 miles of paved roads within the Refuge, and on the 5.8-mile Mt. Scott mountain bike trail and access road. Only a small fraction of all Refuge visits currently involve bicycling, but it is gaining in popularity. Bicycling on paved roads would continue to be governed by State regulations and would be closed at dark according to Refuge policy. Public safety concerns include bicycles crossing cattle guards and lack of adequate shoulders to allow bicycles and vehicles to meet and pass. A project currently underway would continue to pave the highway shoulders along the sections of State Highways 115 and 49 that extend from the Medicine Park gate west and south to the Cache gate.

**Boating**

Boating is allowed on five lakes on the Refuge. Hand powered boats would continue to be permitted on Jed Johnson, Rush, Quanah Parker, and French Lakes. Electric trolling motors would be permitted on boats of 14 feet or less on Jed Johnson, Rush, Quanah Parker, and French Lakes. Sailboats, and any size boat or motor, would be allowed on Lake Elmer Thomas. A no-wake rule

is in effect on Lake Elmer Thomas. One paved and three unhardened boat ramps and other facilities would occur throughout the Public Use Area for this activity. Law enforcement of boating activities would occur to monitor littering, possession of alcohol, and proper licensing. See Fishing section.

**Camping**

Year-round developed camping opportunities would continue to be available at two locations within the Public Use Area: Doris Campground and Fawn Creek Youth Campground. Doris Campground would be a first come-first served campground with a total of 90 individual sites as follows: 23 with electricity (RVs or tents), 47 without electricity (RVs or tents), and 20 walk-in sites (tents only) with fees set accordingly. Doris Campground would also maintain three group sites available by reservation. Amenities at this campground would continue to include a telephone, bathrooms, showers, and drinking water. Fawn Creek Campground would be reserved for youth groups through university aged groups of 8-30 persons. Fees would be charged at Fawn Creek, per group, with stays allowed up to one week. No water or electricity would be available at Fawn Creek.

**Hiking**

The Refuge would continue to allow hiking throughout the Public Use Area year-round. Seven trails totaling about 12 miles, each with lengths from 0.36 to 5.7 miles, would be available to the public for hiking within the Public Use Area. The Dog Run Hollow Trail System is a National Recreation Trail, designated in 1981. Other trails include Little Baldy, Jed Johnson Tower, and the trail link between the Environmental Education Center and Doris Campground. The Kite Trail loop of the Dog Run Hollow Trail System receives heavy use, especially on weekends. Other trails receive light to moderate use throughout the year. Trail maintenance would continue to consist of brushing, removing downed trees, and minor ditching. The need for improved signage, additional drainage structures, and trail rehabilitation to reduce trail braiding and eliminate some social trails would continue for all trails. There would be no group size restrictions in place for this use. Some locations may be closed seasonally to protect resource values (i.e., nest locations, den sites). Search and rescue operations would occur occasionally for injured or lost hikers.

**Picnicking**

Four day-use picnicking areas, Mt. Scott, Lost Lake, Boulder, and Sunset Picnic Areas, with a total of 85 individual sites, are scattered throughout the Public Use Area and would continue to be open year-round during daylight hours. One group site, Boulder Cabin, would be available for rent for group picnicking with a fee. Fire rings, grills, trash receptacles, and toilets would be available at all sites. No limitations for group size would be set.

**Rock Sports (requiring specialized gear)**

Rock climbing, rappelling, and bouldering, or other activities that require specialized equipment such as ropes, harnesses, anchors, and pads, occur throughout the public use area year-round. (Spontaneous bouldering and scrambling that Refuge visitors engage in that do not require any type of special gear are considered part of the hiking experience.) Rock sports would be allowed during daylight hours throughout the Public Use Area of the Refuge, primarily occurring in the Mt. Scott and Narrows areas, with the notable exception of a prohibition of rappelling in the Narrows. Some locations may be closed seasonally to protect resource values (i.e., nest locations,

den sites). Only a small fraction of all Refuge visitors engage in these activities. The Refuge would continue to work collaboratively with the Wichita Mountains Climbers Coalition (WMCC) to evaluate and permit the replacement of fixed anchors and establishment of new routes. WMCC would continue to make recommendations about climbing standards (e.g., evaluate physical conditions of anchors needing replacement, assess if a proposed route meets climbing standards) to the Refuge, and the Refuge would use these recommendations to make adjustments as needed. There would be no group size restrictions in place for these activities. (The 1995 Rock Climbing Compatibility Determination EA encourages commercial climbing instructors to limit group size to less than 15 people.)

## Administrative Area Management

### Holy City General Management

Holy City would continue to be managed according to a five-year Special Use Permit (renewable for 25 years) held by the Wallock Foundation to manage and administer events on this 66-acre site.

## Special Use Area Management (including North Mountain Wilderness Unit)

### Interpretation

The Association of the Friends of the Wichitas would continue to offer interpretive tours into the Special Use Area on established routes. The 7 summer wildlife tours, 6 winter eagle tours, 15 fall elk tours, and 3 fall foliage tours would provide over 800 people each year with an opportunity to experience the Special Use Area. The tours would be limited to established routes in the Special Use Area, and participants may get off the bus briefly to observe or photograph wildlife and scenery but would not be allowed to hike. A short walk would be included in the Fall Foliage Tour.

## Wilderness Area Management (including Charons Garden Wilderness Unit)

### Wildlife Observation

The Charons Garden Wilderness Area would continue to be open to hiking-based viewing opportunities. The Wilderness area would be closed to public use after sunset with the exception of backcountry camping. Temporary access restrictions would occasionally be used to protect sensitive sites from harassment in the Charons Garden Wilderness Area.

### Photography

The Charons Garden Wilderness Area is open to hiking-based photography opportunities. Photography opportunities and restrictions would be identical to those described in the previous Wildlife Observation section.

### Interpretation

Very little organized interpretation would be conducted or offered in the Charons Garden Wilderness Area in an attempt to maintain the unique opportunity for solitude that a congressionally designated wilderness offers. Two trailhead kiosks would offer general Refuge

updates and information. Wilderness management and Leave No Trace information would frequently be included in interpretative talks and at event booths. The Friends of the Wichitas would continue to lead three spring wilderness hikes that provide an on-site interpretive experience for up to 26 people per hike.

**Environmental Education**

Very little environmental education would be conducted or offered in the Wilderness area in an attempt to maintain the unique opportunity for solitude that a congressionally designated wilderness offers. Wilderness management and Leave No Trace information would frequently be included in education modules and events at other locations.

**Camping**

Backcountry camping in the Charons Garden Wilderness Area would continue to be allowed with a backcountry permit issued at the Visitor Center. Campers would be charged a fee for the permit and must camp within a designated camping area. Up to 10 permits would be issued for a maximum stay of two nights for a period of either Monday through Wednesday or Friday through Sunday. The Charons Garden Wilderness Area averages about 1,500 campers per year, with most use occurring during the spring and fall.

**Hiking**

Hiking would continue to be permitted anywhere within the Wilderness area. Two designated trails (Elk Mountain and the Charons Garden Wilderness Area trails) offer the hiker 3.5 miles of rugged, rocky hiking. Numerous social trails and game trails crisscross the area surrounding the designated trails. The Elk Mountain Trail is the most heavily used trail on the Refuge. Both trails have received sporadic brushing and maintenance of water drainage structures over the last decade, and this infrequent maintenance would continue. The trails are in need of annual, routine maintenance such as brushing, trail marking to improve wayfinding and to reduce trail braiding, and drainage control to reduce erosion and down-cutting. Because Charons Garden is a congressionally designated Wilderness area, all trail maintenance must be performed using non-mechanized hand tools to stay within the requirements of the Wilderness designation. There would be no restrictions on group size. Most Search and Rescue operations on the Refuge involve hikers in the Charons Garden Wilderness Area.

**Rock Sports (requiring specialized gear)**

Rock sports (including climbing, rappelling, and bouldering) would continue to occur throughout the Wilderness area and would be allowed year-round during daylight hours. Some locations may be closed seasonally to protect resource values (i.e., nest locations, den sites). Only a small fraction of all Refuge visitors engage in these activities. The Refuge would continue to work collaboratively with the Wichita Mountains Climbers Coalition (WMCC) to evaluate and permit the replacement of fixed anchors and establishment of new routes. WMCC would make recommendations about climbing standards (e.g., evaluate physical conditions of anchors needing replacement, assess if a proposed route meets climbing standards) to the Refuge, and the Refuge would use these recommendations to make adjustments as needed. Fixed anchor replacement or other modifications must be done with hand drills or other similar non-mechanized equipment in keeping with the purpose and intent of the congressionally designated Wilderness area. There would be no group size restrictions in place for climbing in the Wilderness area. (The 1995 Rock

Climbing Compatibility Determination EA encourages commercial climbing instructors to limit group size to less than 15 people.)

## 2.6 Alternative B – Proposed Action

This alternative would provide for a proactive approach to making concerted strategic decisions, through the consideration and analysis of the best available science, based on the goals for management of the Refuge. This alternative was developed based on input received from the public, ODWC, ecoregion partners, Service staff, Service biological and visitor services reviews, and the professional judgment of the planning team. This alternative is based on successful pre-existing Refuge management strategies and has incorporated ecological principles that apply to the Central Mixed-Grass Prairie Ecoregion.

This is the alternative that would best achieve Refuge purposes, vision, and goals and would best contribute to the Refuge System mission. Alternative B, with associated goals, objectives, and strategies, comprises the CCP for the Wichita Mountains Wildlife Refuge. This alternative would also stress the use of adaptive resource management based on observation and the most current scientific research.

### Refuge-Wide Management

#### Climate Change

Same as Alternative A, plus: The Refuge would look for opportunities to monitor effects locally, such as through National Oceanic and Atmospheric Administration (NOAA) U.S. Climate Reference Network monitoring stations. The Refuge would prepare for potential increased fluctuations in precipitation and temperature through natural resource partnerships and appropriate facility design using the most current technologies. An adaptive management approach would be incorporated to prepare for or adapt to water shortages and may include the improvement or development of new water sources.

#### Air Quality

Same as Alternative A, plus: Where appropriate, the Refuge would pursue a strategy of bio-utilization of woody biomass (especially eastern red cedar) to avoid impacting air quality associated with burning. (This infrastructure is not yet in place; if and when the opportunity arises, the Refuge would support its partners and participate in this effort.) The Refuge would increase its dust abatement efforts such as by spraying roads with water to minimize dust or using containment curtains when travelling backcountry roads and performing construction activities. The Refuge would pursue a shuttle route or interpretive tours; this may include the Refuge having visitors park vehicles at the Visitor Center, nearby museums, and other high traffic areas and transporting the visitors to recreation sites and/or providing Refuge tours. The Refuge would also increase its hybrid and alternative fuel use.

#### Fragmentation and Land Protection

The Refuge would develop a Preliminary Project Proposal and, upon approval, a Land Protection Plan, to explore opportunities for Refuge expansion through land acquisitions or other means (such as conservation easements and cooperative management agreements). Work would be

conducted along with and through the Landscape Conservation Cooperative (LCC), The Nature Conservancy, and other partners for the creation of acknowledged and protected corridors regionally. The Refuge would then prioritize future protection efforts towards connecting valuable habitat fragments in identified corridors.

**Riparian Areas**
Same as Alternative A, plus: Develop tactics and outreach to surrounding landowners to maintain riparian corridors outside of the Refuge. Prioritize future protection efforts towards connecting valuable habitat fragments in identified corridors, and take a strategic approach to identifying corridors. The Refuge would also repair and maintain existing crossings and construct new ones in areas in need of protection.

**Water Quality**
Same as Alternative A, plus: The Refuge would expand monitoring of mercury in lakes to include additional waterbodies.

**Special Designations**
The Refuge would designate and manage the Special Use Area (SUA) as a Research Natural Area (RNA). Public use would occur as in Alternative A with the incorporation of adaptive management (e.g., moving or modifying some uses) if serious impairment of the natural condition is found.

**Water Resources**
Same as Alternative A, plus: The Refuge would construct a fish passage structure on West Cache Creek at the Refuge-Fort Sill boundary to improve fish movement. The Refuge would also evaluate and establish historic stream flow regimes through a Water Resource Inventory and Assessment.

**Permitted Grazing**
Same as Alternative A until the boundary fence is moved to the true Refuge boundary. Then this use would be phased out and discontinued over time.

**Native Fauna**
Managed populations would be targeted at levels to allow for habitat variability. The Refuge would continue to hold public auctions (bison) and hunts (deer and elk) to manage populations. The Refuge would evaluate increasing, through a revised Bison Step-Down Plan or the Habitat Management Plan (HMP), the bison herd to a genetically effective population size (and would continue to implement the Department of the Interior Bison Initiative model). Updates or revisions to the HMP would include all fauna management, including bison herd size. The Refuge would increase and improve genetic monitoring as genetic techniques are developed. The pyric herbivory fire-grazing interaction would be fully implemented. Expansion of black-capped vireo habitat stewardship on adjacent lands would be promoted. The NWRS Inventory and Monitoring Program would be implemented. Monitoring of long-term trends in the evaluation of utilization plots and animal health (through monitoring of weight and parasite loading) would occur, along with the adaptive management of the bison herd through pyric herbivory.

**Non-Native Fauna**
Managed populations would be targeted at levels to allow for habitat variability. The Refuge would continue to hold public auctions (longhorn) to manage populations. The Refuge would evaluate decreasing or moving the longhorn herd to an alternate location for the purpose of increasing the bison herd to a genetically effective population size. Updates or revision to the Habitat Management Plan would include all fauna management, including the relationship between longhorn herd size and bison herd size. The pyric herbivory fire-grazing interaction would be fully implemented. The NWRS Inventory and Monitoring Program would be implemented.

Feral hogs would be managed under the Refuge's 2013 Integrated Pest Management Plan, which allows for trapping, aerial gunning, and opportunistic shooting. The Refuge would continue to monitor its lakes for zebra mussels as under Alternative A; none currently occur in these lakes. The Refuge would also consider more aggressive and proactive measures to avoid zebra mussel introduction through coordination with other agencies and organizations such as ODWC, such as by adding a boat wash station at Lake Elmer Thomas.

**Hunting**
Same as Alternative A. Administration of the current hunt program requires a substantial commitment of staff time and resources. At this time, it is not practical or feasible to increase hunting opportunities. In the future, should additional resources become available or more hunts become necessary to manage habitat and wildlife, the Refuge could consider adding or modifying hunting opportunities through a separate NEPA process.

**Special Uses**
Same as Alternative A, plus: The Refuge would complete an appropriate use review, Compatibility Determination, and NEPA analysis as required for all administrative, commercial, and non-commercial special use activities. The Refuge would ensure that special use activities are conducted under a Special Use Permit that protects Refuge resources and minimizes conflicts between user groups. Additional special use management direction would be developed as part of an updated Visitor Services Plan.

**Facilities**
Same as Alternative A, with the exception of the following:

| Facility Type | Alternative B |
|---|---|
| Visitor Center | Update and remodel using green technologies; increase accessibility; construct nature trail. |
| Environmental Education Center | Update and remodel using green technologies; increase accessibility. Expand use of facility by classes and organizations. |
| Campgrounds | Develop or strengthen partnerships to meet local demand for high quality camping experience off-Refuge. |
| Picnic Grounds | Develop or strengthen partnerships to meet local demand for high quality picnicking experience off-Refuge. |
| Wildlife Observation Blinds | Install 2 wildlife observation blinds (Quanah Parker Lake/EE Center and Lake Elmer Thomas/Mt. Scott Picnic Area). |

| Facility Type | Alternative B |
|---|---|
| Lake Jed Johnson Tower | Rehabilitate the Tower for observation and photography activities. |
| Roads, Pullouts, and Parking Areas | Increase maintenance on roads, pullouts, and parking areas. Redesign Turkey Creek prairie dog area. Improve the roadway approaching Lake Jed Johnson Tower parking area to accommodate pedestrians, bicycles, and larger vehicles. Create bike routes (including the Scenic Byway area) and connect existing routes (Lawton, Medicine Park, Cache connections) with roadway improvements. Implement broader shoulder improvements on 2 road segments (State Highway 115 from the Meers intersection north to the Meers gate, approximately 2 miles, and on State Highway 49 from the Meers T intersection to the Medicine Park gate, approximately 4.6 miles) to enhance the operating environment for motorized and non-motorized vehicles. |
| Trails | Develop a multi-purpose trail between the Refuge Visitor Center and the EE Center. Upgrade the existing EE/Camp Doris trail to meet accessibility standards to create a safe and efficient link between the 3 most heavily used visitor facilities that would supplant the need to drive; improve the old Jed Johnson Tower access road to provide accessible hiking; provide trail linkages between the Refuge and LETRA through construction of new segments or reconstruction of old segments. Improve existing administrative road for pedestrians by linking the Mt. Scott Picnic Area and Lake Elmer Thomas. |
| Fences | Build or move the big-game fence to the true Refuge boundary. |
| Fishing Piers and Boat Ramps | Improve and/or increase maintenance and harden boat ramps. Add three new accessible fishing piers at Quanah Parker, Jed Johnson, and Crater Lakes. |
| Kiosks | Add new or replace existing entrance and trailhead kiosks. |
| Signs | Enhance roadway wayfinding system information and signage suitable for motorists, bicyclists, and pedestrians to help visitors find their location and navigate through the Refuge. |
| Headquarters | Replace the current Headquarters building to increase green technologies and accessibility. Expand volunteer RV facilities. |
| Residences | Improve and remodel existing facilities. |
| Corrals | Expand corrals to meet demand of bison herd. |

*Treasure Lake Job Corps*
Same as Alternative A, plus: Partnership opportunities to include increased environmental education and Refuge-specific projects would be considered.

### Cultural Resources
Same as Alternative A, plus: The 1964-1965 archaeological survey would be updated by completing systematic archaeological surveys Refuge-wide. The integrity of known sites would be monitored.

### Staffing and Budget
Base funding and staffing would increase as determined by the CCP in order to fully implement this alternative.

## Public Use Area Management

### Fishing

Same as Alternative A, plus: Fishing opportunities would be improved through increased interpretive signage or educational kiosks, three new fishing piers (see Facilities section for this alternative), increased visitor contacts, and increased law enforcement contacts. Improvements would be focused in the high density use zone to relieve fishing pressure from the medium and low density use zones (see Public Use Density Areas map). A public use density zoning strategy would be used to reduce the pressure and impacts of human use in and around the Charons Garden Wilderness Area by improving public use opportunities and developments in the underutilized east section of the Refuge near Mt. Scott. A youth fishing day clinic would be added to the fishing program. Fishing piers would be added at Quanah Parker, Jed Johnson, and Crater Lakes. Problems with litter or other illegal activities that diminish the quality of the fishing experience would be addressed through education, increased law enforcement, and additional trash/recycle facilities. See Boating section.

### Wildlife Observation

Same as Alternative A, plus: The Refuge would enhance wildlife observation opportunities by upgrading existing facilities and by constructing new facilities, such as the Jed Johnson Tower and trail and two wildlife viewing blinds (see Facilities section for this alternative). Online observation tools and tips would be developed to aid in awareness of observation opportunities. The Refuge would develop and designate a wildlife observation loop using existing public roads and trails. Additional wildlife observation management direction would be developed as part of an updated Visitor Services Plan.

### Photography

Same as Alternative A, plus: Evening and weekend workshops on photographic techniques and etiquette would be added. Photography web pages with seasonal information would be developed. All activities and developments proposed for the wildlife observation program would also benefit the photography program. Additional photography management direction would be developed as part of an updated Visitor Services Plan.

### Interpretation

Same as Alternative A, plus: The Refuge would update exhibits at the Visitor Center and perform regular maintenance or rotation to keep them up-to-date. An interpretive nature trail loop around the Visitor Center would be constructed. The Refuge would create and designate the location for a driving tour with interpretive signs along an established route with posted speed limits, pullouts, and audio capability. Interpretive signs would be installed principally at developed sites in the high density use zone, but also in the medium and low use density zones. Public evening and weekend interpretive workshops would be expanded. Additional interpretation management direction would be developed as part of an updated Visitor Services Plan.

### Environmental Education

The Refuge would work to develop the Environmental Education Center as an educational training facility. All school classes and/or programs would be hosted on Refuge (instead of off-Refuge), and the number of environmental education contacts would be increased from 6 percent to 10

percent of all students contacted. All environmental education programs would be linked to the Oklahoma State curriculum.

**Bicycling**
Same as Alternative A, plus: Bike routes (including the Scenic Byway area) would be created, and the connectivity of existing routes (Lawton, Medicine Park, Cache connections) would be improved on approximately 13 miles of road. The Refuge would increase the quality (linking) of routes to LETRA, Cache, Medicine Park, Meers, and Lawton via partnerships. The Refuge would also consider developing a bicycle share pilot program as part of an updated Visitor Services Plan.

**Boating**
Same as Alternative A, plus: The quality of boating opportunities would be improved through increased interpretive signage or educational kiosks and increased visitor contacts. Problems with litter or other illegal activities that diminish the quality of the boating experience would be addressed through education, increased law enforcement, and additional trash and/or recycle facilities. Improvements would be focused in the high density use zone to relieve boating (and associated activity) pressure from the medium density use zone (see Public Use Density Areas map). See Fishing section.

**Camping**
Same as Alternative A, plus: The Refuge would encourage the increase of camping opportunities adjacent to the Refuge by working with partners (e.g., the creation of a pedestrian and bicycle connection from the Refuge high-use density zone to adjacent campgrounds off-Refuge).

**Hiking**
Trail maintenance would continue as under Alternative A. The Refuge would increase and improve accessible hiking opportunities (trail between the Environmental Education Center and the Visitor Center, Jed Johnson, and LETRA) and build a link between Mt. Scott Picnic Area and Elmer Thomas. Install information kiosks, trash cans, and recycle receptacles at trailheads. The Refuge would require all hikers to register on site so the Refuge can monitor use patterns (such as the type of use, area of use, group size, etc.) and public safety. Conduct a study to determine social and resource thresholds of hiking activity. The Refuge would maintain the existing volume of hiking but redistribute pressure to developed areas and out of Wilderness area. Management direction for hiking would be expanded as part of an updated Visitor Services Plan with a visitor use strategy that offers more engaging and diverse visitor opportunities in the areas of highest use (the east side of the Refuge) to relieve pressure on the low density use areas (Charons Garden Wilderness Area). Group size in the high density use area (see Public Use Density Areas map) could exceed 30 people without a Special Use Permit, group size in the medium density use area could number up to 30 people without a Special Use Permit, and group size in the low density use area (Charons Garden Wilderness Area) could number up 15 people without a Special Use Permit.

**Picnicking**
The Refuge would expand existing picnicking opportunities by working with partners to meet the need for more picnicking in areas adjacent to the Refuge. The quality of the visitor experience in the high density use zone (Mt. Scott picnic area) would be improved by increasing interpretive services, interpretive signage, kid-friendly landscaping, and recycle and/or garbage services.

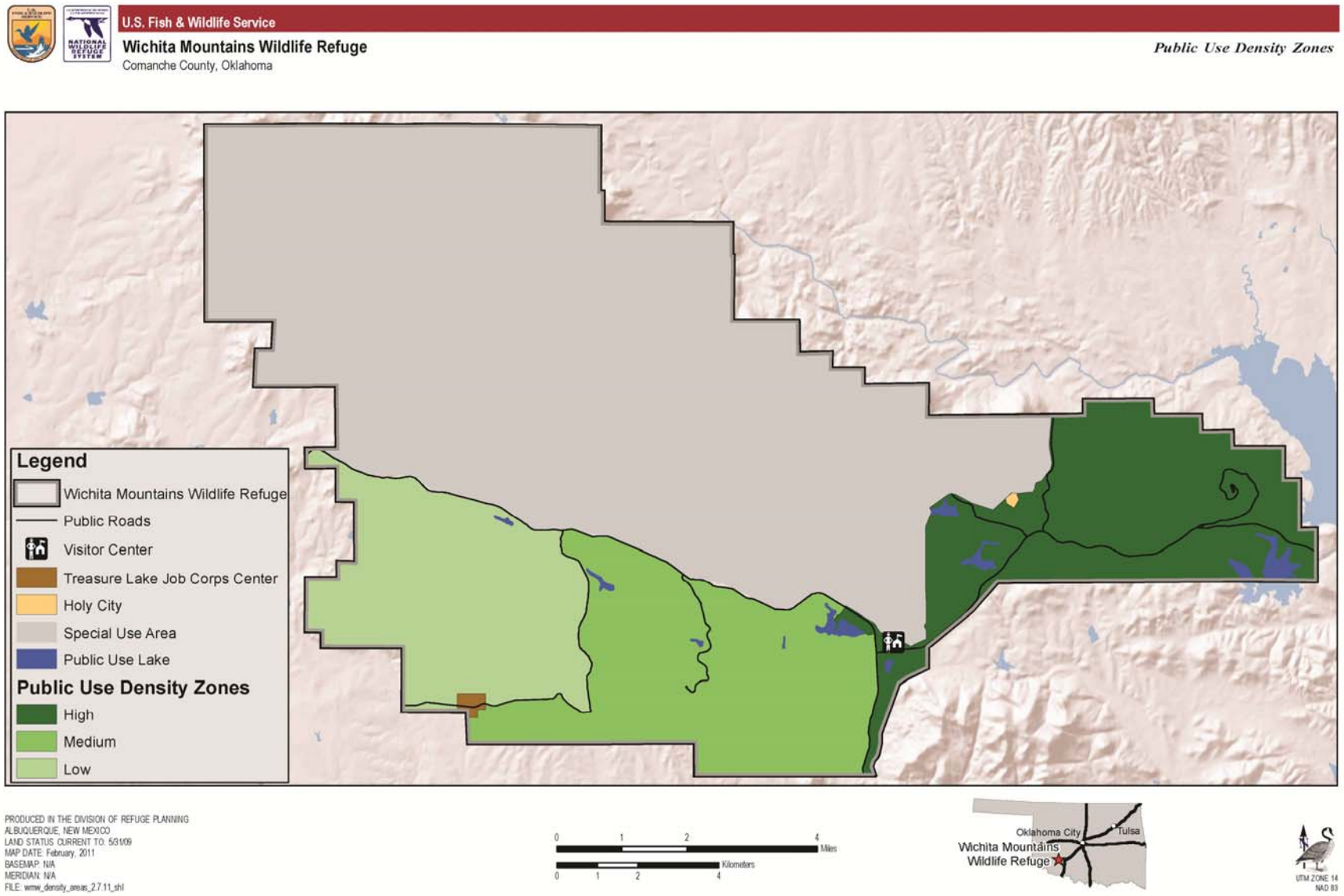


Figure A-2. Public Use Density Zones

Less-utilized picnic areas (Boulder and Lost Lake) in the medium density use area would be improved. The Refuge would redistribute use within existing facilities by increasing services, by improving the LETRA connection and other trail connections, and by allowing for larger groups in high use areas. This use would ultimately be moved or concentrated toward the Refuge's high use zone. The medium use zone would be maintained. Disturbance in the low density use areas (particularly at Sunset Picnic area) would be minimized through improved services such as increasing awareness of other sites and education on wilderness character.

**Rock Sports (requiring specialized gear)**
Same as Alternative A, plus: The Refuge would require all rock sport participants to register on site so the Refuge can monitor use patterns (such as the type of use, area of use, group size, etc.) and public safety. The Refuge would conduct a study to determine social and resource thresholds of rock sports to appropriately manage these activities to fit high, medium, and low density use zones. Fixed anchor review guidelines would be incorporated in the Visitor Services Plan. Replacement of fixed anchors would continue to be permitted but placement of new anchors would be limited. Group size restrictions for rock sports would be identical to those described for hiking. Large groups would be directed to the high use density area, which includes Mt. Scott.

## Special Use Area Management (including North Mountain Wilderness Unit)

**Interpretation**
Same as Alternative A, plus: The Refuge would maintain the interpretive tours but would use adaptive management and modify or move the tours if needed to protect wildlife and habitat integrity. Additional interpretation management direction would be developed as part of an updated Visitor Services Plan.

## Wilderness Area Management (including Charons Garden Wilderness Unit)

**Wildlife Observation**
Same as Alternative A, plus: Additional wildlife observation management direction would be developed as part of an updated Visitor Services Plan.

**Photography**
Same as Alternative A, plus: Additional photography management direction would be developed as part of an updated Visitor Services Plan.

**Interpretation**
Same as Alternative A, plus: The Refuge would limit group hikes to 15 people or less.

**Environmental Education**
The Refuge would minimize organized environmental education in the Wilderness area.

**Camping**

Same as Alternative A, plus: The Refuge would work toward decreasing impacts from camping by implementing Leave No Trace (such as through brochures, signs, etc).

**Hiking**

The Refuge would work toward decreasing impacts from hiking by implementing Leave No Trace (such as through brochures, signs, Trail Rangers, etc). Pressure would be redistributed to trails in the high and medium density use areas and out of the Wilderness area via group size restrictions and education. Trail maintenance would be improved to reduce habitat impacts. All hikers would be required to register on site. The Refuge would monitor and evaluate thresholds for acceptable levels of social and resource impacts. The Refuge would also revise the Wilderness Stewardship Plan and create a Step-Down trail plan. Groups would not exceed 15 people without a Special Use Permit.

**Rock Sports (requiring specialized gear)**

Same as Alternative A, plus: Develop a Wilderness Stewardship Plan (WSP). Fixed anchor management direction in the WSP would provide consistent direction for evaluating and monitoring fixed anchors and would ensure that Wilderness resource values are protected. Fixed anchor permit proposals would continue to be evaluated by the Wichita Mountains Climbers Coalition. Approval of new routes requiring fixed anchors would be very limited and based on adherence to the fixed anchor management direction in the WSP and the significance of the new wilderness climbing opportunity. Users would be required to register on site to monitor use patterns (such as the type of use, area of use, group size, etc.). Group size would not exceed 15 people without a Special Use Permit.

**Administrative Area Management**

**Holy City**

Same as Alternative A, plus: Monitor use and effects to Refuge resources. Adapt management of activities if resources are being adversely affected.

## 2.7 Alternative C

Alternative C is based on input received from the public, ODWC, ecoregion partners, Service staff, and biological and visitor services reviews. This alternative responds to the issues of habitat management for megafauna and the request for greater public access throughout the Refuge. Alternative C would depart from Alternative A by emphasizing a change to habitat and wildlife management and increases in public use opportunities where they do not currently exist.

**Refuge-Wide Management**

**Climate Change**

Same as Alternative B.

**Air Quality**
Same as Alternative B.

**Fragmentation and Land Protection**
Same as Alternative B.

**Riparian Areas**
Same as Alternative B.

**Water Quality**
Same as Alternative B.

**Special Designations**
Same as Alternative A, except: The Refuge would allow greater amounts of controlled public access and use.

**Water Resources**
Same as Alternative B.

**Permitted Grazing**
Same as Alternative B.

**Native Fauna**
Same as Alternative B, plus: The Refuge would evaluate the feasibility of pronghorn antelope and wolf reintroduction.

**Non-Native Fauna**
Same as Alternative A, except: The Refuge would increase the longhorn herd size.

**Hunting**
The Refuge would review and revise its administration of hunts in an attempt to reduce resources needed to implement hunts. Turkey hunts would be considered based on population management. Feral hog hunts or the taking of feral hogs while hunting other species would be considered.

**Special Uses**
Same as Alternative A, plus: Develop a Visitor Services Plan that institutes appropriate Special Use Permit fees and permit administration.

### Facilities

| Facility Type | Alternative C |
|---|---|
| Visitor Center | Same as Alternative B. |
| Environmental Education Center | Same as Alternative B. |
| Campgrounds | Same as Alternative B, plus: Expand electric sites at Doris Campground. |
| Picnic Grounds | Same as Alternative B. |
| Lake Jed Johnson Tower | Same as Alternative B. |
| Wildlife Observation Blinds | Evaluate the need for more blinds or other infrastructure through the Visitor Services Plan. |
| Roads, Pullouts, and Parking Areas | Evaluate the need for additional pullouts in the high density use zone and along the driving route. Emergency telephones would be added. |
| Trails | Develop additional hiking opportunities in the high density use zone. Expand biking opportunities in the Public Use Area. |
| Fences | Same as Alternative B. |
| Dams | Same as Alternative A. |
| Fishing Piers and Boat Ramps | Evaluate the need for additional fishing piers through the Visitor Services Plan based on fishing pressure. |
| Kiosks | Same as Alternative B. |
| Signs | Same as Alternative B. |
| Headquarters | Same as Alternative A, plus: Remodel the Headquarters building. |
| Residences | Same as Alternative B. |
| Corrals | Same as Alternative B. |
| Storage Buildings | Same as Alternative A. |

*Treasure Lake Job Corps*
The Refuge would relocate the site off-Refuge.

### Cultural Resources
Same as Alternative B, plus: The Refuge would identify sites in the Public Use Area at a greater risk of disturbance. The Refuge would also nominate additional sites for the National Register of Historic Places.

### Staffing and Budget
Base funding and staffing would increase as compared with Alternative A in order to meet the needs of the increased habitat management and public use opportunities under this alternative. New construction and maintenance would be increased over levels provided for under Alternative A. Facilities for administrative uses (and for public uses) would be upgraded or newly built to accommodate increased staffing and public use. The expanded staff would include additions of Law Enforcement officers, biologists, visitor services staff, and maintenance personnel on the Refuge, as this alternative would expand public use and access.

## Public Use Area Management

### Fishing
Same as Alternative B, plus: The Refuge would evaluate the need for additional fishing piers through the Visitor Services Plan based on fishing pressure.

### Wildlife Observation
Same as Alternative A, plus: Additional wildlife observation management direction would be developed as part of an updated Visitor Services Plan.

### Photography
Same as Alternative A, plus: Additional photography management direction would be developed as part of an updated Visitor Services Plan.

### Interpretation
Same as Alternative B.

### Environmental Education
Same as Alternative B.

### Bicycling
Same as Alternative B, plus: The Refuge would re-open the Burma Road to bicycling.

### Boating
Same as Alternative B.

### Camping
Same as Alternative B.

### Hiking
Same as Alternative B, plus: The Refuge would develop additional hiking opportunities in the high density use zone.

### Picnicking
Same as Alternative B.

### Rock Sports (requiring specialized gear)
The Refuge would eliminate technical (gear assisted) rock climbing.

## Special Use Area Management (including North Mountain Wilderness)

### Interpretation
Same as Alternative B.

## Wilderness Area Management (including Charons Garden Wilderness)

### Wildlife Observation
Same as Alternative B.

### Photography
Same as Alternative B.

### Interpretation
Same as Alternative B.

### Environmental Education
Same as Alternative B.

### Camping
Same as Alternative B.

### Hiking
Same as Alternative B.

### Rock Sports (requiring specialized gear)
The Refuge would eliminate technical (gear assisted) rock climbing.

## Administrative Area Management

### Holy City
The Refuge would remove facilities and structures.

Table A-1. Summary of Alternatives

| Issues | Alternative A – No Action | Alternative B – Proposed Action | Alternative C |
|---|---|---|---|
| ***Ecoregion*** | | | |
| | | **Refuge-Wide Management** | |
| **Climate Change** | Participate in the Great Plains Landscape Conservation Cooperative (GPLCC). Improve efficiency of fleet and facilities. Participate in recycling. | Same as Alternative A, plus: Seek additional monitoring opportunities. Identify alternative energy and water sources. | Same as Alternative B. |
| **Air Quality** | Implement prescribed burns according to smoke management criteria. Treat invasive plants with a directed spray boom or wand. Mitigate maintenance or round-ups to abate dust. Monitor Class 1 Airshed, atmospheric mercury, and particulates. | Same as Alternative A, plus: Pursue bio-utilization of woody biomass. Increase dust abatement efforts. Pursue park-and-ride commuting or tours and other means to reduce traffic on the Refuge. | Same as Alternative B. |
| **Fragmentation and Land Protection** | Participate in GPLCC. Recognize existing wildlife corridors on the Refuge and promote Refuge as a core habitat block. No Land Protection Plan (LPP) exists. | Identify wildlife corridors. Explore Refuge expansion opportunities (such as through land acquisition, conservation easements, or cooperative agreements) by developing a Preliminary Project Proposal (PPP) and, if approved, an LPP. | Same as Alternative B. |
| **Riparian Areas** | Manage with surrounding ecosystem. Construct and/or maintain low water crossings or bridges. | Same as Alternative A, plus: Outreach maintenance of riparian corridors to surrounding landowners. Prioritize efforts to connect valuable habitat fragments in identified corridors. | Same as Alternative B. |
| **Water Quality** | Monitor and provide public outreach on water quality and mercury contamination through partnerships. | Same as Alternative A, plus: Expand monitoring of mercury. | Same as Alternative B. |
| ***Habitat*** | | | |
| | | **Refuge-Wide Management** | |
| **Special Designations** (See Special Use Area Management section in this Table) | Reserve northwest portion of the Refuge as a Special Use Area (SUA). Prohibit unrestricted public access and use. | Designate and manage the SUA as a Research Natural Area (RNA). Continue public use and access as in Alternative A with the incorporation of adaptive management if/when resources are at risk. | Same as Alternative A, with the exception of allowing more general, although controlled, public access and use. |

| Issues | Alternative A – No Action | Alternative B – Proposed Action | Alternative C |
|---|---|---|---|
| **Water Resources** | Manage lakes at full capacity. Conduct occasional drawdowns to control invasive species, manage fisheries, and improve fishing opportunities. | Same as Alternative A, plus: Construct a fish passage on West Cache Creek to improve fish crossings. Conduct a Water Resources Inventory and Assessment. | Same as Alternative B. |
| **Permitted Grazing** | Permit grazing on 5 small allotments on Refuge property located outside of the Refuge boundary fence to mimic grassland conditions on the Refuge. | Same as Alternative A, with the exception of phasing out and discontinuing grazing permits on Refuge lands when fences are moved to the true Refuge boundaries. | Same as Alternative B. |
| ***Wildlife*** | | | |
| **Refuge-Wide Management** | | | |
| **Native Fauna** | Manage native fauna (elk, deer, and bison) at or near carrying capacity. Hold public auctions (bison) and hunts (elk and deer) to manage population levels. Manage black-capped vireo according to recovery plan. Promote the fire-grazing interaction that historically occurred. | Manage populations at levels targeted to allow for habitat variability. Evaluate increasing the bison herd. Improve genetic monitoring. Hold public auctions (bison) and hunts (elk and deer) to manage population levels. Monitor long-term trends in vegetation and animal health and adaptively manage all native wildlife. Promote expansion of black-capped vireo habitat on adjacent lands. Promote the fire-grazing interaction that historically occurred. Develop a Habitat Management Plan. | Same as Alternative B, plus: Evaluate the feasibility of pronghorn antelope and wolf reintroductions. |
| **Non-Native Fauna** | Manage non-native fauna (longhorn) at carrying capacity. Hold public auctions to manage longhorn population levels. Monitor for zebra mussels in Refuge lakes. Manage feral hogs according to the Integrated Pest Management (IPM) Plan. | Manage livestock populations at targeted levels to allow for habitat variability. Evaluate decreasing longhorn herd size, or move the longhorn herd to alternate location. Hold public auctions to manage longhorn population levels. Fully implement the fire-grazing interaction that historically occurred. Consider more aggressive and proactive measures to avoid zebra mussel introduction. Manage feral hogs according to the IPM Plan. Develop a Habitat Management Plan. | Same as Alternative A, except: Increase longhorn herd size. |
| ***Public Use*** | | | |
| **Refuge-Wide Management** | | | |
| **Hunting** | Administer hunts to achieve population management objectives for white-tailed deer and elk hunts through a cooperative effort between the Refuge and ODWC. | Same as Alternative A. | Review and revise administration of hunts. Consider turkey and feral hog hunts. |
| **Special Uses** | Allow special uses, including monitoring | Same as Alternative A, plus: Manage special use | Same as Alternative B. |

| Issues | Alternative A – No Action | Alternative B – Proposed Action | Alternative C |
|---|---|---|---|
| | and research; economic/commercial special uses including rock climbing, photography instruction, scuba instruction, auctions, and guided interpretive tours; non-commercial special uses including cultural (e.g., tribal) and religious events (e.g., Holy City) and public events. | activities under a Special Use Permit. Update Visitor Services Plan. | |
| **Public Use Area Management – Public Use Opportunities** | | | |
| **Fishing** | Allow fishing at 12 lakes in the Public Use Area. Allow the use of boats according to lake-specific guidelines. Stock resident fish species periodically in cooperation with the ODWC. | Same as Alternative A, plus: Improve fishing opportunities through signage, facilities, hardened boat ramps, and law enforcement. Focus improvements in the high density use zone to relieve fishing pressure from the medium and low density use zones. Add youth fishing day clinic. Add fishing piers at Quanah Parker, Jed Johnson, and Crater Lakes. | Same as Alternative B, plus: The Refuge would evaluate the need for additional fishing piers through the Visitor Services Plan based on fishing pressure. |
| **Wildlife Observation** | Provide viewing opportunities throughout Refuge. Protect sensitive areas or wildlife through temporary access restrictions. Maintain observation sites. | Same as Alternative A, plus: Provide more wildlife observation opportunities by upgrading existing or constructing 2 new wildlife viewing blinds. Create online observation tools. Develop and designate a wildlife observation loop using existing roads and trails. Update Visitor Services Plan. | Same as Alternative A, plus: Update Visitor Services Plan. |
| **Photography** | Manage opportunities, use patterns, and restrictions identical to the Wildlife Observation section. | Same as Alternative A, plus: Offer evening and weekend photography workshops. Create online photography tools. Implement photography program the same as the wildlife observation program. Update Visitor Services Plan. | Same as Alternative A, plus: Update Visitor Services Plan. |
| **Interpretation** | Provide interpretive talks, nature walks, and staffing at off-Refuge event booths and passive interpretation through displays and exhibits on Refuge. | Same as Alternative A, plus: Update exhibits at the Visitor Center. Construct an interpretive nature trail loop around the Visitor Center. Create designated auto tour. Install interpretive signs according to public use density zone. Expand public interpretive workshops. Update Visitor Services Plan. | Same as Alternative B. |
| **Environment-al Education** | Hold environmental education classes on- and off-Refuge. Partner with Friends group to provide transportation assistance | Work to develop Environmental Education Center as a training facility where school classes/programs on-Refuge would be | Same as Alternative B. |

| Issues | Alternative A – No Action | Alternative B – Proposed Action | Alternative C |
|---|---|---|---|
| | for students. | emphasized. Continue to partner with Friends group to provide transportation assistance for students. Link environmental education programs to the Oklahoma State Curriculum. Increase emphasis on environmental education from 6% to 10% of total annual school contacts. Update Visitor Services Plan. | |
| **Bicycling** | Allow on paved roads and on the Mt. Scott access road. Pave highway shoulders along the section of State Highways 115 and 49 that extend from the Medicine Park gate west and south to the Cache gate. | Same as Alternative A, plus: Create/designate hiking and bike routes and connect existing routes. Increase quality (linking) of routes to/from LETRA, Cache, Medicine Park, Meers, and Lawton via partnerships. Consider a bicycle-share pilot program through an updated Visitor Services Plan. | Same as Alternative B, plus: Re-open the Burma Road to bicycling. |
| **Boating** | Boating would continue to be allowed on 5 lakes on the Refuge. Paved and unhardened boat ramps, interpretive signs (including mercury warnings), and other facilities would be provided. Law enforcement of boating activities would occur. See Fishing alternative. | Same as Alternative A, plus: Boating opportunities would be improved through increased interpretive signage or educational kiosks, increased visitor contacts, and increased law enforcement contacts. Improvements would be focused in the high density use zone. Problems with litter would be addressed through education, increased law enforcement, and additional trash/recycle facilities. See Fishing alternative. | Same as Alternative B. |
| **Camping** | Provide and maintain developed camping opportunities at Doris and Fawn Creek Campgrounds. Set fees according to site. Require reservations at Fawn Creek and for group sites at Doris Campground. | Same as Alternative A, plus: Increase camping opportunities by working with partners to meet the need for more camping in areas adjacent to the Refuge including pedestrian and bicycle connection from adjacent campground to Refuge high density zone. | Same as Alternative B. |
| **Hiking** | Allow hiking throughout the Public Use Area on 12 trails totaling about 14.2 miles. Maintain trails. Allow use without group size restrictions. Protect resource values by closing areas seasonally where necessary. | Allow hiking throughout the Public Use Area on 12 trails totaling about 14.2 miles. Maintain trails. Protect resource values by closing areas seasonally where necessary. Increase and improve accessible hiking opportunities. Monitor participation by requiring participants to register on site. Conduct a study to determine social and biological resource thresholds. Manage areas to fit high, medium, and low density use zones. | Same as Alternative B, plus: Develop additional hiking opportunities in the high density use zone. |

| Issues | Alternative A – No Action | Alternative B – Proposed Action | Alternative C |
|---|---|---|---|
| | | Update Visitor Services Plan. | |
| **Picnicking** | Provide and maintain 4 picnicking areas. Allow use without group size restrictions. | Expand existing picnicking opportunities by working with partners to meet need for more picnicking in areas adjacent to the Refuge including pedestrian and bicycle connection from adjacent campground to Refuge high density zone. Improve the quality of the opportunities in the high density use zone. Manage group size via infrastructure development and services. Increase utilization of less visited picnic areas in the medium density use area. | Same as Alternative B. |
| **Rock Sports** | Allow rock climbing, rappelling, and bouldering throughout the Public Use Area. Close locations seasonally where necessary to protect resource values. Maintain partnership and collaborative fixed anchor evaluation process with Wichita Mountains Climbers Coalition (WMCC). Allow use without group size restrictions. | Same as Alternative A, plus: Monitor participation by requiring participants to register on site. Conduct a study to determine social and biological resource thresholds. Manage areas to fit high, medium, and low density use zones. Incorporate fixed anchor review guidelines in the Visitor Services Plan. Replacement of fixed anchors would continue to be permitted but placement of new anchors would be limited. | Same as Alternative A, except: Eliminate technical (gear assisted) rock climbing. |
| **Special Use Area Management – Public Use Opportunities** | | | |
| **Interpretation** (See Special Designations section in this Table) | Offer interpretive tours through the Friends of the Wichitas. Allow participants to get off the bus to observe or photograph wildlife and scenery. Include short walk on Fall Foliage Tour. | Same as Alternative A, plus: Maintain tours but move them from the Special Use Area to the Public Use Area if necessary to protect wildlife and habitat integrity. Update Visitor Services Plan. | Same as Alternative B. |
| **Wilderness Area Management – Public Use Opportunities** | | | |
| **Wildlife Observation** | Allow for hiking-based viewing opportunities only. Close to public use after sunset with the exception of backcountry camping. Use temporary access restrictions to protect sensitive sites. | Same as Alternative A, plus: Develop additional wildlife observation management direction as part of an updated Wilderness Stewardship Plan (WSP). | Same as Alternative B. |
| **Photography** | Allow for hiking-based photography opportunities only. Close to public use after sunset with the exception of backcountry camping. Use temporary access restrictions to protect sensitive sites. | Same as Alternative A, plus: Develop additional photography management direction as part of an updated WSP. | Same as Alternative B. |

| Issues | Alternative A – No Action | Alternative B – Proposed Action | Alternative C |
|---|---|---|---|
| **Interpretation** | Conduct a small amount of interpretative hikes in the Wilderness area. Offer 3 spring hikes through the Friends of the Wichitas. Provide 2 Wilderness trailhead kiosks. Include Wilderness management and Leave No Trace information in talks and at event booths. | Same as Alternative A, except: Limit group hikes to 15 people or less. Update the WSP. | Same as Alternative B. |
| **Environmental Education** | Conduct only a small amount of organized environmental education in the Wilderness area. Include information on Wilderness management and Leave No Trace in education modules and events. | Same as Alternative A, except: Limit group hikes to 15 people or less. Update the WSP. | Same as Alternative B. |
| **Camping** | Allow designated area backcountry camping through a backcountry permit with fee. Up to 10 permits issued weekly for a 2-night stay. | Same as Alternative A, plus: Decrease impacts of camping by implementing Leave No Trace. Update the WSP. | Same as Alternative B. |
| **Hiking** | Allow hiking anywhere within the Wilderness area. Offer 2 designated trails totaling about 3 miles. Maintain trails by hand. Allow use without group size restrictions. | Continue trail maintenance. Implement Leave No Trace. Redistribute hiking pressure to high and medium density use areas. Monitor participation by requiring participants to register on site. Determine use thresholds. Create step-down trail plan. Groups would not exceed 15 without a Special Use Permit. Update the WSP. | Same as Alternative B. |
| **Rock Sports** | Allow climbing, rappelling, and bouldering throughout the Wilderness area. Close some locations seasonally to protect resource values. Maintain partnership with Wichita Mountains Climbers Coalition (WMCC). Implement all anchor replacements or modifications by hand. Allow use without group size restrictions. | Same as Alternative A, except: Develop fixed anchor management guidelines as part of an updated WSP. Fixed anchors would be evaluated by the WMCC. Approval of new routes requiring fixed anchors would be very limited. Users would be required to register on site to keep records of use whereby the Refuge could monitor use patterns. Groups would not exceed 15 without a Special Use Permit. | Same as Alternative A, except: Eliminate technical (gear assisted) rock climbing. |
| ***Facilities*** | | | |
| **Refuge-Wide Management** | | | |

| Issues | Alternative A – No Action | Alternative B – Proposed Action | Alternative C |
|---|---|---|---|
| **Public Use Facilities** | Maintain Visitor Center, Environmental Education Center, roads, trails, campgrounds, picnic areas, fishing piers, boat ramps, etc. | Same as Alternative A, plus: Remodel Visitor Center and environmental education buildings using green technologies and make them fully accessible. Install 2 wildlife observation blinds at the Visitor Center and the Environmental Education Center. Increase trash collection infrastructure, place additional kiosks, and improve wayfinding signage. Update the Facility Management Plan. | Same as Alternative B, plus: Install emergency phones along roadways. |
| **Administrative Facilities** | Maintain Headquarters and residence buildings, dams, fences, and corrals. | Same as Alternative A, plus: Replace Headquarters building, enlarge corrals, and move fence to true Refuge boundary. Update the Facility Management Plan. | Same as Alternative A, plus: Remodel Headquarters building and enlarge corrals. |
| **Cultural Resources** | Protect known archaeological sites. Protect and maintain designated sites or those sites eligible for designation to preserve historic character. | Same as Alternative A, plus: Update the 1964-1965 archaeological survey by completing systematic surveys Refuge-wide. Increase monitoring of known sites. | Same as Alternative B, plus: Identify sites in the Public Use Area at a greater risk of disturbance. Nominate additional historic sites for designation. |
| ***Administrative Areas*** | | | |
| **Holy City General Management** | Manage according to a 5-year Special Use Permit (renewable for 25 years) held by the Wallock Foundation to allow for management and administration of events. | Same as Alternative A, plus: Monitor use and effects to Refuge resources. Adapt management of activities if resources are being adversely affected. | Remove facilities and structures. |
| **Job Corps General Management** | Manage according to a MOA and easement with the U.S. Department of Labor and U.S. Department of Agriculture Forest Service. Administer site jointly as an educational and vocational training site for youth. | Same as Alternative A, plus: Consider partnership opportunities to include increased environmental education and Refuge-specific projects. | Relocate the Job Corps center off-Refuge. |

Table A-2. Mitigation Measures

| Mitigation Measure | Alternatives |
|---|---|
| **General** | |
| Gather updated resource baseline data to form a current analytical base from which to judge future management impacts and effects. | A, B, and C |
| Develop and implement an extensive and ongoing monitoring program to judge management action effectiveness and provide alternative solutions that would lessen any short-term or long-term negative impacts on fish and wildlife resources and other environmental elements. | A, B, and C |
| Regulate timing of management actions to avoid or minimize potential impacts. For example, activities would be conducted during times of the year and in areas where breeding and nesting activities are at a minimum. | A, B, and C |
| Prohibit or restrict activities in areas where listed species occur. The potential effects of CCP implementation on Federally-listed species has been reviewed per an Intra-Service Section 7 Consultation (See Appendix C). | A, B, and C |
| Prohibit or restrict activities in areas where Federal trust species occur. | A, B, and C |
| Seek public input in future planning for any management actions that are considered major Federal actions per NEPA requirements. | A, B, and C |
| **Climate Change** | |
| Tailor Refuge management to protect or, if necessary, restore essential ecological processes and services such as pollination, seed dispersal, soil formation and stabilization, primary production, photosynthesis, and air, water, and nutrient cycling. | A, B, and C |
| Protect lands with a diversity of habitats for declining species and spearhead efforts to protect species of concern. Protect genetic diversity and serve as a source for repopulation efforts. | A, B, and C |
| Serve as large ecological hubs in a greater network of conservation lands allowing for species migration. | A, B, and C |
| Provide natural, minimally altered settings for the evolutionary process and wildlife interaction. | A, B, and C |
| Manage to control and eradicate invasives on Refuge lands, providing habitat for endemic species. Direct efforts to reduce species susceptibility to disease, pathogens, pests, and contaminants. | A, B, and C |
| Conduct directed research to address climate change topics. Continue to build scientific capacities and expertise in the Agency. Foster collaboration among conservation science community. | A, B, and C |
| Increase climate change education, training, and outreach both within the agency and to external audiences. Tailor environmental education and interpretation programs to climate change topics. Provide conservation support to partners and other interested parties. Collaborate and share information and resources both internally and externally. | A, B, and C |
| **Air Quality** | |
| Conduct habitat management involving prescribed burning only under weather conditions that minimize adverse smoke effects. Implement smoke management practices during all burning events. | A, B, and C |
| Ensure fire management is working with an approved prescribed Burn Plan, favorable weather conditions, and adequate firefighting resources. | A, B, and C |
| Abate blowing dust by performing construction and maintenance activities during times of low wind. | A, B, and C |
| Use water trucks to control fugitive dust at construction sites larger than 0.1 acre during windy conditions. | A, B, and C |
| Use water from fire trucks to control fugitive dust at the corrals during working of the animals approximately three times per year. | A, B, and C |
| **Water Management and Quality** | |

| Mitigation Measure | Alternatives |
|---|---|
| Avoid spraying during or immediately before a rainfall event to reduce the chances of runoff and herbicide delivery to water resources. | A, B, and C |
| Implement agency-approved herbicide application practices and guidelines under an approved plan to prevent or minimize effects to water quality. | A, B, and C |
| Use best management practices for treatments around wet areas including the targeting of herbicide at selected plants. Avoid broadcast spray during dry times such as droughts and the summer dry season. Treat invasives with very low-level toxicity herbicide. | A, B, and C |
| **Soils** | |
| Establish wattles or other erosion control methods on construction sites when erosion is a concern. | A, B, and C |
| **Habitats** | |
| Take a proactive approach to working with information provided through biological surveys, inventories, and monitoring to determine changing conditions and vegetative and associated wildlife needs. | A, B, and C |
| Take a proactive approach on staying up-to-date with current literature and scientific findings as applied to adaptive management techniques. | A, B, and C |
| Evaluate the need for rehabilitation projects in areas of high intensity fires. | A, B, and C |
| **Recreation** | |
| Divide the Refuge into density zones and promote use in higher density areas to protect low density areas. | B |
| Close areas seasonally with sensitive resource concerns to avoid impacts. | A, B, and C |
| **Wilderness** | |
| Limit group size to no more than 15 people to avoid ground compaction. | B |

# Chapter 3 – Affected Environment

See CCP Chapter 3.

# Chapter 4 – Environmental Consequences

This section analyzes and discusses the potential environmental effects or consequences that can be reasonably expected by the implementation of each of the three alternatives described in Chapter 2 of this EA. For each alternative, the expected outcomes are portrayed through the 15-year life of the CCP.

This chapter identifies, describes, and compares the physical, biological, and human environment of the three alternatives proposed in this EA. Current management (Alternative A, the No Action Alternative) provides the basis for comparing the effects of the action alternatives (Alternatives B and C). The direct, indirect, and cumulative effects of each alternative are analyzed in this chapter.

Direct effects are the impacts that would be caused by the alternative at the same time and place as the action. Indirect effects are impacts that occur later in time or distance from the triggering action. Cumulative effects are incremental impacts resulting from other past, present, and reasonably foreseeable future actions, including those taken by Federal and non-Federal agencies, as well as undertaken by private individuals. Cumulative effects may result from singularly minor but collectively significant actions taking place over a period of time.

An analysis of the effects of management actions on the physical environment has been conducted for air quality, water, and soils.

Analysis of the effects of management actions on the biological environment has been conducted for vegetation, wildlife, threatened and endangered species, and prescribed burning. Although all plant, animal, and fish species on the Refuge are important, many species are not expected to experience any change—or at most, a negligible one—as a result of implementing any of the alternatives. For that reason, not all Refuge species are discussed in this chapter.

An analysis of the effects of management actions on the human environment has been conducted for socioeconomics, public uses, scenery, and archaeological and historic resources.

## 4.1 Definition of Terms

Potential impacts are described in terms of type, duration, intensity, and context (scale). General definitions are as follows:

### *Impact Type*

Beneficial impacts are those resulting from management actions that maintain or enhance the quality and/or quantity of identified Refuge resources or recreational opportunities.

Adverse impacts are those resulting from management actions that degrade the quality and/or quantity of identified Refuge resources or recreational opportunities.

***Duration of Impacts***

Short-term impacts affect identified Refuge resources or recreational opportunities; they occur during implementation of the management action but last no longer.

Medium-term impacts affect identified Refuge resources or recreational opportunities that occur during implementation of the management action; they are expected to persist for some time into the future though not throughout the life of the CCP.

Long-term impacts affect identified Refuge resources or recreation opportunities; they occur during implementation of the management action and are expected to persist throughout the life of the CCP and possibly longer.

***Intensity of Impact***

Negligible impacts result from management actions that cannot be reasonably expected to affect identified Refuge resources or recreational opportunities at the identified scale.

Minor impacts result from a specified management action that can be reasonably expected to have detectable though limited effect on identified Refuge resources or recreation opportunities at the identified scale.

Moderate impacts result from a specified management action that can be reasonably expected to have apparent and detectable effects on identified Refuge resources or recreation opportunities at the identified scale.

Major impacts result from a specified management action that can be reasonably expected to have readily apparent and substantial effects on identified Refuge resources and recreation opportunities at the identified scale.

***Context or Scale of Impact***

Under the local scale, beneficial or adverse impacts on a given resource occur only at a specific project site or its immediate surroundings and are relatively small in size (i.e., less than 15 acres).

For the moderate scale, beneficial or adverse impacts on a given resource occur beyond a specific project site but at a scale below that of the entire Refuge (i.e., 15-100 acres).

Under the widespread scale, beneficial or adverse impacts on a given resource extend beyond the moderate scale (i.e., greater than 100 acres).

## 4.2 Effects Common to All Alternatives

Some potential effects will be the same or very similar under each alternative and are summarized under the following categories: spring modification, water conservation, water rights, fire ecology and management, invasive and non-invasive flora and fauna, environmental justice, Refuge revenue sharing, and climate change.

### 4.2.1 Spring Modification

Overall, critical spring ecosystems in the area are potentially threatened by over-pumping on lands surrounding the Refuge. Under each alternative, the Refuge would continue current management, utilizing 10-12 modified springs for animal management. These modified springs provide substantial benefits for wildlife on the Refuge by capturing and storing spring water and making it available for animals to drink rather than allowing it to seep back into the ground, evaporate, or flow downstream. The modification of springs may result in the change of downstream conditions and changes in water quality, especially nitrate concentrations (Allan 1995). In addition, the Turtle Springs pipeline is the sole source of water for the Holy City. Each alternative would have the Refuge develop a Water Resource Inventory and Assessment (WRIA), the aim of which would be to determine the effect on Refuge water resources and downstream water users.

Having a water resource assessment developed would provide information that could improve decision making with regard to management of scarce water resources. Potential effects of all alternatives would thus be minor to moderately beneficial, long-term, and localized to widespread.

### 4.2.2 Water Conservation

The Refuge contributes information to and participates in State water planning. Under each of the alternatives, Refuge efforts in State water resources planning and conservation would continue. The Refuge would participate in water planning efforts to make better decisions regarding its use of water, adaptively manage for drought, and inform and/or educate the public on water concerns. As in Spring Modification, under every alternative the Refuge would work toward developing a Water Resource Inventory and Assessment (WRIA) to determine the effect on Refuge water resources and downstream water users.

This WRIA could potentially yield benefits by increasing information so as to aid more informed decision making on water management and conservation efforts for managing this crucial resource. The assessment could also potentially help the Refuge adaptively manage water resources during times of drought. Furthermore, it may serve as a tool to better inform and educate the public on the management and conservation of water. Thus, each of the alternatives would have potential effects related to water conservation that are minor to moderately beneficial, long-term, and widespread.

### 4.2.3 Water Rights

Under each alternative, the Refuge would maintain existing Federal and State water rights. As in Spring Modification, the Refuge would work toward developing a WRIA to systematically analyze Refuge water resources and effects to downstream water users. Furthermore, the assessment would evaluate whether the Refuge’s water rights are adequate or if more rights should be acquired.

Preservation of water rights for wildlife on the Refuge would be highly beneficial for wildlife and achieving the Refuge’s purposes. Water rights in the region are currently a hot topic—and a highly debated one. The efforts of other entities to acquire water rights from Cache Creek are a

good example of that. The Refuge's aim is to ensure that any existing claims to water rights are preserved or, when necessary and if possible, are increased, pending the results of the WRIA.

The potential effects of working to maintain water rights and conducting the water resources assessment under each of the alternatives would be moderately beneficial, widespread, and long-term.

### 4.2.4 Fire Ecology and Management

Under all alternatives, the Refuge would maintain the existing patch burning—grazing management program. Throughout the Refuge, restrictions to free movement (aka, fences) would continue to be reduced or removed. Fire would be applied in a natural fire return interval, described as every five years with both growing and dormant season occurrence. Herbivores would be allowed to freely choose from all available forage. This management practice would not provide post-fire deferment. Deferment results when follow-up fire "draws" animals from previously burned areas to the newly burned location. This management program would continue to mimic historic interactions creating natural disturbances and patch dynamics representative of all habitat conditions, ranging from recently disturbed to rank/decadent conditions. The potential effects of working to apply fire in a natural fire return interval under each of the alternatives would be moderately beneficial, widespread, and long-term.

### 4.2.5 Invasive and Non-Native Flora and Fauna

Under each alternative, invasive and non-native flora and fauna would be managed through the Refuge's 2013 IPMP, and therefore, each alternative would have the same effect on invasive species. The IPMP would include mechanical control for treating native invasive species, including juniper, and chemical treatment of non-native invasives. Acres treated for invasive plants would increase under all of the alternatives.

Chemical herbicides are one of the main methods the Service uses to control invasive plants on national wildlife refuges. Herbicides can efficiently and effectively suppress or kill unwanted plants and the Service uses them in such a manner as to minimize adverse effects on non-target resources. An herbicide suppresses or kills plants by decreasing their growth, seed production, and competitiveness (USFWS 2009).

The benefits of herbicides in controlling invasive plants must be weighed against the potential for exposure and impacts to human health, non-target organisms, and the environment. Both Federal and state governments regulate herbicides to ensure that they do not pose unreasonable risks. The U.S. Environmental Protection Agency (EPA) requires extensive test data from herbicide producers to show that their products can be used safely. EPA scientists and analysts carefully review these data to determine whether to register (license) an herbicide and whether certain restrictions on use are needed (USFWS 2009).

EPA evaluates both exposure and toxicity to determine the risk associated with the use of a given herbicide. People, non-target flora and fauna, water, and soil may all be exposed directly or indirectly to herbicides during applications and subsequent movement; this exposure can be minimized or avoided by following proper instructions and labels. For wildlife and humans, herbicides may enter the body through the skin, by swallowing, and by breathing. Once

herbicides have been applied, the potential for exposure is further influenced by the many biotic (living) and abiotic (non-living) processes that affect the fate of herbicides in the environment.

Herbicide use on national wildlife refuges must be in compliance with the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and other Federal laws and authorities. The use of herbicides and other pesticides on refuges is governed by the U.S. Department of Interior Integrated Pest Management Policy (517 DM 1), the USFWS Pest Management Policy and Responsibilities (30 AM 12), and the USFWS Refuge Manual (7 RM 14).

Service policies and the Refuge Manual state that refuges will use herbicides only after full consideration of management alternatives, including chemical, biological, physical, and no action. If, after considering all of these factors, managers determine that herbicides will be used to meet invasive plant management objectives, then the least hazardous, most effective herbicides will be used to meet those objectives (USFWS 2009).

Refuge staff must complete a Pesticide Use Proposal (PUP) whenever a pesticide is used on a refuge, including applications by staff, volunteers, contractors, or in association with a right-of-way easement or Special Use Permit. The PUPs are usually completed and submitted by individuals with duties related to plant management and knowledge and experience with herbicides. An online PUPS database enables staff to complete and submit PUPS electronically at https://systems.fws.gov/PUPS/. Depending on the type of pesticide and conditions listed in the PUP, the Project Leader may review and approve the PUP or it may require review and approval by the Southwest Regional Office or even the Fish and Wildlife Service Headquarters Office. The National Integrated Pest Management Coordinator works with a national team to determine the appropriate level of review and approval that each pesticide requires. PUP reviewers examine each PUP for compliance with regulations to ensure that employees use the most specific and effective pesticides with the least risk to manage the target pests.

As outlined in 569 FW 1.9 J (USFWS 2010), Refuge Managers or Project Leaders must ensure that:

- Pest management decisions are consistent with all applicable policies, laws, and regulations.
- Integrated Pest Management (IPM) plans are developed and include strategies consistent with resource management goals and objectives.
- IPM practices are promoted to land owners and others whose pesticide use may affect Service lands and resources.
- Anyone applying pesticides, releasing biological control agents, and conducting other Integrated Pest Management (IPM) activities has the appropriate training and equipment necessary to protect their safety and health.
- Pesticides are applied only after the appropriate reviewer approves the PUP.
- Threshold levels of damage or pest populations are established according to Service or field station goals and objectives and applicable laws.
- Staff must verify that damage levels or pest populations exceed threshold levels at potential treatment sites prior to treatment.
- After treatment, staff determines whether the pest management action achieved the desired results and whether there were any unanticipated or non-target impacts.

- Staff store, handle, and dispose of pesticides and pesticide containers in accordance with the label and in a manner that safeguards human, fish, and wildlife health and prevents soil and water contamination.
- Submit annual reports documenting pesticide use and efficacy into the online PUPS database (USFWS 2009).

Overall effects of controlling invasive species for all of the alternatives would be minor, beneficial, long-term, and localized to widespread.

### 4.2.6 Environmental Justice

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" was signed by President Clinton on February 11, 1994, to focus Federal attention on the environmental and human health conditions of minority and low-income populations, with the goal of achieving environmental protection for all communities. The order directed Federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The order is also intended to promote nondiscrimination in Federal programs substantially affecting human health and the environment and to provide minority and low-income communities with access to public information and opportunities for participation in matters relating to human health or the environment.

None of the three management alternatives described in this EA will disproportionately place any adverse environmental, economic, social, or health impacts on minority and low-income populations. Implementation of any action alternative that includes public use and environmental education is anticipated to provide a benefit to the residents residing in the surrounding communities.

### 4.2.7 Refuge Revenue Sharing

Annual Refuge revenue-sharing payments to Comanche County, Oklahoma, would continue at similar rates under each alternative. If lands are acquired and added to the Refuge, the payments would increase accordingly.

### 4.2.8 Climate Change

The U.S. Department of the Interior (DOI) issued an order in January 2001 requiring Federal agencies under its direction that have land management responsibilities to consider potential climate change impacts as part of long-range planning endeavors.

The increase of carbon within the earth's atmosphere has been linked to the gradual rise in surface temperatures commonly referred to as global warming. In relation to comprehensive planning for national wildlife refuges, carbon sequestration constitutes an important climate-related impact to be considered in planning. The U.S. Department of Energy's *Carbon Sequestration Research and Development* (U.S. Department of Energy 1999) defines carbon sequestration as "...the capture and secure storage of carbon that would otherwise be emitted to or remain in the atmosphere."

The land is a tremendous force in carbon sequestration. Terrestrial biomes of all sorts—grasslands, forests, wetlands, tundra, perpetual ice, and desert—are effective both in preventing carbon emissions and in acting as a biological "scrubber" of atmospheric carbon monoxide. The conclusions of the Department of Energy's report noted that ecosystem protection is important to carbon sequestration and may reduce or prevent the loss of carbon currently stored in the terrestrial biosphere.

Conserving natural habitat for wildlife is the heart of any long-range plan for national wildlife refuges. The actions proposed in this comprehensive conservation plan would conserve or protect land and water, and would thus enhance carbon sequestration. This, in turn, contributes positively to efforts to mitigate human-induced global climate change.

Under each of the alternatives, as part of the broader Federal and Department of the Interior response to climate change, the Refuge would undertake certain limited but meaningful actions addressing this looming global problem—a problem that will certainly have regional and local repercussions at the level of the Refuge. Under Alternative A, the Refuge would participate in the GPLCC, improve the efficiency of fleet and facilities, and participate in a recycling program. Alternatives B and C would each do everything that Alternative A would, supplemented by additional monitoring activities and identifying alternative energy and water sources. The scope, depth, and breadth of the climate change issue are such that none of these actions performed by the Refuge at the local scale, in and of themselves, will modify the extent of global climate change and its likely ramifications; nonetheless, the Refuge's actions should be seen as one small but important part of a coordinated, collective response to this vast issue.

The Refuge's management actions, such as improving the energy efficiency of its vehicle fleet and its facilities and participation in a recycling program, are viable strategies for reducing greenhouse gas (carbon dioxide) emissions. With improved efficiency, less $CO_2$ would be emitted for each vehicle mile traveled or to attain comfortable temperatures and lighting levels in indoor facilities. The use of compact fluorescent light bulbs can reduce the electricity consumption and therefore $CO_2$ emissions, by three-quarters. The recycling program efforts may include an effort to sell products within the boundaries of the Refuge with recycled content and the reuse and recycling of such materials as paper, cardboard, glass, aluminum, plastic, dry cell batteries hydraulic fluids, antifreeze, and other potentially recyclable materials. Recycling generally uses less energy, and thus generates fewer $CO_2$ emissions, than using and discarding new products.

Under each of the alternatives, the climate in the area of the Refuge is predicted to change in the following ways (Oklahoma Climatological Survey 2007; National Wildlife Federation 2009):

- An increase in annual mean temperature;
- Increased frequency of hot extremes and heat waves;
- Fewer and less severe cold extremes;
- Longer and earlier arriving warm seasons;
- Warmer and shortened cool seasons;
- Larger changes in summer temperatures than winter temperatures.

The potential implications for the Refuge and the surrounding southern mixed-grass prairie ecosystem are many. Warmer winters may impact soil organic matter and the sequestering of carbon and nitrogen. Changes in the timing of life-history events, or phenology, for particular species, are predicted to occur as well. This potentially involves the decoupling of coevolved interactions, such as plant-pollinator relationships, a shift in the timing of animal migrations, and an increase in the vulnerability of spring agriculture to late freeze/snow events.

Over the long term, such as the next 50 to 100 years, climate change is likely to have significant effects on the Refuge's flora, fauna, and public use. However, over the 15-year planning horizon of this CCP, these effects would probably be more subtle and incremental. Overall, effects from climate change under each of the alternatives would likely be minor to moderately adverse, widespread, and long-term. Under all of the alternatives, the Refuge would attempt to mitigate these effects through adaptive resource management, collaboration with partners, and public education through environmental education and interpretation. Additionally, under each alternative, the Refuge would participate in the GPLCC, improve the efficiency of its vehicle fleet and energy-using facilities, and participate in a recycling program.

## 4.3 Analysis of Impacts by Resource

This section analyzes the direct, indirect, and cumulative environmental and social impacts or consequences that can be reasonably expected by the implementation of each of the alternatives with respect to: the Physical Environment (Air Quality, Water Management and Quality, and Soils), the Biological Environment (Habitat and Wildlife), and the Human Environment (Public Use Opportunities, Socioeconomics, Cultural Resources, and Scenic Resources) (See Table A-3. Summary of Alternatives Effects on Refuge Resources).

## 4.4 Impacts to Physical Resources

### Air Quality

The Wichita Mountains Wilderness is a designated Class I air quality area, receiving further protection under the Clean Air Act. The Refuge has a Class 1 air quality designation because of its Wilderness area. While the Clean Air Act tolerates no degradation of visibility in Class 1 airsheds, the Refuge's air quality is already somewhat degraded by fossil fuel combustion off-Refuge, primarily from coal-fired power plants and vehicular emissions. These result in ozone and regional haze from sulfur dioxide and nitrogen oxide aerosols; in addition, mercury deposition is problematic.

The most prominent ecoregion-wide air quality concerns expressed in scoping were related to the prescribed burns many land managers conduct for habitat management. Adjacent residents of public lands are often disturbed by smoke associated with prescribed burning. Other concerns involve particulate matter that drifts in from nearby urban areas.

The following analysis assumes implementation of the Air Quality Mitigation Measures in Table A-2. Mitigation Measures to protect air quality.

### *Alternative A: No Action*

Under Alternative A, Refuge activities affecting air quality would continue to include prescribed fire, invasive species management, construction and maintenance of roads, and emissions from vehicle exhaust. The Refuge would continue to coordinate with the Service's Denver Air Quality Branch to ensure appropriate and consistent air quality monitoring at, but not limited to, the IMPROVE station to ensure protection of the Wilderness' Class I Airshed status.

The Refuge would continue to apply fire according to a naturally-occurring fire regime. The primary objective is to return fire at a historic fire frequency. Research has found that this historic fire return interval was at least every five years (Stambaugh et al. 2009). The Refuge has approximately 20 prescribed fire units (Figure A-3); about four units would be burned each year on a rotational basis (two per winter, two per summer). The Refuge would burn approximately 8,000 to 14,000 acres annually. The Refuge would not burn in certain weather conditions, such as in the case of predicted inversions or on Oklahoma Category 1 days, which are determined by the ventilation rate which indicates when poor smoke dispersion would occur (www.forestry.ok.gov/smoke-management).

A typical prescribed burn would have minor impacts, but in unusual instances, a prescribed burn could have up to moderate impacts. Prescribed fires could produce smoke that could drift into residential communities and cause breathing and eye irritation and inconvenience during times of unpredicted inversions. There are also short-term adverse impacts on visibility, which is in conflict with the Class 1 Airshed designation. Visibility issues may also cause problems with traffic. Wildfires could have similar impacts as prescribed fires. Impacts from any one prescribed fire or wildfire would be short-term, negligible to moderate, and localized to widespread; viewed from the perspective of the 15-year CCP, impacts from the overall fire management program over the 15-year planning horizon would be intermittent and sporadic but long-term. A Smoke Screening and Dispersion Analysis (FMP 2008) would be conducted during prescribed burn planning to minimize the amount of smoke impact during prescribed fires.

Herbicides are only used on invasive species. Treatments occur throughout the Refuge, but Refuge roads, which are typically denser with invasives, are the primary treatment area. A typical herbicide application is performed by wand and is aimed at the targeted plant. Because of this directional spraying, spray drift would only have a negligible air quality impact as this application reduces the opportunity for spread or the increase in spraying in general.

Fugitive dust can cause impacts including visibility impairment, respiratory problems, or eye irritation. Construction and maintenance occurs Refuge-wide and could cause fugitive dust. Refuge dirt roads would continue to be maintained up to twice per year. Trail maintenance would occur in the Public Use Area periodically. Under Alternative A, new facility construction is limited and would not create more than a negligible adverse impact on air quality. Fugitive dust would typically be negligible, sometimes minor, but it would be reduced by mitigation measures (see Table A-2. Mitigation Measures).

Vehicles traveling Refuge roads for recreational or travel purposes may result in emissions that could negatively impact air quality. The use of boats of any size with any type of motor may result in emissions and exhaust negatively impacting the Refuge's air quality.

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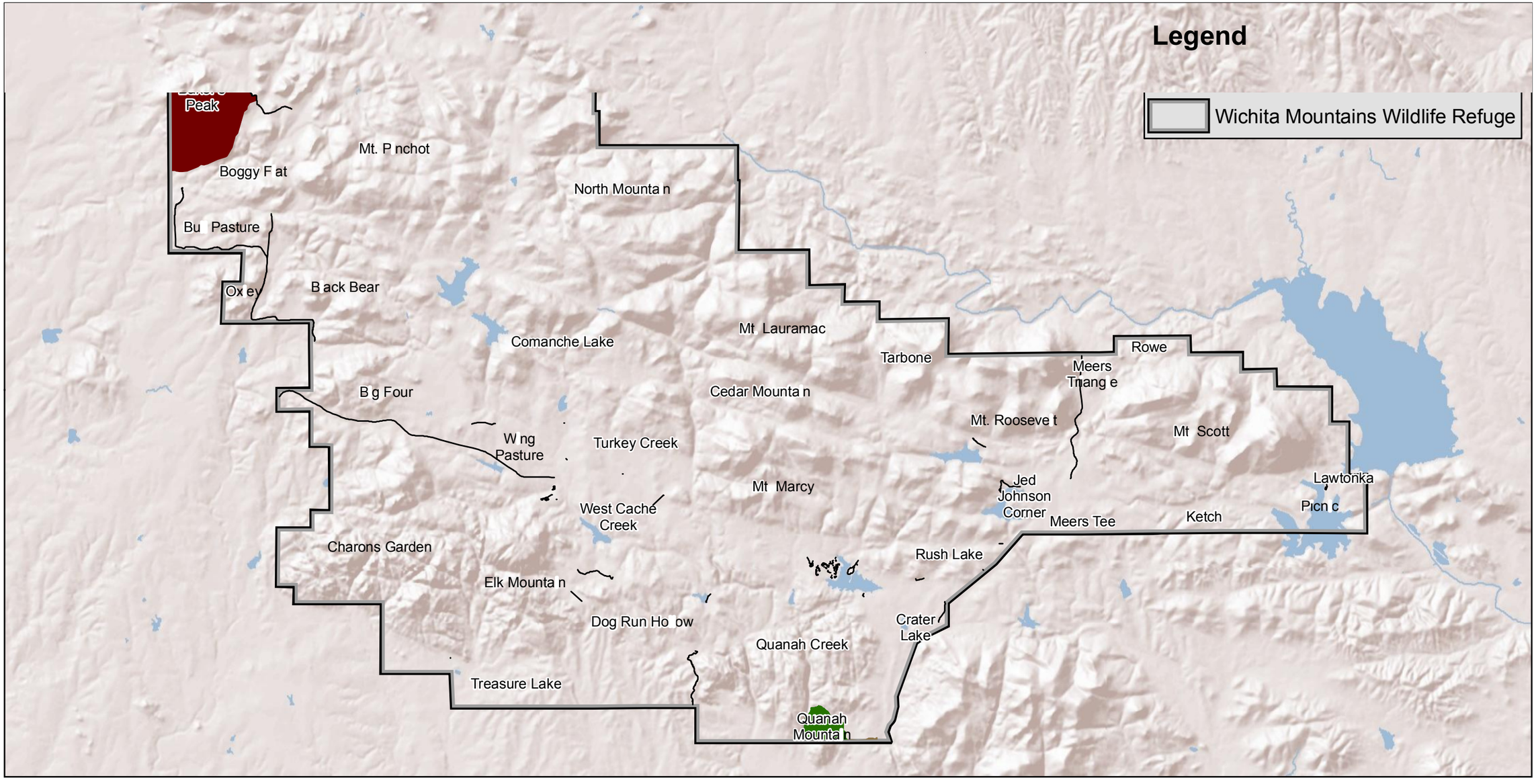
# Wichita Mountains Wildlife Refuge

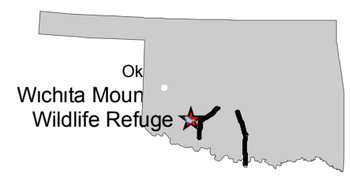
Comanche County, Oklahoma

*Prescribed Fire Units*




PRODUCED IN THE DIVISION OF REFUGE PLANNING
ALBUQUERQUE, NEW MEXICO
LAND STATUS CURRENT TO: 5/31/09
MAP DATE: January, 2011
BASEMAP: N/A
MERIDIAN: N/A
FILE: wmw_fire_prescription_1.4.11_shl

0 1 2 4 Miles
0 1 2 4 Kilometers




UTM ZONE 14
NAD 83

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Impacts of Alternative A on the air quality affected environment would be both adverse and beneficial. Adverse impacts would continue to occur from the use of prescribed fires or managed wildfires, spray drift from herbicide application, from fugitive dust emitted by various activities, and vehicle emissions. Both prescribed fires and wildfires generate smoke that must be dispersed and lofted by prevailing winds to avoid affecting people and communities at ground level. Typically there is a least a small amount of smoke temporarily suspended at ground level. When spraying herbicides, there is some spray drift that causes aerosols and contaminants over a small area. Fugitive dust is emitted when dry, unvegetated ground is disturbed, or unpaved roads are traveled.

Direct beneficial impacts to air quality of Alternative A would result from maintaining and managing over 59,000 acres of natural habitat; this natural habitat, in turn, is responsible for a number of ecosystem services, including air quality maintenance. Conserving the vegetative cover of these habitats would maintain the plants that serve as air filters and assist in the regulation of climate and the hydrologic cycle through evapotranspiration. Furthermore, conserving this natural habitat and open space limits the area of land available for potential commercial and industrial development, thus assuring that these air purifying services would be retained in the future.

Indirect beneficial impacts of Alternative A would occur from monitoring of mercury and regional haze parameters as part of the nationwide Clean Air Act monitoring programs. While monitoring itself does not bring about improvements in air quality, it is a necessary component of the nationwide program in pursuit of cleaner air and prevention of significant deterioration of air quality in Class 1 airsheds. The potentially beneficial impacts from monitoring would be long-term, negligible to minor, and widespread. As noted, air quality-related mitigation measures from Table A-2, Mitigation Measures would be implemented under Alternative A, and would help reduce direct and indirect adverse air quality impacts from management and maintenance activities.

Overall, the combined adverse impacts from these various management activities would typically be short-term in duration, negligible to moderate in intensity, and localized to widespread in extent. Overall benefits are moderate, long-term, and widespread.

***Alternative B: Proposed Action***

Like Alternative A, Alternative B would result in both adverse and beneficial impacts on air quality. The same actions and mechanisms generating both types of impacts that were described for Alternative A are also operative in the case of Alternative B, although the impact's intensity may be reduced in this alternative.

Under Alternative B, prescribed burning and herbicide use would be the same as Alternative A. Therefore, the same effects would be expected.

Facility construction and maintenance would increase under Alternative B and would include remodeling the Visitor Center and the Environmental Education Center, replacing the current Refuge Headquarters building, and adding wildlife observation blinds, kiosks, and more corrals. Trail linkages would be improved, and a trail between the Visitor Center and Environmental

Education Center would be created. Trails, roads (dirt and paved), and buildings would be regularly maintained. These activities would likely cause a negligible to moderate amount of fugitive dust, depending on the facility being maintained or built. Dust would be better abated, however, making the effects short-term and localized. These effects would manifest very similarly to those described in Alternative A, including impacts to visibility, breathing, or eyes. Implementation of mitigation measures should help reduce these effects.

Under Alternative B, the Refuge would better manage for air quality, especially through planning and monitoring. Bio-utilization of woody biomass (especially eastern red cedar) would aid in avoiding impacts to air quality associated with burning. (This infrastructure is not yet in place; if and when the opportunity arises, the Refuge would support its partners and participate in this effort.) In Alternative B, there may be some reduction in certain emissions overall due to increased dust abatement efforts and through the use of park-and-ride commuting or tours.

Potential beneficial impacts on air quality from Alternative B would also be indirect, related to monitoring of mercury, and regional haze and would be the same as those of Alternative A, long-term, negligible to minor, and widespread.

Overall, adverse impacts would be the same as Alternative A (short-term, negligible to moderate, and localized to widespread), with some potential small reductions in emissions and an increase in monitoring that might aid the Refuge in improved management decisions.

As in the case of Alternative A, Alternative B would also result in beneficial effects on air quality from conserving vegetation and habitats on more than 59,000 acres of public open space. These benefits would be moderate, long-term, and widespread. All air quality-related mitigation measures from Table A-2, Mitigation Measures would be implemented in Alternative B, helping minimize adverse impacts.

#### *Alternative C*

Impacts on air quality associated with Alternative C would largely be the same as Alternative B; however, if the Holy City facilities and structures were removed (which would be analyzed under a separate NEPA document) and public use of the Special Use Area increased, greater adverse effects to air quality could be expected.

### Water Quality

The Refuge has both surface and groundwater resources. Surface resources include streams, wetlands, and lakes (reservoirs). Water quality concerns include occasional suspended sediments and turbidity issues as well as contamination from mercury deposition due to coal-fired power plant emissions off-Refuge.

Mitigation measures from Table A-2, Mitigation Measures aimed at the protection of water quality would apply to all three alternatives. The analysis here assumes implementation of these mitigation measures to protect water quality.

### *Alternative A: No Action*

Impacts of Alternative A on water quality would be both adverse and beneficial. Direct and indirect adverse impacts would result from various non-point sources and causes, including prescribed fire, wildfires, erosion from hiking trails or developed areas, soil-disturbing construction activities, and runoff from roads and parking lots.

The Refuge applies fire according to a naturally-occurring fire regime. The primary objective is to return fire at a historic fire frequency. Research has found that this historic fire return interval was at least every five years (Stambaugh et al. 2009). The Refuge has approximately 20 prescribed fire units (See Figure A-3); about four units are burned each year on a rotational basis (two per winter, two per summer). The Refuge burns approximately 8,000 to 12,000 acres annually.

All wildland fires, both prescribed fires and wildfires, can adversely affect water quality by burning protective vegetative cover, thereby exposing soils to wind and water erosion. Especially on slopes, these soils can then be transported with runoff to waterbodies, including streams, marshes, ponds, and lakes, where they at first occur as suspended sediments, causing turbidity (muddy or cloudy water). High levels of turbidity are not only aesthetically unattractive but may reduce the amount of light penetrating to lower depths, which inhibits the growth of submerged aquatic plants. In turn, this may affect aquatic organisms which are dependent on aquatic plants, such as fish and shellfish like mussels.

To a limited extent, use of trails may result in soil compaction, erosion, trampling of vegetation, and production of litter or human waste. Areas surrounding public use facilities can also contribute to the problems of erosion, suspended sediments, turbidity, and sedimentation. Bicycling on the Mt. Scott trail may result in soil compaction, creation of tire tracks, erosion, and trampling of vegetation. To a limited extent, erosion on the trail has the potential to impact water quality by contributing to suspended sediment, turbidity, and sedimentation. The ground is typically exposed (unvegetated) in these areas, and thus more vulnerable to runoff and erosion than ground with a layer of protective vegetative cover. Eroded soils, as described under fire previously, can be transported, especially on steeper slopes, to waterbodies, where turbidity and sedimentation occur, temporarily impairing water quality, especially immediately after storm events. When and where possible the Refuge would work to incorporate maintenance or mitigation activities where erosion is excessive. Overall, these impacts have a low potential of leading to water quality degradation in waterbodies.

Maintenance to facilities or the use of roads and trails could cause soil disturbance, or materials from these sites (such as leaked equipment fluids) could get washed away during a storm event. However, the amount of work to facilities under this alternative would be small and activity would be temporary making any associated adverse effects negligible to minor, short-term, and localized to widespread, depending on whether the runoff traveled to land or moving water.

Although pesticide use is tightly regulated and pesticide labels are followed to the letter, there remains a small—though unlikely—chance that misuse of pesticides could have an environmental impact to water resources. The damage to water quality is mitigated by requiring applicators obtain a technician's license through the Oklahoma Department of Agriculture, Food,

and Forestry, maintaining a safe working distance from water resources and by using low pressure spot spray applications to prevent spray drift.

At Wichita Mountains Wildlife Refuge, the area of impermeable road and parking lot surfaces is quite limited compared to the area of the landscape, and most of these surfaces are located at some distance from waterbodies. The Refuge has approximately 335 acres of developed lands (which accounts for .6 percent of the total Refuge area) and 160 miles of roads (including seldom used administrative roads). The main areas of concern would be where roads parallel waterbodies in close proximity and where bridges cross them. The Refuge would maintain its low water crossings under this alternative which would cut down on the potential for erosion, sedimentation, and turbidity.

In general, roads, bridges, and paved parking lots contribute substantial quantities of pollutants to waters of the United States. Contaminants from vehicles are washed from the impermeable surfaces of roads, parking lots, and roadsides whenever precipitation occurs. A large amount of this runoff pollution is carried directly to waterbodies. As runoff flows over impermeable surfaces, the water picks up dirt and dust, rubber and metal deposits from tire wear, salts, antifreeze and engine oil that has dripped onto the pavement, pesticides and fertilizers, cigarette butts, and other litter. All of these contaminants can impair water quality, and some are toxic to aquatic life (EPA 1995). However, as mentioned previously, the Refuge has a relatively small area of paved surfaces, particularly in close proximity to waterbodies. Therefore, at these sites, road runoff would likely cause localized and short-term (confined to hours or days after storm events), negligible to minor water pollution.

Other Refuge management activities such as the bison and longhorn auctions, grazing by permitees, and special and commercial uses would only have negligible and short-term adverse effects on Refuge water quality.

Overall, the combined adverse impacts from the actions, activities, and facilities described previously would largely be short-term from specific actions, of negligible to moderate intensity, and on a localized to moderate scale. Direct and indirect beneficial impacts of Alternative A would occur from monitoring mercury levels in fish, low water stream crossings, trail maintenance, and other management actions, such as maintaining the closure of the Special Use Area to the public, and more broadly managing the Refuge as a whole in a manner that protects vegetative cover. While mercury monitoring would not improve water quality in and of itself, it is a crucial data-gathering component of overall nationwide efforts to reduce ambient levels of mercury in the environment. The continued management of the Special Use Area would prevent the sort of erosion and sedimentation described previously for hiking trails and other developed areas since it has limited public use and few developments. Low-water stream crossings are beneficial for water quality because they allow vehicles to cross streams without stirring up sediments and temporarily causing turbidity. Trail maintenance would ultimately reduce erosion and likewise contribute to reducing the potential for erosion and downstream suspended sediments and turbidity. In general, management and conservation of habitats across the entire Refuge would serve to protect water quality because intact grasslands and wooded areas minimize erosion, runoff, and subsequent sedimentation.

Overall then, beneficial effects from Alternative A on water quality would tend to be long-term, of minor to moderate intensity, and on a localized to moderate scale.

***Alternative B: Proposed Action***

The effects from this alternative would be largely similar to those under Alternative A; however, there would be additional direct, short-term, localized, minor adverse impacts on water quality from suspended solids and turbidity due to the proposed construction of a fish passage structure, new facilities, and the management of group sizes for some recreational activities. A Water Resource Inventory and Assessment (WRIA) would also be completed on the Refuge as part of this alternative.

Under this alternative, the Refuge would construct a fish passage structure on West Cache Creek to allow movement of fish in this area. Though the construction itself would likely cause some impacts while construction occurs, no long-term effects would be expected. New low water stream crossings in this alternative would likely have short-term adverse impacts as indicated previously. However, these new and already existing structures would also continue to have long-term, beneficial, localized, minor effects on water quality.

Other new facilities and maintenance activities, including adding three new fishing piers, replacing the Refuge Headquarters building, enlarging corrals, and moving the Refuge boundary fence could cause some short-term adverse impacts to water quality. The construction of the fishing piers would likely have the largest impact to water quality as water is directly affected. However, these actions will be addressed in a step-down management plan to ensure that locations and methods minimize potential adverse environmental impacts. Other construction activities could cause soil disturbance, or materials from these sites (such as leaked equipment fluids) could get washed away during a storm event. However, construction would be short-term and localized to the site, making any associated adverse effects negligible to minor, short-term, and localized to widespread, depending on whether the runoff traveled to land or moving water.

Implementing the public use density zoning strategy and managing the group size of hiking and rock sports groups in the low and medium density areas would also be modestly beneficial for water quality, due to not only lessening or redistributing physical disturbance from trampling, uprooting, breakage, but also through reducing generalized destruction of submerged and emergent aquatic vegetation, which stabilizes sediments and forms the basis for the food web (Ruhl et al., 2007). However, the incremental benefits of reducing group size on water quality would likely be negligible.

A WRIA would be completed on the Refuge's water resources and water quality that would ultimately help the Refuge make more informed decisions about its ground and surface waters.

In broad terms, overall adverse and beneficial impacts of Alternative B on water quality would be similar to those of Alternative A with some short-term adverse effects and additional long-term benefits.

### *Alternative C*

Overall impacts of Alternative C on water quality would probably be largely the same as Alternative B. However, if overgrazing and soil damage or erosion due to some increases in public use opportunities or removal of the Holy City facilities were to occur under Alternative C (discussed in more detail in subsequent text), there could possibly be adverse repercussions for water quality because of increased runoff and soil erosion, and then subsequent turbidity and sedimentation in waterbodies.

Under Alternative C, the Refuge would increase both the bison and the longhorn populations, which could lead to overgrazing and excessive trampling of groundcover. If the ground were disturbed enough, soil erosion could ensue. This impact could be moderately adverse over the long-term and widespread scale.

Alternative C would increase some public use opportunities and decrease others. The overall effect, therefore, would likely be imperceptible to water quality. The Refuge would, however, open the Special Use Area to increased public use, which—depending on the level of use and area of use—could cause some soil erosion, trampling of vegetation, and adverse water quality impacts.

Removing the Holy City facilities could cause some water quality impacts while deconstruction occurs and thereafter until the site is recovered to its natural state. The same would be true of the Job Corps site if the facilities were removed. These actions would be further analyzed under a separate NEPA document.

Overall, Alternative C would result in some negligible to moderate adverse impacts to water quality that would occur over the short- to medium-term on a localized to widespread scale.

## Water Resources (Lakes, Streams, and Fisheries)

Wichita Mountains Wildlife Refuge contains important water resources, including reservoirs, streams, and the fish populations that inhabit these waterbodies.

### *Alternative A: No Action*

Under Alternative A, lakes would be managed at full capacity. The Refuge would conduct occasional drawdowns to control invasive species, manage fisheries, and improve fishing opportunities.

In a drawdown, lake water level is deliberately lowered to the lowest level possible for a period of weeks or months. Fisheries are managed through drawdowns by reducing aquatic vegetation, which makes small fish fry more accessible for consumption. These drawdowns also expose invasive aquatic plants (and likely some native plants as well) to dry conditions which would result in a temporary die-back. While they temporarily reduce aquatic plants near the surface and fisheries, over the long term, drawdowns allow managers to enhance fisheries and fishing opportunities. Invasive species of both aquatic plants and animals can be controlled, at least temporarily, during the drawdown condition. After re-flooding, desirable aquatic plant and invertebrate populations can be increased sharply through restocking and natural recovery.

As noted previously, drawdowns for fishery management may also have negative short-term consequences. Exposure of the littoral zone constitutes at a minimum a short-term loss of habitat for benthic invertebrates. In general, however, drawdowns are an effective, well-established, and widely employed fisheries management technique. They are used to enhance the growth of predator species, to control the density of forage fish, and to assist in the management of sport fish such as largemouth bass, sunfish, crappie, and channel catfish.

Drawdowns would also produce a limited (due to size of lakes), short-term, beneficial impact by providing new shorebird and wading bird habitat.

Overall net effects on water resources from Alternative A's management actions would be minor to moderately beneficial, short-term to long-term in duration, and localized. Any adverse effects, from actions such as lake drawdowns, would be negligible to minor, short-term, and localized (Refuge-wide or smaller in area).

***Alternative B: Proposed Action***

Alternative B's actions, and thus its effects, would be largely the same as Alternative A, that is, mostly beneficial. In addition, under Alternative B the Refuge would construct a fish passage structure on West Cache Creek to help facilitate fish movement and would build new fishing piers at Quanah Parker, Jed Johnson, and Crater Lakes. A Water Resources Inventory and Assessment (WRIA) would also be conducted under this alternative. The Refuge would replace the current barrier of a low water crossing off of Burma Road with the West Cache Creek fish passage structure that allows flow. The Refuge would also maintain existing or construct new low water crossings where needed to prevent or minimize erosion.

The fish passage structure would allow crossing of isolated aquatic populations thus improving the connectivity of the West Cache Creek. Ultimately, the health and genetic variability of fish species in this Creek would increase. This structure would also benefit a CCP focal species, the plains minnow.

Maintenance or construction of low water crossings may result in temporary disturbance to water resources. In addition, construction of additional fishing piers may temporarily impact water resources as well, but these actions will be addressed in a step-down management plan to ensure that locations and methods minimize potential adverse environmental impacts.

A WRIA would be completed on the Refuge's water resources and water quality that would ultimately help the Refuge make more informed decisions about its ground and surface waters.

Overall, these actions would provide additional direct and indirect benefits related to water resources by allowing for the more complete utilization of this resource by fish and by providing additional data to better inform decision making through the WRIA.

***Alternative C***

Overall impacts of Alternative C on water resources would be the same as Alternative B.

### *Soils*

Actions on the Refuge that could potentially affect soils include herbicide use for invasive vegetation control, prescribed fire, fire suppression, and grazing of ungulate herds (e.g., bison, elk, longhorn cattle) and to a limited extent, livestock under Special Use Permit, maintenance activities (of roads, facilities, etc.), and recreational opportunities. One mitigation measure from Table A-2. Mitigation Measures, is to protect soils on the Refuge would apply to all three alternatives. The analysis here assumes implementation of this mitigation measure to protect Refuge soils.

### *Alternative A: No Action*

The impacts of continuing current Refuge management, including the soil-affecting activities cited previously, would be both beneficial and adverse, largely the former. Beneficial impacts would accrue from long-term conservation and maintenance of soil-protecting vegetative cover throughout the Refuge. Maintaining and protecting the cover provided by vegetation ranging from grasses, forbs, shrubs, and trees is the best way to conserve soils. As a result of this, overall, it is anticipated that soils would be in slightly better condition at the end of the planning horizon than at present; that is, both the quality and quantity of soils should have improved slightly after an additional 15 years of soil development under a protective cover (i.e., soil formation processes can continue uninterrupted).

Limited hand application of herbicides occurs Refuge-wide on scattered, small, and isolated populations to control invasive flora. This activity is not expected to damage or contaminate soils because the herbicides used are not persistent in the environment; they break down relatively quickly. Low-pressure handheld sprayers are typically used to reduce impact to other resources. Efforts to control invasive and non-native plant species such as old-world bluestem, Johnson grass, cocklebur, and thistle using a variety of broad-leaf, grass, and brush control chemicals (e.g., Glyphosate as prescribed on the label) may cause contaminants to occur temporarily in either terrestrial or aquatic sediments on a localized scale. See section 4.2.5 for more information on the Refuge's pesticide use procedures.

The Refuge would continue to apply fire according to a naturally-occurring fire regime. The primary objective is to return fire at a historic fire frequency. Research has found that this historic fire return interval was at least every five years (Stambaugh et al. 2009). The Refuge has approximately 20 prescribed fire units (See Figure A-3); about four units would be burned each year on a rotational basis (two per winter, two per summer). The Refuge would burn approximately 8,000 to 12,000 acres annually.

As noted previously, both prescribed and wildland fires affect soils in several ways. A number of factors influence just how prescribed fire affects soils, including fire intensity, ambient temperature, vegetation type, and soil moisture (Wells et al. 1979). Low-intensity prescribed fires have few, if any, adverse effects on soil properties; in some cases, such fires may improve soil properties. Repeated burning over a long period may affect levels of available phosphorus, exchangeable calcium, and organic matter content of mineral soil. While fire volatilizes nitrogen, causing losses of this nutrient, these losses are often offset by increased activity of nitrogen-fixing soil microorganisms after fires. Calcium and phosphorus may be lost from the upper soil layer but tend to be partially retained in lower mineral soil horizons.

Moderate-intensity prescribed burns have little, if any, adverse effect on soil erosion even on relatively steep slopes (Brender and Cooper 1968; Cushwa et al. 1971; Goebel et al. 1967). Virtually all prescribed fires on the Refuge would be moderate-intensity.

Alternatively, prescribed burns conducted when soils and fuel loads are too dry can cause severe damage to soils. High-intensity prescribed fires have a short-term negative impact on nutrient status from volatilization of nitrogen and sulfur, plus some cation loss from ash convection. Such effects tend to be short-term after moderate-intensity fires, but recovery is not as rapid after severe fires (Stanturf, no date).

Alternative A would lead to a rather limited amount of soil erosion and soil compaction from wildland fires. Soil erosion could occur in two principal ways from wildland fires: fire suppression and fuel reduction activities. Both ways involve exposing or disturbing soils, especially soils on steeper slopes, to rainfall and runoff. Wildfires and prescribed fires alike can temporarily eliminate or reduce the protective vegetative cover and burn up duff and litter, thus exposing underlying soils to the direct impact of raindrops and allowing soil particles to be carried away in runoff as suspended sediments or by wind. Disturbed soils on steeper slopes are more vulnerable to runoff, and they tend to be thinner anyway, so damage to soils and the vegetation they support on these sites is longer-lasting.

At Wichita Mountains Wildlife Refuge, the fire program is such that prescribed fires would be conducted at such a frequency as to avoid the accumulation of fuels that might result in hot fires and severe damage to soils. Additionally, the attraction of grazers to freshly burned areas will lessen long-term impacts to soils by allowing sites across the Refuge time to recover from intensive grazing pressure.

Grazing, both of native and non-native species (e.g., bison, elk, Texas longhorn, livestock) would have both beneficial and adverse impacts at a localized scale. Grazing would have minor adverse impacts that are long term because light to moderate grazing can decrease water infiltration compared to the ungrazed condition (Gifford and Hawkins 1978). Grazing also has minor beneficial impacts that are long term because grazing simulates carbon and nitrogen cycling from above ground plant components to the soil (Schuman et. al. 1999). Herds of grazers would not be allowed to overpopulate the ranges, or exceed range carrying capacity—that is, the population density that can be supported in perpetuity without damaging the range—which would maintain any adverse effects on soils to at most a minor level.

Maintenance activities would have localized, negligible to minor adverse impacts on soils by exposing them through removing vegetation, and by erosion. These effects would range from short-term to long-term. Short-term effects would occur during and immediately after maintenance activities. The amount of work to facilities under this alternative would be small and activity would be temporary making any associated adverse effects negligible to minor, short-term, and localized to widespread depending on the potential for storms and erosion.

Hiking, rock climbing, and other public uses that employ off-pavement travel throughout the Public Use Area would result in some disturbance to soils. However, trail maintenance would occur in the Public Use Area periodically to reduce to potential for erosion. These impacts have a

low potential of leading to extensive soil erosion or degradation. Visitor access typically occurs by individuals or groups that participate in recreational activities for short durations. The Refuge would continue to encourage the use of designated roads and trails where facilities exist specifically to accommodate the use while reducing resource impacts. The use of trails may result in soil compaction, erosion, and trampling of vegetation. These impacts have a low potential of leading to extensive soil erosion or degradation. Bicycling on the Mt. Scott trail (administrative road) would result in negligible soil compaction, erosion, and trampling of vegetation over and above that of infrequent administrative vehicle use.

Other Refuge management activities such as the bison and longhorn auctions, grazing by permitees, and special and commercial uses would only have negligible and short-term adverse effects on Refuge water quality due to their short duration and distance from Refuge waterbodies.

Overall then, Alternative A's effects on soils would be both beneficial and adverse, largely the former. Beneficial impacts would be minor to moderate in intensity, long-term, and widespread. Adverse effects would be negligible to minor in intensity, short-term to long-term, and localized.

***Alternative B: Proposed Action***

Impacts on soils from Alternative B, the proposed action, would be similar to those in Alternative A. Under Alternative B, the proposed management of the size of hiking and rock sports groups in the low and medium use density areas (see Figure A-2) would reduce the impact on soils. Conversely, there would be short-term adverse, localized impacts on soils, primarily possible erosion and compaction on a very small scale, from constructing new facilities. The soils mitigation measure in Table A-2, Mitigation Measures would help control this impact.

Implementing the public use density zoning strategy and managing the group size of hiking and rock sports groups in the low and medium density areas would be modestly beneficial for soils, due to not only lessening physical disturbance from trampling, uprooting, breakage, but also through reducing the potential for informal trails which can have serious erosion issues. Groups or individuals travelling on trails or cross-country may cause soil compaction, vegetation trampling, and erosion. Group size and density zoning actions would not change the overall amount of public use but would redistribute pressure and impacts from the west side to the east side. This action could have either a positive or negative minor impact at the local scale but a negligible impact at the moderate scale.

New facilities and maintenance activities, including replacing the Refuge Headquarters building, enlarging corrals, and moving the Refuge boundary fence could cause some short-term adverse impacts to soils. Construction activities could cause soil disturbance, and sediments could get washed away during storm events. However, construction would be short-term and localized to the site, making any associated adverse effects negligible to minor, short-term, and localized to widespread, depending on the amount of runoff.

Overall, a mix of short-term and long-term beneficial and adverse effects would result, with beneficial effects broadly outweighing adverse effects overall because proposed management would largely maintain and conserve vegetative cover and the soils beneath it across the Refuge.

***Alternative C***

With one possible important exception, impacts of Alternative C on soils would be largely the same as Alternative B; any differences would be largely trivial or negligible on the scale of the Refuge as a whole.

The possible exception to this conclusion relates to the aim of Alternative C to increase the herd sizes of bison and longhorn, as well as adding pronghorn antelope to the mix of grazers on the Refuge. Were this to occur, and if range carrying capacity were exceeded as a result of excessively large herds, there is a possibility that soils on the Refuge's grasslands would be damaged from trampling and overgrazing. Common results of overgrazing are soil compaction, topsoil loss, and reduction in long term grazing productivity (Hogan 2010).

Alternative C would also increase some public use opportunities and decrease others. The overall effect, therefore, would likely be imperceptible to soils. The Refuge would, however, open the Special Use Area to increased public use which, depending on the level of use and area of use, could cause some trampling of vegetation and associated soil erosion.

Removing the Holy City facilities could cause some soil impacts while deconstruction occurs and thereafter until the site is recovered to its natural state. The same would be true of the Job Corps site if the facilities were removed. These actions would be further analyzed under a separate NEPA document.

Overall, a mix of short-term and long-term beneficial and adverse effects would result. Beneficial effects would occur because proposed management would largely maintain and conserve vegetative cover and the soils beneath it across the Refuge. However, adverse effects would be likely if the Refuge were to exceed its carrying capacity by over expanding bison and longhorn herds. Other soils impacts from public uses and facilities would be negligible to minor and only temporarily adverse.

## 4.5 Impacts to Biological Resources

### Habitats

The Refuge manages important wildlife habitats, including Crosstimbers forests and mixed-grass prairie grasslands, as well as aquatic habitats (covered previously).

Mitigation measures from Table A-2, Mitigation Measures to protect habitats on the Refuge would apply to all three alternatives. The analysis here assumes implementation of these Mitigation Measures to protect Refuge habitats.

***Alternative A: No Action***

In general, the Refuge supports and maintains a number of habitats in relatively natural and undisturbed conditions. These include the central mixed-grass prairie, Crosstimbers Oak Forest and Woodland, rocklands habitat, and several types of aquatic habitats, including wetlands, open waters, and riparian areas. The Refuge employs fire management, grazing by megafauna, population control of those same megafauna, nutrient cycling by prairie dogs, and invasive species control to help maintain these habitats in productive condition. Under this alternative, the

Refuge would also continue to allow minor amounts of public tree cutting and natural resource collection. Public use opportunities throughout the Refuge would have some impacts on Refuge habitats.

Prescribed fires would be conducted in the late summer, winter, and early spring to help maintain and restore the central mixed-grass prairie and the Crosstimbers Oak Forest and Woodland habitat types. The Refuge would continue to employ prescribed fire to manage for or mimic the natural fire occurrence and grazing interaction, with a goal of promoting naturally-occurring and historic habitat conditions to sustain natural biological diversity and heterogeneity. No forest harvest would be conducted in the Refuge's forests and woodlands, so fires would help maintain desired vegetative communities and prevent undergrowth from becoming too dense. Prescribed burning would also help maintain vertical structure and provide nutrient cycling to benefit habitats.

Wildfires occasionally occur on the Refuge. They would continue to be evaluated to determine if they are meeting management, habitat, and other resource objectives and values. Wildfire could create the same benefits as a prescribed burn under the right conditions.

The historical interaction between fire and grazing on the Great Plains was characterized by a shifting mosaic of disturbances across the landscape. The mosaic included areas that were burned, grazed, and burned and grazed in succession, alongside other areas that were not disturbed for some years. A given site would burn and then, as it sprouted fresh new growth, a variety of herbivores would be attracted and graze it intensely. As grazers concentrated on this burned site, other sites, in turn, would receive reduced or no grazing pressure. When another nearby site would burn, the grazers would shift their focus toward it and the new vegetative growth. Thus, the previously heavily utilized site was given a chance to recover for a certain period of time before it would be burned and then grazed again. This fire-grazing interaction would be repeated across the landscape, its timing determined by climate, recovery of vegetation, and re-ignition. The randomness of this disturbance pattern resulted in a patchy landscape which allowed many plant and animal species to exist simultaneously, thus maximizing biodiversity (Oklahoma State University 2006).

High intensity fires can create hydrophobic soils that contribute to excess runoff. The elimination of vegetation and other processes thereby create soils that will not absorb moisture. These effects are typically short-term and adverse. In these situations the Refuge would consider rehabilitation to reduce the impacts. Vegetative type conversion could occur from high intensity fires, such as forest to early successional. These effects would be long-term and adverse but typically only occur within small perimeters of the burn area.

Grazing by bison, longhorns, elk, and deer would continue to occur Refuge-wide and would help maintain prairie habitats on the Refuge, minimizing encroachment by woody vegetation such as shrubs and trees and maintaining the open character and nutritional quality of these grasslands. To a very small extent, cattle grazing on small areas of the Refuge's periphery would have the same effect. Grazing would largely be managed by the rotation of prescribed burning as herbivores tend to follow the green-up of recently burned areas. Herbivores would contribute to

habitat management not only by grazing but also by hoof action and nutrient cycling. As long as Refuge herbivores are kept in carrying capacity, the Refuge would experience beneficial impacts.

Bison, longhorns, elk, and deer would continue to be managed within the Refuge's carrying capacity, as defined in the Refuge's Grassland Management Plan (1985), to ensure proper habitat health and function and to eliminate the impact of overgrazing.

Prairie dogs on the Refuge would also contribute to nutrient cycling both from the effect of their burrowing and by attracting grazers to their towns. They would also maintain vertical vegetation structure in a way that contributes to habitat diversity and provides habitat for some bird, reptile, amphibian, insect, and mammal species.

Control of invasive and non-native plant species such as plains bluestem, Johnson grass, cocklebur, and thistle would often be conducted with the use of herbicides. Eastern red cedar and mesquite, while both native species, are considered invasive in this ecoregion, which is on the edge of its natural range. Cedars and mesquite can encroach into both grassland and woodland habitats, where they reduce forage for grazers and use available soil moisture. Therefore the Refuge would control them with a combination of herbicides, mechanical treatment, fire, and grazing. Control efforts could be temporarily adverse because they can cause soil disturbance. Disturbing these areas could create an environment for other opportunistic invasive species. However, if treatments result in replacement with native species the long-term effect to habitat is beneficial.

Riparian areas would be managed in the context of the surrounding ecosystem.

Tree cutting and natural resource collection on the Refuge would be managed through the issuance of a Special Use Permit. Tree cutting would only occur on the Refuge in small quantities in order to remove eastern red cedar, oak, or other woody species from specified locations for Refuge management purposes. Impacts on Refuge lands would be generally positive in that effective fire breaks are maintained by this practice and fire risk is reduced as excessive fuel accumulations are decreased. In addition, removal of invasive species (i.e., eastern red cedar) helps to protect grasslands from encroaching woody species. Also beneficial is that tree cutting results in the removal of concentrated seed sources, thereby providing beneficial long-term impacts to habitat in reducing the spread of invasive species. Tree cutting produces beneficial impacts by clearing open areas where the Refuge can safely manage bison and longhorn cattle. Natural resource collection would occur only in special instances (e.g., for tribal, educational, or cultural reasons). Typically, this use would entail the removal of plants, cedar branches, or rocks for traditional ceremonies or educational purposes. This activity would mainly occur adjacent to existing roads and trails, thereby minimizing any adverse impacts to soils, habitat, and waterbodies. The action may result in some level of disturbance to wildlife, but the very low frequency and duration of this use would not result in any measurable resource impacts. Furthermore, the relatively few resources harvested during natural resource collection would not significantly alter the many habitats scattered across the Refuge.

All public use opportunities on the Refuge have the potential to introduce invasive species, hinder the growth of or damage vegetation in highly visited areas, disturb wildlife, and produce

litter. Public use facilities and other public use sites, as well as administrative facilities, would decrease the amount of habitat available on the Refuge. In addition, use of trails in the Public Use Area may cause trampling, erosion, and plant damage, thus resulting in habitat degradation. The fishing program requires occasional drawdowns to control aquatic invasive species, to manage fisheries, and to improve recreational fishing opportunities. These drawdowns also have the potential to provide habitat for waterbirds and migratory waterfowl and shorebird species. Boat use may spread non-native fauna like zebra mussels or other aquatic invasive species that can lead to habitat degradation and loss. Zebra mussels cause tremendous modifications and disruptions in freshwater ecosystems. Currently, these mussels do not occur on Refuge lakes. Due to the level of the use and facilitation of the program by Refuge staff, these impacts are likely to be minimal and short-term. Offering these activities does not alter the Refuge's ability to meet habitat goals and helps support several of the primary objectives of the Refuge.

Overall, Alternative A would result in net beneficial impacts on habitat from the fire program, grazing, invasive species control, and other activities such as the general exclusion of recreation activities from the Special Use Area. These impacts would be minor to moderately beneficial, long-term, and widespread (Refuge-wide).

***Alternative B: Proposed Action***

Most features of Alternative B related to habitat management are the same as Alternative A. Riparian areas would be managed in the context of the surrounding ecosystem. The Refuge would continue to employ prescribed fire to manage for or mimic the natural fire occurrence and grazing interaction, with a goal of promoting naturally-occurring and historic habitat conditions to sustain biological diversity and heterogeneity. Grazing by native and non-native ungulates would be managed so as to maintain the quality of grassland habitats. Under Alternative B, the Refuge would work with surrounding landowners and conservation partners to identify and maintain (conserve) existing corridors outside of the Refuge or to expand the Refuge (such as through land acquisition, conservation easements, or cooperative agreements) with the aim of connecting valuable habitat fragments. Public uses and facilities would be increased slightly and improved over Alternative A; however, group size would be managed to minimize the effects to habitats, particularly in the Charons Garden Wilderness Area. Finally, under this alternative, the Refuge proposes establish its Special Use Area (SUA) as a Research Natural Area (RNA) to solidify its protection of this portion of the Refuge in perpetuity.

In striving to mimic these heterogeneous conditions created by the historic fire-grazing interaction and healthy landscape conditions through grazing, Alternative B, like Alternative A, would benefit and improve habitat quality on the Refuge's prairie grasslands.

Under Alternative B, the Refuge would work to expand its footprint through the conservation of corridors and/or the expansion of the Refuge. In general, conservation corridors provide for the movement of animals and plants between larger areas of adequate protected habitat and thus help arrest the negative effects of habitat fragmentation and genetic isolation on populations and ecological communities. They also serve as a population source, as well as containing whole communities, and are able to withstand natural disturbance events. Riparian corridors in particular form a transition zone between terrestrial and aquatic environments and perform a range of important environmental services, in particular furnishing nursery and refugium

functions by providing a diversity of habitat for terrestrial, riparian, and aquatic flora and fauna species, suitable habitat for aquatic organisms and amphibians, connectivity between wildlife habitats, an interface between developments and waterways, and space for migration and dispersal. For these reasons, they deserve to receive special protection and indeed are a focus of protection by land managers around the country. Because of the value of the ecosystem services and functions of riparian corridors, as well as their own habitat value, it is important for conservation biologists to identify and prioritize corridors and conduct outreach to surrounding landowners in an effort to protect them (Ruhl et al. 2007; Hammond 2002; Semlitsch 1998; Knopf et al. 1988).

In this alternative, the Refuge would develop a Preliminary Project Proposal (PPP) and, upon approval, a Land Protection Plan (LPP) to identify and prioritize lands adjacent to the Refuge where conservation and protection is both achievable and vital. These lands may be acquired if a willing seller or donor becomes available or, perhaps in addition, the Refuge would work toward conservation easements or cooperative agreements. Expanding the Refuge would increase acreage available for the conservation of valuable habitat for trust species and would allow the Refuge more management flexibility for wildlife and habitat management.

The Refuge would increase some public uses and facilities in this alternative. However, any additions to public use opportunities would be small and produce only a minor effect on habitats. New facilities would remain within the already developed footprint so as to prevent habitat loss, with the small exception of the expansion of corrals. Short-term habitat disturbance may occur from expanding the existing corrals, related to the management of bison and longhorn. The public use management actions and associated facilities improvements proposed in Alternative B (such as implementation of group size limits, public use density zoning, improvement of hiking opportunities, construction of new piers and observation blinds, and road improvements) might have a negative though minor impact on habitat at the local to moderate scale. However, these actions help the Wichita Mountains Wildlife Refuge and National Wildlife Refuge System meet habitat related outreach and education goals at a local to widespread scale. Public use density zoning may shift human pressure and impacts from west to east, resulting in equal amounts of positive and negative effects at the local scale. Trail improvements would occur primarily along existing roads and trails, but may have a minor long-term impact on habitat quality at the local scale. Public use improvements are not expected to increase the amount of public use the Refuge receives but redirect and improve the management of it.

The creation of a Research Natural Area (in the area of the SUA) would provide a stronger level of protection for habitat over the long-term and could eventually yield information that would lead to future improvements in habitat management. The Refuge would likely experience increased monitoring and research projects due to the attention on the Refuge generated by the RNA's establishment which could, in turn, benefit the Refuge's habitat management techniques. Other uses and management would likely remain the same with the exception of adaptive management. Adaptive management would be incorporated as a management tool if and when resources are at risk.

Overall, Alternative B's impacts on habitat would be somewhat more beneficial than Alternative A's.

***Alternative C***

Most features of Alternative C related to habitat are the same as Alternative B and similar to those of Alternative A. Like Alternative B, Alternative C would identify wildlife corridors and explore Refuge expansion opportunities by developing a PPP and, upon approval, a LPP. It would also conduct outreach with surrounding landowners in an effort to conserve riparian corridors off the Refuge and prioritize efforts to connect valuable habitat fragments in identified corridors. Grazing permits would be phased out (like Alternative B), and fire management would be the same as both previous alternatives. The Refuge would also expand and improve its corral system for managing bison and longhorn. However, the increase of bison and longhorn herds under Alternative C may have more adverse implications for the Refuge's habitats than either Alternative A or B.

Alternative C emphasizes increasing the size of both the bison and longhorn herds on the Refuge. This could potentially damage habitat, on which all Refuge species depend, from overgrazing as Refuge carrying capacity would be exceeded. Overgrazing could also have effects to other Refuge species' habitats, including trust species. Other adverse effects could occur to wetland and riparian habitat. These adverse effects would be widespread (throughout the whole Refuge) and potentially moderate to major in intensity and long-term.

Allowing public foot access to the SUA/RNA would increase the amount of litter, soil compaction, spread of invasive plant species, vegetation trampling, wildlife disturbance, and soil erosion above current levels. This could result in a minor, long-term adverse impact on habitat at the local scale. The magnitude of the impact would be correlated with the amount, location, and season of increased use.

Mountain biking on the Burma Road, like biking on the Mt. Scott administrative road, would have very few impacts on habitat conditions over and above the public foot travel and administrative vehicle use of the road. However, past experience with management of mountain bikes in this location suggest that riders frequently leave the road and travel cross-country due to the enticing terrain, which results in soil compaction, vegetation trampling, rutting, and erosion. Unchecked mountain biking on the Burma Road could cause adverse minor, localized effects on adjacent habitats.

Overall, Alternative C would have fewer net benefits and more adverse effects on habitat than Alternative B. Damage to grassland habitat on the Refuge from overgrazing is a real possibility of this alternative.

**Wildlife**

***Alternative A: No Action***

Native Species

Under Alternative A, the Refuge would continue a number of actions to manage and benefit native wildlife species. It would continue to provide valuable habitat for resident and migrating wildlife, management of wildlife populations, disease monitoring, management of the historic fire-grazing interaction, hunting, and invasive species control. This alternative would also

continue the management of non-native Texas Longhorn cattle herd and the Refuge's public use program.

The Refuge provides migratory stop-over and nesting habitat during seasonal migration for Neotropical migrants, as well as limited habitat for shorebirds and waterfowl. There are long-term and widespread beneficial effects to migrating bird species that depend on areas like the Refuge for feeding and nesting.

The Refuge, through its existence, also maintains valuable habitat for Resident species, also a long-term beneficial and widespread effect.

The Refuge monitors bison, deer, and elk populations through annual surveys. Bison populations would continue to be managed by selling surplus animals at an annual public auction. Deer and elk populations would continue to be managed through facilitated hunts. Bison, deer, and elk are managed at their established carrying capacities (.i.e., the population sizes of each respective species capable of being supported in perpetuity by the range).

Managing populations has beneficial effects on the health of populations by minimizing the risk of disease or reduction in habitat quality. If wildlife are managed outside of their carrying capacity, long-term adverse impacts to habitat can occur, including soil erosion, degradation of water quality, introduction of invasives, and impacts to other wildlife. However, the Refuge has been managing its wildlife populations for over 50 years within carrying capacity. Therefore, long-term beneficial effects over the whole Refuge have been continued.

Bison would continue to be monitored for brucellosis, tuberculosis, basic herd health, and genetic diversity. Monitoring for disease and general herd health provides long-term beneficial impacts by ensuring the bison population is maintained on the Refuge and contributions are made to the DOI Bison Initiative effort nationwide.

The Refuge would continue to apply fire according to a naturally-occurring fire regime. The primary objective is to return fire at a historic fire frequency. Research has found that this historic fire return interval was at least every five years (Stambaugh et al. 2009). The Refuge has approximately 20 prescribed fire units (See Figure A-3); about four units would be burned each year on a rotational basis (two per winter, two per summer). The Refuge would burn approximately 8,000 to 12,000 acres annually.

Fire management on the Refuge would promote naturally-occurring and historic habitat conditions to sustain both biological diversity and heterogeneity. Immediately following prescribed burns, there would be negligible adverse effects that include wildlife mortality and minor to moderate adverse effects that include displacement. There may be longer-term type conversions (e.g., oak forest/woodland to scrub oak/grasslands) that may be adverse or beneficial depending on a particular species' needs. In the longer-term, there would be benefits to habitat maintenance in optimum conditions for native species. Long-term beneficial effects would also include a reduction of dead and down material. This reduction of vegetation (i.e., thinning) would also open up and rejuvenate the scrub areas (an emphasis of black-capped vireo management), which allows easier wildlife movement and creates habitat for other species.

Higher intensity fires (some wildfires), especially those occurring in more severe weather conditions, could cause longer-term adverse effects in terms of mortality, displacement, and vegetation type-conversions.

Hunting and fishing are the only public uses that would directly affect wildlife populations through mortality of the targeted species. Under this alternative, the Refuge would continue to allow hunting of elk and deer. Hunting is regulated by the Oklahoma Department of Wildlife Conservation and the Service to provide for sustainable harvests on the Refuge so that the hunting program is not detrimental to the long-term population stability of the game species in question. Hunting, fishing, and all the other public uses occurring on the Refuge have the potential to disturb wildlife. However, Refuge management is cognizant of the potential for this adverse effect and manages both visitors and visitor facilities in an attempt to strike a balance between the needs of wildlife and the desires of the public.

The Refuge would continue to control invasive flora and fauna on behalf of native species. The Refuge would control these species with a combination of herbicides, mechanical treatment, fire, and grazing. Control efforts can be temporarily adverse because they can cause soil disturbance and temporary displacement of some wildlife. However, treatment of these invasive species would have long-term beneficial impacts to native wildlife by replacing invasive flora with native species and minimizing the effect of degradation of habitat, disease concerns, and impacts to ground nesting species caused by feral hogs and other non-native fauna. Enhanced efforts to reduce the size of the feral hog population and to prevent the encroachment of zebra mussels into the Refuge's aquatic habitats would also result in long-term, minor, widespread benefits for the Refuge's biological resources. Feral hogs damage and modify terrestrial environments, harming both native flora and fauna, while zebra mussels massively modify and disrupt freshwater ecosystems in a number of ways (Nationalatlas.gov, 2011), not all of them negative—for example, by increasing water clarity and sunlight penetration (USGS 2010).

However, under Alternative A, the Refuge would also continue to maintain a Texas longhorn herd as required by the Congressional Appropriations bill (1927), which would compete for available forage for native species, reducing the populations of bison, elk, and deer the Refuge is capable of sustaining.

The Refuge would continue to manage public use on the Refuge as it currently exists under this alternative. The use of roads, trails, or facilities for public use opportunities may result in some environmental impacts to the Refuge, its habitat, and wildlife species. Human activity on the Refuge (i.e., driving, hiking, camping, jogging, bicycling, picnicking, fishing, hunting, wildlife observation, environmental education, and rock sports) would continue to result in some temporary but chronic disturbance to wildlife. Disturbance and harassment of wildlife by visitors has been routinely observed in the Public Use Area. However, with 1.5 million Refuge visitors each year, it is likely that wildlife species on the Refuge have acclimated to some human presence. Offering these public use activities does not negate the Refuge's ability to meet wildlife management goals and helps meet wildlife related outreach and education goals at a local to widespread scale. Under Alternative A, human disturbance is expected to increase as a result of an increasing regional population. Outreach, education, and enforcement of Refuge regulations would be used to minimize the amount and type of human disturbance to wildlife.

While public use of the Refuge does result in minor to moderate, long-term negative impacts to native species at the moderate scale, the long-term positive impacts of an aware, engaged, and supportive public at the widespread scale helps offset the negative impacts.

Overall, Alternative A would be moderately beneficial for native wildlife, and these effects would be long term. The effects would be localized to widespread (Refuge-wide and beyond due to the DOI Bison Initiative). There would also be adverse effects on native fauna from maintaining a population of competing non-native grazers, and these effects would be moderate, long-term, and Refuge-wide.

Federally-Listed Species

The Service and the Refuge are responsible for managing Federal trust species, including threatened and endangered species such as the black-capped vireo.

Under this alternative, Wichita Mountains Wildlife Refuge would continue to provide habitat for other Federal trust species, principally migratory birds. It would continue to serve as a migratory stop-over habitat for Neotropical migrants as well as furnish some habitat for shorebirds, waterfowl, and wading birds. Fire management on the Refuge would promote naturally-occurring and historic habitat conditions to sustain both biological diversity and heterogeneity, which would tend to benefit Federal trust species.

Alternative A would manage the black-capped vireo according to its approved recovery plan. The Refuge would continue to maintain black-capped vireo habitat through its prescribed burn program. To maintain and enhance black-capped vireo habitat, the Refuge would burn an annual maximum of 7,200 acres (Biological Opinion of Section 7) of black-capped vireo habitat. Burning controls the successional stage on this habitat preferred by the black-capped vireo.

The Refuge also traps brown-headed cowbirds during the vireo nesting season to reduce the potential for parasitism of nests. Grzybowski (1990c) explained that in the 1980s, more than 70 percent of nests were parasitized across the range examined and at some locations exceeded 90 percent. Reducing the prevalence of brown-headed cowbirds most likely has had a positive effect on the nesting success of the black-capped vireo on the Refuge.

The effects of Alternative A on the black-capped vireo and other Federal trust species would be long-term and moderately beneficial. Population impacts would be widespread because they would help overall recovery of listed and Federal trust species that range well beyond the Refuge's boundaries.

Non-Native Species

Under Alternative A, Texas longhorn cattle would continue to be managed on the Refuge. Feral hog and other non-native fauna populations would be controlled under the Refuge's 2013 Integrated Pest Management Plan, and the Refuge would continue to monitor its lakes for the introduction of zebra mussels.

The Refuge's longhorn cattle herd would continue to be managed at a level needed to maintain a viable population as described in the Grasslands Management Plan (1985) and Longhorn

Management Plan (2003). The Refuge would also continue to sell longhorn at annual public auctions to remove excess animals. Managing this herd would have beneficial effects on the maintenance of this oldest true-to-type herd and would be an effort in maintaining a genetic pool for national benefit. It would also likely continue to be a popular traditional attraction on the Refuge. However, managing this herd would also reduce the opportunity to expand the bison herd to a genetically viable population and would have affects to deer and elk populations by reducing the amount of available habitat and forage.

Feral hogs and other non-native fauna would be managed under the Refuge's 2013 Integrated Pest Management Plan, which would allow for trapping, aerial gunning, and opportunistic shooting. The Refuge would continue to monitor its lakes for the introduction of zebra mussels. These efforts would have long-term adverse effects to invasive species; however, that would mean long-term beneficial effects to habitat and native species on the Refuge.

Given existing directives, continuing to maintain the Texas longhorn cattle population as a living cultural resource would represent a minor to moderate social and cultural benefit, although—as noted in the discussion under native species—the opportunity cost of this benefit would be somewhat reduced forage availability for native grazers, and thus, the maintenance of lower populations of these. These effects are long-term and they would be both localized and widespread (Refuge-wide and beyond). Overall, this alternative would have beneficial effects to the longhorn herd, the longhorn genetic pool, and the visitors to the Refuge who appreciate viewing them over the long-term.

***Alternative B: Proposed Action***

Native Species

Under Alternative B, the Refuge would continue a number of the actions listed for Alternative A to manage and benefit native wildlife species. It would continue to provide migratory stop-over habitat during seasonal migration for Neotropical migrants, as well as limited habitat for shorebirds and waterfowl. Via hunting and/or public auction, populations of native grazers such as bison, deer, and elk would continue to be managed within their established carrying capacities. Bison would be monitored for brucellosis, tuberculosis, and basic herd and genetic health. Fire management on the Refuge would promote naturally-occurring and historic habitat conditions to sustain both biological diversity and heterogeneity. The Refuge would also continue to control invasive flora and fauna to minimize their disruptive effect on native species. However, under Alternative B, the Refuge would also evaluate increasing the bison herd population, improve genetic monitoring for bison, promote expansion of black-capped vireo habitat on adjacent lands, increase overall monitoring of native species, and would consider expanding the Refuge.

Under Alternative B, managed populations of native wildlife would be targeted at levels to allow for habitat variability. The Refuge would also evaluate increasing the bison herd to a genetically effective population size of 1,000 individuals. To successfully increase the bison herd the Refuge would need to decrease or move the longhorn population off-Refuge and/or expand the size of the Refuge. Decreasing or moving the longhorn herd would represent a benefit to native grazers

by making more forage available, and in all likelihood, would allow for somewhat larger populations of bison, elk, and deer.

The Refuge would promote range extension and habitat improvement for black-capped vireo off-Refuge by partnering and/or collaborating with surrounding landowners other entities. This would provide a minor to moderate beneficial effect, dependent on the participation of surrounding landowners.

Updates or revision to the Habitat Management Plan would include all fauna management, including bison herd size. The NWRS Inventory and Monitoring Program would also be implemented. This CCP would have a positive effect on proactive management of native species on the Refuge.

In this alternative, the Refuge would develop a Preliminary Project Proposal and, upon approval, a Land Protection Plan to identify and prioritize lands adjacent to the Refuge where conservation and protection is both achievable and vital. These lands may be acquired if a willing seller or donor becomes available or, perhaps in addition, the Refuge would work toward conservation easements or cooperative agreements. Expanding the Refuge would increase acreage available for the conservation of valuable habitat for trust species and would allow the Refuge more management flexibility for wildlife and habitat management.

The Refuge would increase some public uses and facilities in this alternative. However, any additions to public use opportunities would be small and produce only a negligible effect on native species. New facilities would remain within the already developed footprint so as to prevent habitat loss and further wildlife disturbance. A possible additional benefit of Alternative B on habitats would occur from the management of hiking and rock sports group size, which could reduce localized impacts from disturbance on native wildlife. The additional trails proposed in this alternative would increase the area where resource impacts occur while simultaneously decreasing the density of those impacts overall. Therefore, negative impacts to native species are minor.

The creation of a Research Natural Area (in the area of the SUA) would provide a stronger level of protection for native species over the long-term and could eventually yield information that would lead to future improvements in native species management. The Refuge would likely experience increased monitoring and research projects due to the attention on the Refuge generated by the RNA's establishment which could, in turn, benefit the Refuge's native species management techniques. Other uses and management would likely remain the same with the exception of adaptive management. Adaptive management would be incorporated as a management tool if and when resources are at risk.

The net sum of the actions associated with Alternative B would be even more beneficial than Alternative A for native wildlife due to a predicted increase in the bison (and perhaps deer and elk) population because of a corresponding decrease in the longhorn population. These effects would be long-term and localized to widespread (Refuge-wide and beyond due to the DOI Bison Initiative). Improved management of public use activities under Alternative B would pose a potential additional minor beneficial resource impact.

Federally-Listed Species

In addition to the actions proposed under Alternative A, Alternative B would promote expansion of black-capped vireo habitat onto lands adjacent to the Refuge. Furthermore, under Alternative B, the Refuge would consider expansion and work with surrounding landowners to maintain riparian corridors outside of the Refuge, with the aim of connecting valuable habitat fragments in identified corridors.

The Refuge would promote range extension and habitat improvement for black-capped vireo off-Refuge by partnering and/or collaborating with surrounding landowners or other entities. This would provide a minor to moderate beneficial effect, dependent on the participation of surrounding landowners.

When two or more isolated or fragmented areas of the same habitat are connected by corridors, the number of individuals of a given species that can be supported by the area of suitable habitat tends to increase more than proportionately and the population, especially if relatively small, is safeguarded against random disturbances that may eliminate it. This action would potentially benefit other trust species, especially Neotropical migratory birds.

In this alternative, the Refuge would also develop a Land Protection Plan to identify and prioritize lands adjacent to the Refuge where conservation and protection is both achievable and vital. These lands may be acquired if a willing seller or donor becomes available or, perhaps in addition, the Refuge would work toward conservation easements or cooperative agreements. Expanding the Refuge would increase acreage available for the conservation of valuable habitat for trust species and would allow the Refuge more management flexibility for wildlife and habitat management.

Updates or revision to the Habitat Management Plan would include all fauna management, including the management of Federal Trust Species. The NWRS Inventory and Monitoring Program would also be implemented and would create a monitoring step-down plan. These plans would have a positive effect on proactive management of Federal Trust Species on the Refuge.

Thus, Alternative B is likely to be somewhat more beneficial for the black-capped vireo and other Federal trust species than Alternative A. These benefits would be moderate in intensity, long-term, and widespread.

Non-Native Species

Under Alternative B, the Refuge would evaluate decreasing the size of the longhorn herd or move the longhorn herd to an alternate location for the purpose of increasing the bison herd to approximately 1,000 individuals. The Refuge would also consider more aggressive and proactive measures to avoid zebra mussel introduction and would manage feral hogs according to the 2013 IPM Plan.

The effects of Alternative B would be similar to those of Alternative A, except that the longhorn population would (subject to results of an evaluation) be managed at a lower population level or relocated (to other government-managed public land) to allow for an increase in the bison population. Given existing directives, maintaining the Texas longhorn cattle population as a

living cultural resource, even at a lower population size than at present, would still represent a minor, long-term social and cultural benefit.

***Alternative C***

Native Species
Alternative C is largely the same as Alternative A with the exception of the possible reintroduction of native species.

Under this alternative, the Refuge would evaluate the reintroduction of pronghorn antelope and wolves, two extirpated native species. The Refuge would first have to determine whether adequate habitat is available. Any native species reintroduction may represent a beneficial impact in that it would be restoring the earlier species composition of the ecosystem. However, such a reintroduction, especially of a species such as the wolf, would be fraught with ecological uncertainty and obstacles toward gaining public support. In all likelihood, more than just the populations of deer, elk, and bison would be affected. The Service and other stakeholders would have to study this option in much more detail prior to any firm decision on implementation.

The biological feasibility of both proposed introductions is questionable. Pronghorn antelope re-introduction has been tried before on the Refuge and ultimately failed. Historically, the Wichita Mountains were not prime antelope habitat because these mountains do not have the large expanses of uninterrupted prairie that antelopes prefer to be able to spy and escape from their predators. In addition, they did not live in the Wichitas year-round. If it were possible to reintroduce these species, the Refuge would expect a short-term beneficial effect on native species diversity. However, as time passes, there would be a long-term adverse effect if forage is reduced.

With regard to wolves, given the large area each wolf pack requires to survive, it is highly questionable whether the Refuge is large enough to support a viable population of wolves. There would likely be continual problems with predation on surrounding livestock operations, with attendant resentment and controversy. If it were possible to reintroduce these species, the Refuge would expect a short-term beneficial effect on native species diversity. However, as time passes, there would be a long-term adverse effect if surrounding landowners are affected and forage is reduced. The ecological, economic, and social ramifications of a successful reintroduction of wolves, as demonstrated prominently by the case of Yellowstone National Park, would be many.

The proposed increase in the population of longhorns on the Refuge under Alternative C would offset some of the benefits just described, once again, by reducing forage availability for native grazers. Indeed, it may not be ecologically feasible for the Refuge to accommodate an increase in the number of non-native longhorns even as the number of native bison is increased and pronghorns and wolves are reintroduced after many decades or a century of absence.

Under Alternative C, the Refuge would also consider expansion. Only a significant expansion would allow the Refuge to accommodate all of the increases in native species populations proposed in this alternative.

Changes in public use activities in Alternative C would result in both positive and negative minor impacts to the natural environment. An additional minor to moderate negative impact of Alternative C on wildlife could occur from increasing public use in the SUA. This use would lead to trampling of vegetation, displacement or disturbance to wildlife, and increased road and facility maintenance. However, several public uses would be eliminated or reduced in the Public Use Area such as guided hikes, picnicking, and technical rock climbing, which would reduce wildlife and habitat impacts.

There is a great deal of uncertainty as to the viability of Alternative C's proposals with regard to wildlife, specifically related to introductions. This alternative runs the risks of attempting to fulfill a number of disparate aims simultaneously that, to some extent, are competing or even mutually incompatible.

Federally-Listed Species
The effects of Alternative C on the black-capped vireo and Federal trust species would be the similar to Alternative B, or potentially slightly more adverse, due to the increased public access and use of the Special Use Area and the increase in the longhorn herd by decreasing the amount of bison (a trust species) the Refuge is capable of maintaining. Overall, these adverse effects would be long-term, minor to Federal Trust Species, and widespread.

Non-Native Species
Actions under and impacts associated with Alternative C for non-native species would be about the same as Alternative A, except that the Refuge would endeavor to increase the longhorn herd size, subject to the results of an evaluation.

Under this alternative, the Refuge would attempt to increase the size of the longhorn herd. However, it may not be realistic to maintain a higher longhorn population for several reasons, including an increased bison herd, adding an apex predator like the wolf, and available forage. This alternative runs the risks of attempting to fulfill a number of disparate aims simultaneously that to some extent are competing or even mutually incompatible.

## 4.6 Impacts on the Human Environment

### 4.6.1 Public Uses

Wichita Mountains Wildlife Refuge offers all six wildlife-dependent priority public uses cited in the 1997 Refuge Improvement Act: hunting, fishing, wildlife observation, photography, environmental education, and interpretation. These "big six" are generally considered compatible with the purposes of all national wildlife refuges. The Refuge also provides opportunities for a number of other outdoor recreational pursuits that are deemed supportive of the six wildlife-dependent uses and are considered compatible with the Refuge purposes (see Appendix F).

***Alternative A: No Action***

***Public Use Opportunities***

Under Alternative A, the No Action Alternative, the Refuge would continue current management direction over the next 15 years. All six wildlife-dependent public use opportunities and all

supportive uses, (i.e., bicycling, boating, camping, hiking, picnicking, and rock sports would continue to be managed as they are currently. Most activities would continue to occur in the Refuge's Public Use Area, with smaller amounts of public use opportunities occurring in the Charons Garden Wilderness Area. The Refuge's Special Use Area would continue to be open to Refuge-led interpretive tours. While all public use activities have the potential to adversely impact the physical, biological, and human environment, with adequate management and mitigation, they may result in long-term beneficial impacts to the human and biological environment. Public use opportunities may increase the participant's understanding and appreciation of fish and wildlife, their habitat needs, and the role of the NWRS in their conservation. Individual public uses are discussed in the subsequent text.

Hunting

Deer and elk hunting would continue to be administered according to population management objectives. The number of permits and hunt days available would depend on population levels and habitat conditions. Numbers have averaged about 100 deer permits and 250 elk permits annually. Hunts are cooperatively managed and tightly controlled by the Refuge and ODWC. Refuge and ODWC staff shuttle hunters to access hunt areas. Hunters are required to follow all Refuge restrictions, including the night-time closure. Facilitated hunts typically occur Refuge-wide, including within the Special Use Area where public use is largely prohibited with the exception of these hunts and some interpretive tours. The gun hunts are held each fall and winter (between November and January) depending on white-tailed deer and elk population levels and habitat conditions. Each hunt lasts four days, with a one-day orientation and safety meeting and three days of active hunting. Public access to the Refuge during a controlled hunt is restricted during the three days of active hunting. Overall, the use equates to 6 to 12 days of restricted public access each year.

Hunting has the potential to adversely impact the physical, biological, and human environment; however, the current hunting program has shown no assessable adverse environmental impact to the Refuge, its habitats, or wildlife species because the use is limited and heavily facilitated by Refuge and ODWC staff. Refuge staff shuttles hunters to various locations to minimize any impacts from vehicle access, especially in the Special Use Area. Facilitation of the hunts allows the Refuge or ODWC staff to minimize detrimental effects to vegetation, water quality, soils, or habitat. Hunting does cause mortality and disturbance to those deer and elk that are hunted and nearby non-target species, but providing this public use ultimately provides the Refuge with a method of population management for these wildlife species in excess of their carrying capacity. Limiting access to the Refuge to approximately 100 deer hunters and 180-250 elk hunters each year, each with specific areas that they are allowed to access, minimizes disturbance. Population management helps enhance the habitat conditions for the remainder of each herd. Therefore, this management would provide long-term beneficial impacts to the larger deer and elk population, as well as to Refuge habitat that provides shelter and forage for all Refuge species. Potential short-term adverse hunt-related impacts such as wildlife and habitat disturbance, poaching by non-registered hunters, public safety, search and rescue operations, and conflicts between hunters and other members of the public would be mitigated by the limited number of hunts offered each year and by the high level of hunt facilitation and staffing. For this reason, foot and vehicle traffic on arterial roads would be prohibited to other public uses during the hunts. In addition to providing a population management tool, hunting allows the public to engage in a recreational,

spiritual, and subsistence activity that helps connect people to the land. Hunting is one of the six priority recreational uses of a national refuge, and hunts on the Wichita Mountain Wildlife Refuge are considered to be some of the highest quality and most affordable deer and elk hunts in Oklahoma. The effect of Alternative A on hunting would be moderately beneficial, long-term, and widespread, taking place across the Refuge. The psychological value of hunting opportunities to resident and non-resident hunters would extend beyond the boundaries of the Refuge to wherever they live.

Fishing

Fishing occurs on 12 lakes totaling approximately 500 acres in the Public Use Area. These lakes are open to fishing 24 hours a day. Stocking of resident fish species to enhance sport fishing opportunities would occur periodically in cooperation with the Oklahoma Department of Wildlife Conservation. Stocking is not conducted on an annual basis but on a limited and sporadic basis as funds and fish are available. The Refuge receives about 8,300 fishing visits each year. The Refuge provides and maintains fishing piers, boat ramps, and other public use facilities to allow for this use.

Fishing has the potential to adversely impact the physical and biological environment. However, fishing poses minimal detrimental environmental impacts to the Refuge, its habitats, or wildlife species. Anglers are required to follow State regulations on fishing. Therefore, effects would likely only be negligible and opportunities for over-harvest would be minimized. Alternatively, fishing may result in long-term beneficial impacts to the human environment. This use may increase the viewers' understanding and appreciation of fish and wildlife, their habitat needs, and the role of the National Wildlife Refuge System in their conservation. Existing fishing facilities would offer opportunities for the public to participate in this wildlife-dependent recreational activity, thereby helping the Refuge to accomplish some of its primary objectives.

Wildlife Observation/Photography

Under this alternative, wildlife observation and photography, particularly driving observation, would continue as the most popular public uses of the Refuge. The Refuge would continue to offer world-class wildlife viewing and photography opportunities at developed public use sites, along roadways, and on hiking and biking trails. The Public Use Area would continue to be open to public access via foot and vehicle. Over 50 miles of paved roads, 14.2 miles of hiking trails, and 13 miles of dirt roads facilitate a range of wildlife observation and photography experiences. The Refuge would continue to maintain two developed observation and photography sites, 89 pullouts and parking areas scattered along the Refuge road system to facilitate driving observations and photography opportunities, and one wildlife observation blind. Refuge visitors are allowed access for wildlife observation and photography during daylight hours, with the exception of Doris Campground and certain night fishing opportunities. The only restrictions to wildlife observation and photography occur during fall and winter permit hunts, when foot travel and vehicle travel on arterial roads would be restricted.

Wildlife observation and photography activities have the potential to adversely impact the physical and biological environment. Visitor access typically occurs by individuals or small groups that participate in recreational activities for short durations. The Refuge would continue to encourage the use of designated roads and trails where facilities exist specifically to

accommodate public use while reducing natural resource impacts. Therefore, destruction or negative impacts to habitat and associated vegetation are minor. Alternatively, wildlife observation and photography may result in long-term beneficial impacts to the human environment. This use may increase the viewers' understanding and appreciation of wildlife and their habitat needs as well as the role of the National Wildlife Refuge System in resource conservation. In sum, the effect of Alternative A on wildlife observation and photography would be moderately beneficial, long-term, and localized to widespread. As with hunting and fishing, the benefits of wildlife observation and photography to Refuge visitors would extend beyond the boundaries of the Refuge itself, all the way to the communities where these visitors live, in Oklahoma, other states, and even other countries.

Interpretation

Under Alternative A, interpretation would occur through signage, informational kiosks, brochures, exhibits, demonstrations, oral presentations, audiovisual media, and conversations with staff; however, firsthand individual (passive) experiences are emphasized. Active interpretation consists of Ranger talks, nature walks on the Refuge or at off-Refuge events, and Friends-led interpretive tours. This activity may be facilitated through other wildlife-dependent recreation activities (hunting, fishing, environmental education, wildlife observation, and photography) or secondary supportive uses, including camping, hiking, jogging, boating, bicycling, picnicking, rock sports, and scuba diving. Active interpretive contacts made annually number around 64,000 or more. Countless thousands are contacted informally by roving staff members at popular observations areas such as Mt. Scott and Turkey Creek prairie dog town. The 24,088-acre Public Use Area is open to public access for interpretive purposes. Facilities that support interpretation include the Visitor Center, trails, picnic sites, information kiosks, and the Turkey Creek prairie dog town. Very little organized interpretation is offered in the Wilderness area in an attempt to maintain the unique opportunity for solitude that Charons Garden offers. The Friends group has led three spring Wilderness hikes to provide on-site interpretation. In the Special Use Area, interpretation is only offered through the Friends' tours. (These are covered under Special Uses).

Refuge visitors are generally allowed access for interpretation in the Public Use Area during daylight hours, with the exception of Doris Campground. The only restrictions to interpretation would occur during fall and winter permit hunts, when foot travel and vehicle travel on arterial roads is restricted. Most informational kiosks would continue to be accessible to visitors after normal Visitor Center hours as well.

Some Friends tours also focus on stargazing, an interpretive event aided by the use of optical equipment. Reservations are required for individuals participating in stargazing interpretation. Virtual geocaching would continue to be allowed on the Refuge given its negligible impact to natural resources.

Interpretive activities have the potential to adversely impact the physical and biological environment. However, interpretation may result in long-term beneficial impacts to the human environment. This use may increase the viewers' understanding and appreciation of wildlife and their habitat needs as well as the role of the National Wildlife Refuge System in resource conservation. In sum, the effect of Alternative A on interpretation would be moderately

beneficial, long-term, and localized to widespread. As with hunting and fishing, the benefits of interpretation to Refuge visitors would extend beyond the boundaries of the Refuge itself, all the way to the communities where these visitors live, in Oklahoma, other states, and even other countries.

Environmental Education

Under Alternative A, the environmental education (EE) program on Wichita Mountains Wildlife Refuge would continue as one of the largest in the U.S. Fish and Wildlife Service. Environmental education classes would generally be held on the Refuge, and the Refuge would continue to partner with its Friends group to provide transportation assistance for students when needed. Most youth programs would be conducted at the EE Center at Quanah Parker Lake, although some would occur at other locations in the Public Use Area including the Charons Garden Wilderness Area. Youth programs would consist primarily of public school classes from the surrounding region, although home-schools, scout troops, youth groups, parochial schools, and other entities also benefit from the programs. Once per year, the Refuge would provide a week-long sleep-over camp called Nature Quest to offer extensive EE opportunities to school-aged children. EE programs would be offered on an advance reservation basis only, and class sizes would be limited to ensure quality programming. The EE Center would be available seven days a week for educational classes and meetings. EE contacts would generally last at least two hours and involve a series of contacts that culminate in personal action.

Environmental education activities have the potential to adversely impact the physical and biological environment. Any adverse impacts to public use opportunities resulting from the EE program would be minimal due to the emphasis on courses occurring on-Refuge at the EE Center. The EE Center would remain unchanged and would therefore not increase the footprint of facilities on the Refuge as the current facilities are already in existence. Implementation of the EE program would ultimately continue to provide a benefit to local residents by developing a higher level of environmental knowledge and awareness among students. In addition, the program would provide long-term benefits for the Refuge itself by promoting environmental stewardship in students. The effect of Alternative A on public use opportunities would be moderately beneficial, long-term, and localized to widespread.

Bicycling

While not a wildlife-dependent public use, bicycling is compatible with Refuge purposes and often leads to interpretation and wildlife observation on the part of participants. Under Alternative A, it would be allowed on the 50 miles of paved roads within the Refuge, and on the 5.8-mile Mt. Scott mountain bike trail/access road. Bicycling on paved roads would continue to be governed by State regulations and would be closed at dark according to Refuge policy. The only other limitations to bicycling occur during fall and winter permit hunts, when foot travel and vehicle travel on arterial roads is restricted. Roadway shoulder improvements would continue, creating additional six- to eight-foot shoulders along State Highways 49 and 115 through the Refuge; this would not only add to the safety of bicyclists, but also the quality of their experience as well. Bicycling has the potential to adversely impact the physical and biological environment. However, bicycling may result in long-term beneficial impacts to the human environment. This use may increase the viewers' understanding and appreciation of wildlife and their habitat needs as well as the role of the National Wildlife Refuge System in

resource conservation. In sum, the effect of Alternative A on bicycling would be moderately beneficial, long-term, and localized to widespread. As with the other public uses, the benefits of bicycling to Refuge visitors would extend beyond the boundaries of the Refuge itself, all the way to the communities where these visitors live, in Oklahoma, other states, and even other countries.

Boating

Under Alternative A, five lakes in the Public Use Area would remain open to the public for boating. While not a wildlife-dependent public use, boating is a compatible use that often leads to wildlife observation and fishing on the part of participants. These lakes have infrastructure that enhance the boating experience including boat ramps, interpretive signs (including mercury warnings), parking lots, and other facilities. Law enforcement of boating activities would also continue to occur. Lake Elmer Thomas would continue to be the only location on the Refuge where operation of any size boat or motor, including sailboats, is allowed, although a “no-wake” speed limit is enforced. Hand powered boats would continue to be allowed on the following Refuge lakes within the Public Use Area: Jed Johnson Lake, Rush Lake, Quanah Parker Lake, French Lake, and Lake Elmer Thomas. In addition, electric trolling motors would be permitted on boats of 14 feet or less on these lakes. Boating would be allowed year-round during daylight hours only. Boating activities have the potential to adversely impact the physical, biological, and human environment. However, boating would likely result in long-term beneficial impacts to the human environment as it supports wildlife observation, photography, fishing, and interpretation. This use may increase the viewers’ understanding and appreciation of fish and wildlife, their habitat needs, and the role of the National Wildlife Refuge System in its conservation efforts. The effect of Alternative A on boating would be moderately beneficial, long-term, and localized to widespread, occurring at different sites throughout the Refuge.

Camping

While not a wildlife-dependent public use, camping is compatible with Refuge purposes and is often associated with wildlife-dependent activities such as wildlife observation and fishing. Under Alternative A, year-round developed camping opportunities would continue to be available at two locations within the Public Use Area: Doris Campground (90 first come, first served sites and three group reservation sites) and Fawn Creek Youth Campground (three group reservation sites). The Refuge would continue to offer camping opportunities year-round. Prime camping season extends from mid-March to late June, with a second peak occurring in September and October when the weather cools. During prime camping season and on holiday weekends, the demand for campsites occasionally exceeds supply.

Camping has the potential to adversely impact the physical and biological environment at the site-specific areas where the use is allowed. However, camping may also result in long-term beneficial impacts to the visitor experience and the mission of the National Wildlife Refuge System. This use may increase the viewers’ understanding and appreciation of wildlife and their habitat needs as well as the role of the National Wildlife Refuge System in resource conservation. Camping is supportive of all six of the wildlife-dependent recreational uses allowed on the Refuge, which would serve to increase public awareness of the Refuge and conservation issues. Furthermore, camping may draw more visitors to the Refuge who participate in other wildlife-dependent recreational uses of the Refuge or those available on nearby lands. In this sense, camping may provide short-term benefits to the socioeconomics of the community.

The effect of Alternative A on public use opportunities would be moderately beneficial, long-term, and localized to widespread. As with the other activities, these widespread benefits for campers would extend in scale beyond the boundaries of the Refuge by increasing the public's awareness, understanding, and appreciation of fish and wildlife resources.

Hiking

While not a wildlife-dependent public use, hiking is compatible with Refuge purposes. It is also often associated with wildlife observation and photography, which are wildlife-dependent uses. Under Alternative A, the Refuge would continue to allow hiking throughout the Public Use Area year-round. Twelve trails totaling about 14.2 miles, each with lengths from 0.4 to 5.7 miles, would be maintained and available to the public for hiking. There would be no group size restrictions in place for this use. All trails would continue to be maintained infrequently through methods such as brushing, removing downed trees, and minor ditching. Refuge visitors are allowed access for hiking during daylight hours. The only restrictions to hiking occur during fall and winter permit hunts, when foot travel and vehicle travel on arterial roads are restricted. Some locations may be closed seasonally to protect resource values such as nest locations or den sites.

Hiking has the potential to adversely impact the physical and biological environment. However, hiking may result in long-term beneficial impacts to the visitor experience and the mission of the National Wildlife Refuge System. This use may increase the viewers' understanding and appreciation of wildlife and their habitat needs, as well as the role of the National Wildlife Refuge System in resource conservation. Hiking is supportive of all six of the wildlife-dependent recreational uses allowed on the Refuge, which would serve to increase public awareness of the Refuge and conservation issues. The net effect of Alternative A on hiking would be moderately beneficial, long-term, and localized to widespread.

Picnicking

While not a wildlife-dependent public use, picnicking is compatible with Refuge purposes and is often associated with wildlife-dependent activities such as wildlife observation and photography. Under Alternative A, four day-use picnicking areas with a total of 85 individual sites, scattered throughout the Public Use Area, would continue to be open year-round during daylight hours on a first-come, first-served basis. Fire rings, grills, trash receptacles, and toilets would be available at all sites. No restrictions for group size would be set. In addition, the Boulder Cabin would be available for large group picnicking by reservation and would occasionally be used for events such as weddings and family reunions. Boulder Cabin Picnicking Area has one group picnic site with a shelter available for day-use only. Capacity for the site is a minimum of 20 people and a maximum of 60 people. The Refuge would offer picnicking opportunities year-round during daylight hours only. Picnic areas receive a sporadic but high level of use on weekends and holidays.

Picnicking has the potential to adversely impact the physical and biological environment at the site-specific areas where the use is allowed. Picnicking at all sites may result in long-term beneficial impacts to the visitor experience and the mission of the National Wildlife Refuge System. Picnicking is supportive of all six of the wildlife-dependent recreational uses allowed on the Refuge, which would increase public awareness of the Refuge and conservation issues. Picnicking may also increase the publics' understanding and appreciation of wildlife and their

habitat needs, as well as the role of the National Wildlife Refuge System in resource conservation. Boulder Cabin Picnicking Area offers guests another unique opportunity to picnic at a site listed on the National Register of Historic Places. This opportunity may result in the same general adverse impacts to resources at that site, but it may also heighten visitors' understanding and appreciation of the historic role of the Refuge, the cabin site, and natural resources. In this regard, this opportunity would result in long-term beneficial impacts to the human environment. The existing facilities at Boulder Cabin are large enough to house groups of 20 to 60 individuals without resulting in long-term natural resource degradation that is possible at other picnic areas. Therefore, Boulder Cabin could accommodate the demand for picnicking in large groups while minimizing potential adverse impacts to the physical and biological environment elsewhere. Furthermore, picnicking may draw more visitors to the Refuge who participate in other wildlife-dependent recreational uses of the Refuge or those available on nearby lands. In this sense, the use may provide short-term benefits to the socioeconomics of the community. In sum, the effect of Alternative A on public uses would be moderately beneficial, long-term, and localized to widespread.

Rock Sports

While not a wildlife-dependent public use, rock sports have been compatible with Refuge purposes and may lead to a greater appreciation for nature, geology, and wildlife on the part of enthusiasts. Rock sports include traditional climbing, rappelling, and bouldering—activities that require specialized equipment such as ropes, harnesses, anchors, and pads. While engaging in rock sports, individuals may also engage in wildlife-dependent recreation through wildlife observation and interpretation. In this manner, rock sports are an existing supportive recreational use. Under Alternative A, rock sports would be allowed during daylight hours throughout the Public Use Area of the Refuge, especially occurring in the Mt. Scott and Narrows areas, with the notable exception of a prohibition on sport rappelling in the Narrows. Some locations may be closed seasonally to protect resource values such as nest locations and den sites. The Refuge would continue to work collaboratively with the Wichita Mountains Climbers Coalition (WMCC) to evaluate and permit the replacement of fixed anchors and establishment of new routes. There would be no group size restrictions in place for these activities.

Rock sports have the potential to adversely impact the physical, biological, and human environment at the site. However, rock sports may result in long-term beneficial impacts to the visitor experience and heighten visitors' understanding and appreciation of the Refuge's natural resources. In this regard, this opportunity would result in long-term beneficial impacts to the human environment. Other Refuge visitors seeking solitude and a more undisturbed wilderness atmosphere tend to avoid climbing areas. Socioeconomic impacts would be positive for area motels, service stations, and restaurants. Other Refuge users such as bird watchers, wildlife photographers, and environmental educators may occasionally experience conflicts with climbers or rappellers (especially large and/or noisy groups). Rather than direct conflict, however, more commonly the reaction of these other users is to avoid popular climbing areas to seek solitude and a more undisturbed atmosphere elsewhere. Overall, the effect of Alternative A on rock sports would be moderately beneficial, long-term, and localized to widespread. No adverse environmental or physical impacts have been documented as a result of rock sports. While the rock sports themselves are concentrated in a few locations on the Refuge, and thus are localized,

rock sport enthusiasts come from across the State to experience the Refuge's rock sport activities.

***Special Uses***

Under Alternative A, the Refuge would continue to allow and occasionally permit some activities or events on the Refuge, including physical fitness activities, both competitive and non-competitive, and hobby activities. Physical fitness activities include jogging or strenuous walking, annual bicycling events (including competitions), and marathons or similar running events. Hobby activities taking place on the Refuge include amateur radio and scuba diving (outside of an instructional environment). All special uses are discussed here.

Jogging and Strenuous Walking

Jogging and strenuous walking would continue to occur on the Refuge. The Refuge provides a serene and natural landscape for civilians to exercise and view wildlife. In this manner, jogging and strenuous walking is a secondary use occurring primarily in support of wildlife observation and to a lesser extent, interpretation. Jogging and fitness walking would be allowed on all public access roads and two dirt roads (the Mt. Scott bike trail/administrative road and the Burma administrative road) in the Public Use Area. Although these activities could occur on hiking trails throughout the Refuge, visitors typically do not run on trails. Jogging and strenuous walking may occur year-round during daylight hours only. Restrictions occur during fall and winter permit hunts, when foot travel and vehicle travel on arterial roads is restricted. Although physical fitness is likely the primary purpose of this activity, there is an opportunity to enjoy the beauty of the Refuge. Thus, jogging and strenuous walking occur in support of wildlife observation and interpretation which are priority wildlife-dependent recreational uses. In this manner, jogging and strenuous walking are an existing supportive recreational use. Overall, the effect of Alternative A on public use opportunities would provide negligible to minor benefits over the long-term and negligible to minor adverse effects over the short term, and would occur over the localized to widespread geographic scale.

Organized Fitness Events

For many years, the Refuge has been home to annual bicycling and running events such as the Tour de Meers, Tour of the Wichitas, and the Race for Survival. Typically, these non-commercial fitness events are sponsored by local Refuge partners. The Tour de Meers occurs each year on the Saturday of Memorial Day weekend, and is sponsored by the Meers Volunteer Fire Department. The Tour of the Wichitas occurs in June each year in conjunction with the Museum of the Great Plains Bike Festival and is sponsored by a variety of Lawton-area wellness and youth services partners. The Race for Survival occurs in October and is sponsored by the Comanche County Memorial Hospital Foundation. Although physical fitness is the primary purpose of each event, participants are encouraged to engage in wildlife observation and to enjoy the beauty of the Refuge. Thus, the events occur in support of wildlife observation, interpretation, and photography, which are priority wildlife-dependent recreational uses. In this manner, annual organized fitness events are an existing supportive recreational use that occurs on paved public access roads in the Public Use Area of the Refuge. The Refuge would continue to allow and occasionally permit these uses through a Special Use Permit issued to the host of the event.

To reduce the potential for any adverse effects, each proposed event (new or existing) would be evaluated based on the overall impact and would only be approved and permitted when minimal impacts to Refuge resources and existing wildlife-dependent recreation can be assured. Possible short-term impacts of road-based events could include the disruption of vehicular traffic through the Refuge, increased litter due to increased visitation, and increased noise along the roadways. Participant safety is another concern. Participants would be informed that wildlife is free ranging on the Refuge and that they must wait for animals on or near the road to pass before they continue the event.

Organized annual fitness events could draw more visitors to the Refuge who would participate in other wildlife-dependent recreational uses of the Refuge or those available on nearby lands. In this sense, these events may provide short-term benefits to the socioeconomics of the community. The Refuge would discuss any restrictions on the timing, location, magnitude, and method of the events to limit any potential adverse effects. Overall, the effect of annual fitness events on public use opportunities would mean minor benefits over the long-term and negligible to minor adverse effects over the short term, and would occur over the localized to widespread geographic scale.

Amateur Radio

Amateur radio operation on the Refuge occurs once or twice a year in association with events held on the Refuge such as an organized fitness event. Visitors bring portable equipment designed for the transmission and reception of high frequency, very high frequency, and/or ultra-high frequency radio signals, including simple antennae. This activity is not a wildlife-dependent public use of the National Wildlife Refuge System, and it requires a Special Use Permit in all instances. Visitors would operate the radio equipment from a temporary site located within the existing 24,088-acre Public Use Area. When visitors request this use, the Refuge would specify locations where the use may be conducted in the Special Use Permit. In the past, permits have almost exclusively been issued for a site on top of Mt. Scott where radio operators can easily transmit signals. Operators are allowed to participate in the use only in areas that are open for other recreational uses, and they may only occupy an area of space similar to other Refuge recreational users (such as one parking space). Time frames for this use would vary depending on the request, and restrictions on when the use could be conducted would be described in the individual Special Use Permits.

Amateur radio operators would need to include some sort of promotional information for the Refuge during broadcasts to other radio operators. In this manner, the use would support the enhancement of the publics' general knowledge of the Refuge. Ultimately, it is expected the very low frequency and duration of this use in areas where other recreational uses occur would not result in any measurable resource impacts. In addition, promotion of the Refuge by amateur radio operators may result in increased awareness of the Refuge. Public operation of amateur radio equipment has been allowed on the Refuge for many years without resulting in any disturbance, user conflict, or resource impacts beyond those that result from the more typical public uses. Overall, the effect of amateur radio operation on public use opportunities would mean minor beneficial and negligible to minor adverse effects over the long-term and would occur over the localized to widespread geographic scale.

Scuba Diving

Scuba diving occurs infrequently on the Refuge and is considered a form of underwater wildlife observation. Under Alternative A, this use would continue to be allowed, though only on Lake Elmer Thomas. Refuge visitors engage in scuba diving on the Refuge year-round during daylight hours only. Changes in habitat or water and shoreline quality are not expected as a result of this activity due to the depth of water that divers generally utilize. Scuba diving may have both a positive and a negative impact on the human environment. User conflict may arise since both scuba divers and boaters and anglers use the deep-water portion of Lake Elmer Thomas near the dam. On the other hand, scuba diving is a short-term and infrequent use on the Refuge that may result in beneficial impacts to the visitor experience. This activity would be supportive of wildlife observation, and perhaps interpretation, making this activity a wildlife-dependent supportive use.

***Commercial Uses***

Under Alternative A, the Refuge would continue to allow some commercial uses that support wildlife-dependent recreation. These include all instructional activities (i.e., art, film, rock sports, and scuba diving), the production of objects or media for sale, and organized recreation activities that charge a fee such as interpretation, fishing tournaments, and rock sports.

Commercial Art, Filming, and Photography

Commercial art, filming, and photography would continue to occur on the Refuge. The Refuge would require these users, depending on the use, to obtain a Special Use Permit and manage their use through its terms. This use would occur when commercial operators come to the Refuge to produce or teach art, film, or photography using professional equipment. The resulting product is typically bought or sold for profit. Though there is a commercial element to this activity, these events would occur in support of wildlife observation and photography which are priority wildlife-dependent recreational uses. In this manner, commercial art, filming, and photography are an existing supportive recreational use. Commercial art, filming, and photography may occur year-round during daylight hours only.

To reduce the potential for any adverse effects, each activity would be evaluated individually and would only be approved and permitted only when minimal impacts to Refuge resources and existing wildlife-dependent recreation can be assured. These activities could result in adverse effects that come from large groups congregating on the Refuge such as habitat trampling, wildlife disturbance, litter, and user conflicts. On the other hand, commercial activities, while a short-term and infrequent use on the Refuge, may result in long-term beneficial impacts to the visitor experience. These activities could bring visitors to the Refuge to participate in interpretation, photography, and wildlife observation, making these uses supportive of wildlife-dependent uses.

Commercial Fishing Tournaments

Under Alternative A, commercial fishing tournaments would continue to occur on the Refuge. Though there is a commercial element to this activity, these events would occur in support of fishing which is a priority wildlife-dependent recreational use. In this manner, commercial fishing tournaments are an existing supportive recreational use. Commercial fishing tournaments

would be allowed only on Lake Elmer Thomas within the Public Use Area. Fishing tournaments may occur year-round during daylight hours only.

To reduce the potential for any adverse effects, each tournament would be evaluated individually and would only be allowed when minimal impacts to Refuge resources and existing wildlife-dependent recreation functions could be assured. These activities could result in adverse effects to the natural and human environment such as habitat degradation, wildlife disturbance, and user conflicts that come from large groups congregating on the Refuge, especially on the banks of Lake Elmer Thomas. On the other hand, fishing tournaments, while a short-term and infrequent use on the Refuge, may result in long-term beneficial impacts to the visitor experience. This activity could potentially bring visitors to the Refuge to participate in other uses such as interpretation, photography, and wildlife observation, making this use supportive of wildlife-dependent uses.

Commercial Scuba Diving Instruction

Commercial scuba instruction has occurred infrequently on the Refuge for some time, and would continue to occur under a Special Use Permit issued by the Refuge. Commercial scuba instruction differs from recreational scuba diving in that individuals in the class are charged a fee for the course instruction, and the instructor makes a profit off of this opportunity. Though not a priority wildlife-dependent recreational use, scuba diving is a form of underwater wildlife observation and perhaps interpretation, making this activity a wildlife-dependent supportive use. Scuba diving would continue to be allowed only on Lake Elmer Thomas. Refuge visitors may engage in scuba diving on the Refuge year-round during daylight hours only. Changes in habitat or water and shoreline quality are not expected as a result of this activity due to the depth of water that divers generally utilize. User conflicts may arise since both scuba divers and anglers and boaters use the deep-water portion of Lake Elmer Thomas near the dam. On the other hand, scuba diving is a short-term and infrequent use on the Refuge that may result in beneficial impacts to the human environment through wildlife-dependent recreational uses of wildlife observation and interpretation. Socioeconomic impacts would likely be positive for area motels, service stations, and restaurants as a result of this use.

Commercial Interpretive Tours

The Association of the Friends of the Wichitas would continue to offer interpretive tours into the Public Use Area on a bus and by foot and into the Special Use Area around the Pinchot Loop on a bus. The tours would occur on the same roads in the Special Use Area every time and participants would be allowed to get off the bus briefly to observe or photograph wildlife and scenery. Participants would not be allowed to hike in the Special Use Area, although a short walk would be included in the Fall Foliage Tour.

Additional commercial interpretive tours would be permitted Mondays through Thursdays year-round, with holidays excluded. From March through May, commercial tours would be limited to the hours of 1:00 p.m. through 6:00 p.m. to reduce conflict with the large number of school groups the Refuge hosts during the spring. Such commercial tours are not a wildlife-dependent public use, but they would occur in support of wildlife observation and interpretation while providing access to the Refuge with a Refuge staff person or Refuge-trained interpreter.

The effect of commercial interpretive tours on public use opportunities would thus be moderately beneficial, long-term, and localized to widespread. Potential negative impacts are those associated with any increase in visitation: trampling of vegetation, disturbance to wildlife, littering, increased facility maintenance activity, and potential conflicts with other visitors. Because of the Refuge's combined administrative oversight and law enforcement focus on public use activities, direct impacts from commercial bus tours should have minimal or negligible impact to fish and wildlife resources, other Refuge resources, and other Refuge users. Commercial tours would benefit the Refuge by offering an energy-efficient, organized, content driven method of facilitating large numbers of people engaged in observation. This use also has the potential to reduce the number of cars traveling on Refuge roads. Socioeconomic impacts would likely be positive for area motels, service stations, and restaurants as a result of this use.

Commercial Rock Sports

Commercial rock sport instruction and activities would continue to occur when guides obtain a Special Use Permit from the Refuge in order to bring a class to the Refuge. Individuals in the class are charged a fee for the course instruction, and the teacher makes a profit off this opportunity. Rock sports include traditional climbing, rappelling, and bouldering—activities that require specialized equipment such as ropes, harnesses, anchors, and pads. While engaging in rock sports, individuals could also engage in wildlife-dependent recreation through wildlife observation and interpretation. In this manner, rock sports are an existing supportive recreational use. Rock sports would be allowed throughout the Public Use Area of the Refuge, with the notable exception of no rappelling in the Narrows. The primary rock sport areas of the Refuge are located at Mt. Scott, the Narrows, and several locations within the Charons Garden Wilderness Area. Refuge visitors may engage in rock sports on the Refuge year-round during daylight hours only. The Refuge would continue to work in collaboration with the Wichita Mountains Climbers Coalition (WMCC) to ensure that rock sports do not impact other user groups or the natural resource, and to manage the installation and replacement of permanent anchors.

Instructional climbing groups use the same permanent climbing anchors (bolts) that sport climbers use, so no additional adverse impacts are expected on the physical or aesthetic elements of the rock or surrounding habitat. There is the potential for conflict with other users, especially individual climbers, although other users will typically avoid instructional climbing groups. Rock sports may also result in long-term beneficial impacts to the visitor experience. This opportunity may result in some general adverse impacts to resources at the site, but it may also heighten visitors' understanding and appreciation of the Refuges natural resources. In this regard, this opportunity would result in long-term beneficial impacts to the human environment. Socioeconomic impacts would likely be positive for area motels, service stations, and restaurants as a result of this use.

Overall, Commercial Uses on the Refuge as conducted through a Special Use Permit would have negligible to minor beneficial effects and some negligible to minor adverse effects over the long-term and widespread scale. All uses would be conducted in support of one of the six wildlife-dependent recreational uses.

***Wilderness Areas***

The Charons Garden Wilderness Area would continue to be open to hiking-based opportunities for wildlife observation and photography, camping (with a permit), and rock sports. The Refuge would also continue a small amount of guided interpretive hikes and organized environmental education with a Leave No Trace message or theme. Two designated trails totaling about three miles would continue to be maintained by hand. Climbing, rappelling, and bouldering would continue to be allowed throughout the Wilderness area. The partnership with the Wichita Mountains Climbers Coalition (WMCC) would be maintained. All anchor replacements or modifications would continue to be done by hand. The Wilderness area would be closed to public use after sunset with the exception of backcountry camping (up to 10 permits issued weekly for a two-night stay). Use would be allowed without group size restrictions. Temporary access restrictions would occasionally be used to protect sensitive sites from harassment in the Charons Garden Wilderness Area. The overall effect of Alternative A on the Charons Garden designated wilderness area would be moderately beneficial, long-term, and localized to widespread. Nevertheless, as a result of increasing visitation pressures on Charons Garden Wilderness Area, the sense of solitude that is supposed to prevail there according to the intent of the Wilderness Act may continue to erode. The overall effect of Alternative A on the Charons Garden Wilderness Area would be adverse, though minor, over the long-term at a localized to widespread scale due to the effects of large groups and heavy use on wilderness character.

The North Mountain Wilderness Area has very limited public access due to its location inside the Special Use Area. The overall effect of Alternative A on the North Mountain Wilderness Area would be moderately beneficial, long-term, and localized to widespread.

***Facilities and Administrative Areas***

The effects of Alternative A from facilities and administrative areas on public use would be neutral, long-term, and localized. No new major facilities would be planned or developed; existing facilities would be maintained in approximately their present condition. However, as regional populations grow during the life of the CCP, Refuge visitation is also expected to grow. Increased visitation without improvements to existing facilities may cause a slight decrease in the quality of the visitor experience. The Job Corps site would continue to be managed under an MOA with the U.S. Forest Service. Likewise, Alternative A would not affect the Holy City, which would continue to be managed according to a five-year Special Use Permit (renewable for 25 years) held by the Wallock Foundation to manage and administer events on the 66-acre site.

Overall, the net effect of facilities on the Refuge's existing recreational and public use opportunities would be moderately beneficial, long-term, and localized to widespread.

***Alternative B: Proposed Action***

***Public Use Opportunities***

Alternative B, the Proposed Action, would improve the quality of public use activities and the effectiveness of public use management while minimizing the adverse impacts that public uses have on wildlife and wildlife habitat in the face of increasing visitation.

Hunting
Alternative B would continue the same hunting management as Alternative A. Thus, the effect of Alternative B on hunting would be moderately beneficial, long-term, and localized to widespread (see Alternative A for discussion).

Fishing
Under Alternative B, the same fishing opportunities described for Alternative A would continue. In addition, there would be increased interpretive signage or educational kiosks, new accessible fishing piers, improved and/or hardened boat ramps, and increased visitor contacts and increased law enforcement contacts. Signage, kiosks, recycle facilities, and increased visitor contacts would serve to inform and educate anglers. New accessible fishing piers at Quanah Parker, Jed Johnson, and Crater Lakes would increase the number of sites that lend themselves to fishing and provide adequate facilities for users. Increased law enforcement contacts would help prevent and reduce poaching and other inappropriate conduct such as alcohol consumption and litter. A youth fishing day clinic would be added to the fishing program.

Fishing and the associated improvements may increase the viewers' understanding and appreciation of fish and wildlife, their habitat needs, and the role of the National Wildlife Refuge System in its conservation efforts. The additional fishing facilities would offer increased opportunities for the public to participate in this wildlife-dependent recreational activity, thereby helping the Refuge to accomplish some of its primary objectives. While the construction of additional fishing piers may result in temporary disturbance to water resources, these actions would be addressed in a step-down management plan to ensure that locations and methods minimize potential adverse environmental impacts.

The effect of Alternative A's improved facilities, services, and fisheries management on the human environment and public use opportunities would be moderately beneficial, long-term, and localized to widespread. These localized benefits occur at individual fishing sites and the widespread benefits are the aggregate of fishing areas spread across the Refuge.

Wildlife Observation and Photography
Under Alternative B, the Refuge would offer the same wildlife observation and photography opportunities as in Alternative A. In addition, under this alternative, the Refuge would provide more wildlife observation opportunities by upgrading the facilities at the Turkey Creek prairie dog town and the Jed Johnson Tower, and by improving driving safety with widened shoulders along State Highways 115 and 49. Two new viewing blinds would be constructed on Quanah Parker Lake in support of the Environmental Education Center, and on Lake Elmer Thomas in support of the Mt. Scott Picnic Area nature trail. Podcasts or online observation tools and tips would be developed to aid in awareness of observation opportunities. Increased bison populations under this alternative would provide more wildlife to view and photograph. Workshops on photographic techniques and etiquette would be offered and photography web pages with seasonal information would be developed.

Adverse impacts associated with existing observation and photography activities are described in Alternative A. Facility improvements and construction would lead to some short- to long-term, site specific, habitat and wildlife disturbance. The adverse impacts of facility improvements

would be mitigated through seasonal and diurnal timing restrictions, soil erosion control, native revegetation, and the use of previously disturbed sites. Wildlife observation and photography would likely result in long-term beneficial impacts to the human environment. This use may increase the viewers' understanding and appreciation of wildlife and their habitat needs as well as the role of the National Wildlife Refuge System in resource conservation. The additional wildlife observation and photography facilities would offer increased opportunities for the public to view and photograph wildlife and scenery in a variety of habitats occurring on the Refuge while enhancing the overall Refuge System mission. In sum, Alternative B would be somewhat more beneficial than Alternative A because of improved facilities and opportunities, and increased bison populations.

Interpretation

Under Alternative B, interpretation would include everything described for Alternative A. In addition, the Refuge would update exhibits at the Visitor Center and construct an interpretive nature trail loop around the Visitor Center. The Jed Johnson tower and trail would be improved. The Refuge would create a designated driving tour with interpretive signs along an established route with posted speed limits, pullouts, and audio capability. Interpretive signs would be installed, principally at developed sites in the high density use zone but also in the medium and low use density zones. Public evening and weekend interpretive workshops would be expanded. Interpretation talks and event booths would include interpretive materials emphasizing Wilderness management and Leave No Trace information; this is done to offer non-intrusive Wilderness interpretation without actually bringing large groups to the Wilderness areas.

Impacts associated with existing interpretive activities are described in Alternative A. Interpretive facility improvement would lead to some short- to long-term, site specific, habitat and wildlife disturbance. The adverse impacts of facility improvements would be mitigated through seasonal and diurnal timing restrictions, soil erosion control, native revegetation, and the use of previously disturbed sites. Overall, interpretation may result in long-term beneficial impacts to the visitor experience and the mission of the National Wildlife Refuge System. The Visitor Center facilities, publications, films, and public talks would increase public awareness of the Refuge and conservation issues. This use may increase the viewers' understanding and appreciation of wildlife and their habitat needs as well as the role of the National Wildlife Refuge System in resource conservation. The additional interpretive facilities would offer increased opportunities for the public to observe, understand, and appreciate wildlife while enhancing the overall Refuge System mission. Therefore, these beneficial impacts would likely remain over the long term. With all of these new interpretive facilities and opportunities, Alternative B would provide more benefits than Alternative A.

Environmental Education

All environmental education under Alternative A would also occur under Alternative B. In addition, the Refuge would work to develop and remodel the Environmental Education Center as an educational training facility, which would train teachers and other educators, eventually leading to a higher level of environmental knowledge and awareness among students in the region, promoting stewardship of the area. Most school classes and/or programs would be hosted on Refuge (instead of off-Refuge), and the percentage of all students contacted receiving environmental education would be increased from 6 percent to 10 percent. All environmental education programs would be linked to the Oklahoma

State Curriculum, improving opportunities for teachers and their classes to visit the Refuge. The Refuge would continue to partner with the Friends of the Wichitas to provide transportation assistance for students.

Impacts associated with existing education activities are described in Alternative A. Education facility improvements would lead to some short- to long-term, site specific, habitat and wildlife disturbance. The adverse impacts of facility improvements would be mitigated through seasonal and diurnal timing restrictions, soil erosion control, native revegetation, and the use of previously disturbed sites. Implementation of the EE program under Alternative B would provide a benefit to local residents by developing a higher level of environmental knowledge and awareness among students. In addition, the added programs and improved facilities would provide long-term benefits for the Refuge itself by promoting environmental stewardship in students.

Bicycling

Alternative B's bicycling opportunities and impacts would be nearly the same as Alternative A's. In addition, bike routes would be designated and signed, the connectivity of existing routes (Lawton, Medicine Park, LETRA, Cache connections) would be improved via partnerships and improved public information, and a bike-share program would be considered. Under Alternative B, there would be greater moderate benefits for bicycling over the long-term and local scale due to longer routes, linkages, and wider highway shoulders.

Boating

Under Alternative B, the same boating opportunities described for Alternative A would continue. In addition, there would be increased interpretive signage or educational kiosks, improved and/or hardened boat ramps, and increased visitor contacts and increased law enforcement contacts. Signage, kiosks, and increased visitor contacts would be used to inform and educate boaters. Increased law enforcement contacts would help prevent inappropriate conduct, such as alcohol consumption or safety issues. Problems with litter would be addressed through education, increased law enforcement, and additional trash/recycle facilities. Improvements would be focused in the high density use zone. This use may increase the viewers' understanding and appreciation of fish and wildlife, their habitat needs, and the role of the National Wildlife Refuge System in its conservation efforts. The additional lake facilities would offer increased opportunities for the public to participate in this wildlife-dependent supportive recreational activity, thereby helping the Refuge accomplish some of its primary objectives. Ultimately, boating would likely result in long-term beneficial impacts to the human environment. Overall, these proposed new facilities and services would help improve boating on the Refuge and would thus be more beneficial than Alternative A.

Camping

Under Alternative B, camping on the Refuge would be nearly the same as Alternative A. Rather than expand the number of campsites or campgrounds on the Refuge itself, the Refuge would work with partners to encourage the use of additional camping opportunities and facilities in nearby off-Refuge areas. This would enable an increase in regional camping opportunities without increasing the development footprint on the Refuge. Overall, therefore, the effects of Alternative B on public use opportunities would be more beneficial than Alternative A.

Hiking

Under Alternative B hiking would include all activities described in Alternative A, plus all hikers would be required to register on site so the Refuge can monitor use patterns and public safety. The Refuge would increase and improve accessible hiking opportunities such as the trail between the Environmental Education Center and the Visitor Center, the trail between the EE Center and Camp Doris, the Jed Johnson Tower trail, the LETRA connecting trail, and the development of a Mt. Scott Picnic Area Nature Trail. These trails would be located along existing trail, road, and utility corridors. Trails would be more regularly maintained. The Refuge would also maintain the existing volume of hiking but redistribute pressure to developed areas and out of the Wilderness area to help maintain Wilderness character. The Refuge would also conduct a study to determine social and resource thresholds of hiking. Group size would be regulated to provide for natural resource protection and to reduce user conflicts.

Impacts associated with existing hiking activities are described in Alternative A. Trail improvements would lead to some short- to long-term, site specific, habitat and wildlife disturbance. The adverse impacts of trail improvements would be mitigated through seasonal and diurnal timing restrictions, soil erosion control, native revegetation, and the use of previously disturbed areas. Group size restrictions would constitute a minor adverse effect for some hikers (those in large groups) due to the limitation on group size. However, there would be a minor beneficial effect on the hiking experience for many hikers in the Wilderness area and medium density use area due to the same group size limitation. Overall, the net effect of Alternative B on hiking would still be moderately beneficial, long-term, and localized to widespread.

Picnicking

Under Alternative B, the Refuge would expand existing picnicking opportunities by working with partners to meet the need for more picnicking in areas adjacent to the Refuge. The quality of the visitor experience in the high density use zone (Mt. Scott picnic area) would be improved by increasing interpretive services, interpretive signage, and recycle and/or garbage services. Less-utilized picnic areas (Boulder and Lost Lake) in the medium density use area would be improved to encourage use. Wilderness and low density use area disturbance (particularly at Sunset Picnic area) would be minimized through improved services such as increasing the awareness of other sites and education on wilderness character. The administration and use of Boulder Cabin would remain the same as Alternative A.

Proposed partnerships surrounding public use may result in long-term beneficial impacts to the Refuge and potential partners as off-Refuge areas gain increased visitation, while decreased use on the Refuge protects resources. Once trail connections or linkages are complete, travel between Refuge sites and off-Refuge neighboring sites would be facilitated. Thus, visitors could still enjoy the Refuge experience and use trail connections to participate in desired picnicking off-Refuge. Efforts to enhance picnicking opportunities outside of the vicinity of the Wilderness area would minimize the amount of use near the Wilderness where there is high potential to degrade resources or even wilderness character. By expanding infrastructure in other areas, large groups would have opportunities to use other picnic grounds other than the Sunset Picnic area. These changes would help limit litter, human disturbance, and noise, while maintaining or enhancing the wilderness character of the area. Furthermore, offering this wilderness experience to individuals or small groups of Refuge visitors seeking solitude at Sunset Picnic Area would

further the understanding of nature in its most intact state. Overall, the effect of Alternative B on the physical and biological environment is expected to be negligible, while the effect on the human environment and public use opportunities is expected to be more beneficial than Alternative A.

Rock Sports

Alternative B would continue the same management of rock sports as Alternative A. In addition, the Refuge would require all rock sport participants to register on site so the Refuge can monitor use patterns and public safety. The Refuge would also conduct a study to determine social and resource thresholds of rock sports. Fixed anchor review guidelines would be incorporated in the Step-Down Visitor Services Plan to be developed by 2014. Replacement of fixed anchors would continue to be permitted but placement of new anchors would be limited. Group size would be regulated to provide for natural resource protection and to reduce user conflicts and would be the same as those for hiking. Overall, the effect of Alternative B on the physical and biological environment is expected to be negligible, while the effect on the human environment and public use opportunities is expected to be more beneficial than Alternative A.

***Special Uses***

Under Alternative B, the Refuge would continue to allow all the activities listed under Alternative B with few changes with the exception of the requirement of the issuance of a Special Use Permit for each activity. Overall, when special uses on the Refuge are regulated and administered through a Special Use Permit and are in support of the six wildlife-dependent recreational uses, they would have minor positive and adverse effects over the long-term and widespread scale. The issuance of a Special Use Permit would also allow the Refuge to monitor these uses, the permittee, and the consequences of allowing a particular activity or set of activities.

Jogging and Strenuous Walking

Jogging and strenuous walking would continue to occur in Alternative B. However, under Alternative B, recreationists would be required to follow the conditions and stipulations stated in the Compatibility Determination. Unless large user groups or commercial activities occur for this use, a Special Use Permit would not be required.

Organized Athletic Events

Annual bicycling and running fitness events would continue to occur in Alternative B as in Alternative A with the exception that all event hosts would be required to obtain and follow the conditions and stipulations of a Special Use Permit and group size restrictions.

Amateur Radio

Amateur radio would continue to occur in Alternative B as in Alternative A.

Scuba Diving

Scuba diving would continue to occur in Alternative B as in Alternative A with the exception that non-commercial use would be restricted to small groups in order to protect the limited area

of entry and use. Unless large user groups or commercial activities occur for this use, a Special Use Permit would not be required.

***Commercial Uses***

Under Alternative B, the Refuge would continue to allow and permit all the activities listed under Alternative B but all uses would require a Special Use Permit and potentially a fee, depending on the use. Overall, when commercial uses on the Refuge are regulated and administered through a Special Use Permit and are in support of the six wildlife-dependent recreational uses, they would have minor adverse and beneficial effects over the long-term and widespread scale. The issuance of a Special Use Permit would also allow the Refuge to monitor these uses, the permittee, and the consequences of allowing a particular activity or set of activities.

Commercial Art, Filming, and Photography

Commercial art, filming, and photography would continue to occur in Alternative B as in Alternative A, with the exception that all users would be required to obtain and follow the conditions and stipulations of a Special Use Permit and group size restrictions. Specific regulations on timing, methods, and locations allowable would be stipulated and explained in the Special Use Permit.

Commercial Fishing Tournaments

Commercial fishing tournaments would continue to occur in Alternative B similarly to Alternative A, with the exception that all users or event hosts would be required to obtain and follow the conditions and stipulations of a Special Use Permit and group size restrictions. Hosts and individuals would be allowed access for fishing tournaments through a Special Use Permit that would regulate the timing, location, method, and duration of the allowable use.

Commercial Scuba Diving Instruction

Commercial scuba diving instruction would continue to occur in Alternative B as in Alternative A with the exception that all users or class instructors would be required to obtain and follow the conditions and stipulations of a Special Use Permit and group size restrictions.

Commercial Interpretive Tours

Commercial interpretive tours would continue to occur as in Alternative A, with the exception that all users or hosts would be required to obtain and follow the conditions and stipulations of a Special Use Permit and group size restrictions. This use would require commercial operators to obtain a Special Use Permit from the Refuge Manager prior to conducting interpretive tours.

Commercial Rock Sports

Commercial rock sport activities would occur as in Alternative A, with the exception that all users or instructors would be required to follow group size restrictions as specified in a Special Use Permit.

Special uses and commercial uses on the Refuge, conducted through a Special Use Permit, would have negligible to minor adverse effects over the long-term and widespread scale. All uses are conducted in support of one of the six wildlife-dependent recreational uses.

Overall, the net effect of Alternative B on the Refuge's public use and recreational opportunities would be moderately beneficial, long-term, and localized to widespread. Alternative B would provide for greater or improved public use opportunities and facilities than Alternative A.

***Wilderness Areas***

With regard to the Charons Garden Wilderness Area, Alternative B would work toward decreasing impacts from hiking and camping by implementing Leave No Trace (such as through brochures, signs, Trail Rangers, etc.) and continuing trail maintenance. Under Alternative B, wilderness-themed environmental education courses would mostly be taught outside of Wilderness areas in order to reduce natural resource impacts. Hiking, rock sports, or other groups would not exceed 15 people without a Special Use Permit. Pressure would be redistributed to trails in the high and medium density use areas and out of the Wilderness area via management of group size and education. Trail maintenance would be increased to reduce habitat impacts. All hikers and rock sports users would be required to register on site. The Refuge would also revise the Wilderness Stewardship Plan (WSP) and create a Step-Down trail plan and a Visitor Services Plan, as well as implement various monitoring efforts, including monitoring and evaluating thresholds for acceptable levels of social and resource impacts. The WSP would include fixed anchor management guidelines. Fixed anchors would continue to be evaluated by the Wichita Mountains Climbers Coalition (WMCC). Approval of new routes requiring fixed anchors would be very limited. In sum, the overall net effect of Alternative B on the Wilderness would be more beneficial than Alternative A due to the increased protection of wilderness character through limitations on activities and the management of group size.

The North Mountain Wilderness Area has very limited public access due to its location inside the Special Use Area, and this would continue under Alternative B. The overall effect of Alternative B on the North Mountain Wilderness Area would be the same as Alternative A.

***Facilities and Administrative Areas***

Under Alternative B, the Refuge and the public would experience beneficial, long-term, localized impacts from a number of new and rebuilt administrative and visitor facilities. Remodeled facilities include the Visitor Center and environmental education buildings using green technologies and incorporating accessibility standards. The Refuge Headquarters building would be replaced. Corrals would be enlarged, the Refuge boundary fence would be moved to the true Refuge boundary, and the Refuge would add or improve wildlife observation blinds, fishing piers, boat ramps, kiosks, and signs. The Refuge would consider partnership opportunities with the Job Corps to increase environmental education and Refuge-specific projects. In this alternative, the Refuge would continue to manage the Holy City under a Special Use Permit. The Refuge would also continue the current level of interpretation on Holy City (handouts on Holy City provided by the Wallock Foundation, answer inquiries at the Visitor Center) and would work with the Wallock Foundation to offer increased interpretation of Refuge resources. Overall, the effect of facilities and administrative areas on the Refuge's public use and recreational opportunities would be moderately beneficial, long-term, and localized to

widespread. Alternative B would provide for greater or improved public use opportunities and facilities than Alternative A.

***Alternative C***

***Public Use Opportunities***

Alternative C is based on input received from a variety of stakeholders. This alternative responds to the issues of habitat management for megafauna and changes in public access throughout the Refuge. Alternative C departs from Alternative A by emphasizing a change to habitat and wildlife management and changes in public use opportunities, both increases and decreases.

Hunting

Under Alternative C, the Refuge would review and revise its administration of hunts in an attempt to reduce the resources needed to implement hunts. Turkey hunts would be considered based on population management objectives. Feral hog hunts or the taking of feral hogs while hunting other species would also be considered.

Due to the resources involved in administering a hunt, the Refuge permits only those hunts that contribute to population management. The incidental taking of feral hogs would probably not result in much additional population control.

It is not yet established that a turkey hunt is required to meet turkey population goals.

New hunts would pose a user conflict and require additional restrictions on other public use activities during the hunt. Thus, hypothetically, Alternative C could potentially be more beneficial than Alternative A on the surface due to the addition of these new hunts. However, in actuality, new hunts would require additional resources (staffing and budgetary) from the Refuge administration to make it a successful hunt and avoid impinging on other user groups, and new hunts would not effectively address population management objectives. Alternative C would be less beneficial to the physical, biological, and human environment than either Alternative A or Alternative B. Moreover, hunting is not a viable hog population control method, and turkey populations on the Refuge do not need to be a controlled.

Fishing

Fishing would be nearly the same in Alternative C as Alternative B. The Refuge would evaluate the need for additional fishing piers through the Visitor Services Plan based on fishing pressure. Adverse environmental effects of construction would be mitigated through seasonal and diurnal timing, erosion control, and native revegetation. Thus, Alternative C would be somewhat more beneficial than Alternative A and B due to the increased access and use opportunities this alternative provides.

Wildlife Observation and Photography

Under Alternative C, wildlife observation and photography facilities and opportunities would be the same as Alternative A. Additional wildlife observation management direction would be developed as part of an updated Visitor Services Plan under Alternative C. This alternative would result in a mixture of beneficial and adverse effects. Beneficial effects would result from a

potentially increased bison population. Minor to moderate, long-term, localized adverse effects could occur due to added hunts, which could further restrict access of the general viewing public to parts of the Refuge during hunting season, and due to the reduction of longhorn cattle.

Interpretation
Under Alternative C, interpretation's overall effects would be the same as Alternative B.

Environmental Education
Under Alternative C, environmental education's overall effects would be the same as Alternative B.

Bicycling
Bicycling under Alternative C would include the same expanded opportunities and facilities as Alternative B. In addition to those, the Refuge would also re-open the Burma Road to bicycling. Thus, beneficial effects on bicycling from Alternative C may exceed those of Alternative B due to more opportunities. However, there is a potential increased adverse effect on bicycling, as there is on hiking, due to added hunting opportunities under Alternative C, which may close certain areas to bicyclists during hunting season. Nevertheless, the overall effect of Alternative C on bicycling would be moderately beneficial, long term, and localized to widespread.

Boating
Under Alternative C, boating's overall effects would be the same as Alternative B.

Camping
Camping opportunities under this alternative would be the same as under Alternative B. The overall effect of Alternative C on camping would be the same as both Alternatives A and B: moderately beneficial, long-term, and localized to widespread.

Hiking
Hiking opportunities under Alternative C would be nearly the same as in Alternative B. In addition, under this alternative, the Refuge would develop further hiking opportunities in the high density use zone. There could be a minor incremental beneficial effect from Alternative C due to additional opportunities in the high use density area. There could be a potential adverse effect due to increased hunting opportunities, which may close some areas to hiking during hunting season. The overall net effect of Alternative C on hiking would still be moderately beneficial, long-term, and localized to widespread.

Picnicking
Picnicking opportunities and effects under Alternative C would be the same as in Alternative B.

Rock Sports
Alternative C would eliminate gear-assisted technical rock sports. This would constitute a moderate, long-term, and local to widespread adverse impact on the human environment. However, if a climbing restriction results in less overall visitation and less hiking pressure it would produce benefits towards the maintenance of the Charons Garden Wilderness Area's wilderness character, habitat quality, and user conflict.

***Special Uses***
Under Alternative C, the Refuge would continue to allow all the activities listed under Alternatives A or B with few to no changes based on each activity; thus, similar effects are expected.

Jogging and Strenuous Walking
Jogging and strenuous walking would continue to occur in Alternative C as in Alternative A.

Organized Athletic Events
Annual bicycling and running events would continue to occur in Alternative C as in Alternative B.

Amateur Radio
Amateur radio would continue to occur in Alternative C as in Alternative A.

Scuba Diving
Scuba diving would continue to occur in Alternative C as in Alternative B.

***Commercial Uses***
Under Alternative C, the Refuge would continue to allow all the activities listed under Alternative B with few to no changes based on each activity; thus, similar effects are expected.

Commercial Art, Filming, and Photography
Commercial art, filming, and photography would continue to occur in Alternative C as in Alternative B.

Commercial Fishing Tournaments
Commercial fishing tournaments would continue to occur in Alternative C as in Alternative B.

Commercial Scuba Diving Instruction
Commercial scuba diving instruction would continue to occur in Alternative C as in Alternative B.

Commercial Interpretive Tours
Commercial interpretive tours would continue to occur in Alternative C as in Alternative B.

Commercial Rock Sports
Under Alternative C, all technical (gear assisted) rock sports would be eliminated throughout the Refuge. This would constitute a moderate long-term, and local to widespread adverse impact on this activity and for this user group. However, it would produce benefits towards the maintenance of the Charons Garden Wilderness Area's wilderness character.

Overall, the net effect of Alternative C on the Refuge's public use and recreational opportunities would be moderately beneficial, long-term, and localized to widespread.

***Wilderness Areas***
Alternative C would eliminate all guided group hikes and technical rock sports in Wilderness areas. This alternative would preserve more of the wilderness character by limiting activities and group size in wilderness areas. While elimination of guided interpretive hikes would create an adverse effect for those groups looking for this activity, the overall effect of this would be negligible to minor, as this is not a large Refuge use. In addition, those groups could obtain literature on many natural resource subjects to allow for a self-guided hike. However, the elimination of technical rock sports in the Wilderness would constitute a moderate long-term, and local to widespread adverse impact on this activity and for this user group. On the other hand, limitations on uses in this area would produce benefits towards the maintenance of the Charons Garden Wilderness Area's wilderness character. Overall impacts of Alternative C with regard to Wilderness would be beneficial and adverse, long-term, and localized to widespread.

***Facilities and Administrative Areas***
Alternative C would have beneficial, long-term, localized effects on the human environment. The Refuge would continue to maintain its administrative buildings as in Alternative A plus remodel the Refuge Headquarters building and expand the corral system for the management of bison and longhorn. Public use facilities would be managed as under Alternative B, plus the Refuge would add emergency phones across the Refuge. The effect of these administrative and public use facility improvements would be minor to moderately beneficial to the human environment with only minor adverse and localized impacts to the natural environment from construction activities. As described in Alternative B, adverse environmental impacts can be reduced through timing restrictions and restoration. The Job Corps center would be relocated off-Refuge under this alternative, which would be a minor to moderate beneficial impact with the potential for habitat restoration on the site. If relocated nearby, socioeconomic impacts of such a relocation would not occur; if it were to be relocated at a considerable distance, there would be moderate adverse social repercussions. Likewise, the Refuge would remove facilities and structures at Holy City under Alternative C. While such an action would potentially eliminate constitutional conflicts posed by the presence of this religious facility on a national wildlife refuge, it would also represent a significant adverse impact on this culturally important and historic resource, which would require the preparation of an Environmental Impact Statement (EIS) were this alternative to be selected.

### 4.6.2 Socioeconomics

Over 1.5 million people visit the Wichita Mountains Wildlife Refuge annually. Spending by these visitors generates economic activity throughout the local economy, both income and jobs (Carver and Caudill 2007).

***Alternative A: No Action***
While the particular economic impact of expenditures associated with visitation at Wichita Mountains Wildlife Refuge has not been quantified, a rough, conservative estimate can be obtained by comparing the Refuge to other national wildlife refuges in Oklahoma on which

economic studies have been conducted recently by the Service. Extrapolating from these studies at Sequoyah, Tishomingo, and Washita national wildlife refuges, total expenditures by resident and non-resident visitors to Wichita Mountains Wildlife Refuge would probably total over $30 million annually. Directly and indirectly, these expenditures would likely support over 500 jobs in the local economy, with annual income from those jobs amounting to more than $10 million annually. Tax revenues would also benefit local governments (Carver and Caudill 2007).

The socioeconomic benefits of the Wichita Mountains Wildlife Refuge consist of contributions it makes to local retail trade in the form of contracts, equipment rental and purchases, and other services. Annual salaries of Refuge employees also contribute to the tax base of Comanche County. The Refuge supports economic activities such as the annual bison and livestock auctions, interpretive tours, and other permitted uses that require a fee. Land acquired by the Service in fee title is removed from county tax rolls. To help pay for lost tax revenues, the county receives an annual payment in lieu of taxes, as provided by the Refuge Revenue Sharing Act of 1935 (16 U.S.C. 7145:48 Stat. 383, as amended). In 2010, Wichita Mountains Wildlife Refuge's payment to Comanche County was $7,891.

It is reasonable to assume that visitation to the Refuge will grow proportionate with the projected increases in the State of Oklahoma's population, the source of most visitors to the Refuge. Oklahoma's population is projected to grow by about six percent to the year 2025 (U.S. Census Bureau 2005), towards the end of the CCP planning period, at an annual rate of increase of about 0.7 percent. The U.S. Census Bureau projects that Oklahoma's population will increase from 3.5 million to 3.8 million from 2000 to 2025, an increase of 13.4 percent (U.S. Census Bureau 2005).

Based on the foregoing analysis, Alternative A is anticipated to result in minor to moderate beneficial effects on the local economy from Refuge visitation and expenditures. These impacts would be long-term and localized to widespread.

***Alternative B: Proposed Action***

Since visitation is not expected to change from that of Alternative A under Alternative B, this alternative's effects on the local economy would be the same as Alternative A: minor to moderately beneficial, long-term, and localized to widespread.

***Alternative C***

Since visitation is not expected to change from that of Alternative A under Alternative C, its effects on the local economy would be the same as Alternative A: minor to moderately beneficial, long-term, and localized to widespread.

### 4.6.3 Cultural Resources

***Alternative A: No Action***

Under Alternative A, the Refuge would manage cultural resources according to law, regulation, and policy, protecting known archaeological sites from human disturbance through active law enforcement. Five sites are listed on the National Register of Historic Places: Boulder Cabin, Buffalo Lodge, the Cedar Creek Arrastra Site, Ferguson House, and Ingram House. Boulder Cabin would continue to be open and available for public use under a daily use permit system.

The Cedar Creek Arrastra would be available but not advertised for public viewing. All eligible and listed historic sites would be maintained as needed. Other facilities on the Refuge that were evaluated but were not identified as eligible for listing on the NRHP or facilities that were not evaluated but that may be eligible for inclusion would be maintained by the Refuge to preserve their historic character. The impacts of ground and habitat disturbing activities like road, trail, and facility maintenance, fire suppression, and prescribed fire activities on cultural resources would be evaluated prior to implementation, and mitigated on a site specific basis as needed.

Alternative A would have negligible to minor beneficial effects in general on cultural resources from managing according to the directive and the National Historic Preservation Act (NHPA). These effects would be long-term and localized to the site.

***Alternative B: Proposed Action***

Actions related to cultural resources under Alternative B would be the same as Alternative A. In addition, Alternative B would update the 1964-1965 archaeological survey by completing systematic archaeological surveys Refuge-wide. The integrity of known sites would be monitored. Archaeological surveys would be required before any new ground disturbing activities could begin.

These actions would be moderately beneficial, which is more beneficial than Alternative A because of the proposed surveys and increased monitoring. Effects would long-term and localized.

***Alternative C***

Actions related to cultural resources under Alternative C would be the same as Alternative B. In addition, Alternative C would identify unknown sites in the Public Use Area at a greater risk of disturbance. The Refuge would also nominate additional sites for the National Register of Historic Places.

Alternative C would be more beneficial than Alternative B because of this risk assessment of sites in the Public Use Area and additional sites nominated for the National Register of Historic Places. These impacts would be long-term and localized.

### 4.6.4 Scenic Resources

The Refuge has important scenic resources appreciated by hundreds of thousands of visitor annually. Many make the drive to the summit of 2,464-foot Mt. Scott to gaze out upon the Refuge's landscapes and habitats.

***Alternative A: No Action***

The continued, long-term protection of the scenic resources provided by the Refuge's Federal designation has major, positive, long-term, widespread benefits to the human environment. Construction and invasive species treatments would have short-term, localized, negligible to minor adverse effects on scenic resources, but probably the single management action with the greatest, albeit short-term, effect on scenic resources would be prescribed fire. The smoke

created by fire would have a short-term, localized to widespread, negligible to minor adverse effect on visual and scenic resources. The plume of smoke itself would be visible for miles, but even when dispersed, smoke can contribute to unsightly haze which may compromise visibility. However, over the long term, prescribed fire helps maintain open landscapes and ecosystem integrity, which have their own aesthetic attributes. Another short-term but minor effect to scenic resources might be caused by invasive species treatments conducted along roadsides and around public use areas through the Refuge's Integrated Pest Management Plan (2013). The treating of invasive would be very short-term, taking place over one day to one week. But as treated vegetation begins to die off, the impact to scenery might be a little more prominent for a longer period of time until new growth remerges. However, the transition to native vegetation and loss of non-native invasive populations would improve the aesthetics. Construction activities on the Refuge might reduce the quality of scenic resources, though the effect would only be short-term (temporary), minor, and localized (i.e., confined to places that are already modified from the natural Proposed Action condition such as public use sites and facilities).

The overall long-term effects of Alternative A on scenery would be major and localized to widespread.

***Alternative B:***

Effects of Alternative B on scenic resources would be largely the same as Alternative A. Some additional construction and maintenance of facilities would occur under this alternative but would not add extensively to adverse effects. Effects would be negligible to minor over the long term and localized scale.

***Alternative C***

Effects of Alternative C on scenic resources would mostly be the same as Alternative A, largely negligible over the long term. However, consideration for removing the facilities that comprise Holy City and the moving of the Job Corps site off-Refuge may result in increased scenery opportunities, and both actions would need additional analysis before any implementation would begin.

Table A-3. Summary of Alternatives Effects on Refuge Resources

| Issues | Alternative A – No Action | Alternative B Proposed Action | Alternative C |
|---|---|---|---|
| **Climate Change** | • Increase in annual mean temperature predicted.<br>• Increased frequency of hot extremes and heat waves predicted.<br>• Fewer and less severe cold extremes predicted.<br>• Warm season predicted to become longer and arrive earlier.<br>• Cool season predicted to warm and shorten.<br>• Larger changes in summer temperatures than winter temperatures predicted. | Same as Alternative A. | Same as Alternative A. |
| ***Physical Resources*** | | | |
| **Air Quality** | • Impacts would be both adverse and beneficial.<br>• Adverse impacts would occur from prescribed fires, fugitive dust, and spray drift.<br>• Adverse impacts would be short-term, negligible to moderate, and localized to widespread.<br>• Direct and indirect beneficial impacts would occur from maintaining habitat and monitoring mercury and regional haze parameters.<br>• Direct beneficial impacts from habitat conservation would be moderate, long-term, and widespread.<br>• Indirect beneficial impacts from monitoring would be long-term, negligible to minor, and widespread. | • In general, adverse impacts would be the same as Alternative A, except that there may be some reduction in certain emissions overall.<br>• Beneficial impacts would be the same as Alternative A. | Same as Alternative B. |
| **Water Resources** | • Overall net effect from management actions would be beneficial.<br>• Effects range from short-term to long-term in duration.<br>• Effects would be minor to moderately | Same as Alternative A except for possible beneficial, long-term, localized effect on fisheries related to fish passage structure on West Cache Creek to improve fish passage. | Same as Alternative A. |

| Issues | Alternative A – No Action | Alternative B Proposed Action | Alternative C |
|---|---|---|---|
| | beneficial.<br>• Any adverse effects would be negligible to minor and localized (Refuge-wide). | | |
| **Water Quality** | • Impacts would be both adverse and beneficial.<br>• Adverse impacts would result from a variety of sources.<br>• Adverse impacts would be short-term from specific actions, of negligible to moderate intensity, and on a localized to moderate scale.<br>• Beneficial impacts would occur from monitoring mercury levels in fish, low water stream crossings, and conserving Refuge vegetative cover.<br>• Beneficial impacts would be long-term, of minor to moderate intensity, and on a localized to moderate scale. | • In broad terms, overall impacts would be the same as Alternative A.<br>• There would be additional short-term, localized, minor adverse impacts on water quality (due to suspended solids and turbidity) from proposed construction of a fish crossing structure and other new facilities.<br>• New low water stream crossings would have long-term, beneficial, localized, minor effects on water quality.<br>• Managing group size in low and medium density areas for hiking, rock climbing would be an added benefit, although probably negligible. | • Effects similar to Alternative A.<br>• Possibility of increased erosion, turbidity, and sedimentation from overgrazing. |
| **Soils** | • Impacts would be both beneficial and adverse, largely the former.<br>• Roads, trails, construction and maintenance activities would have localized, negligible to minor adverse impacts.<br>• The pyric herbivory model of grazing interactions would lessen long-term damage to grasslands, by attracting grazers (by post-burn growth) across the Refuge.<br>• Livestock grazing under special use permit would cause localized soil compaction and erosion.<br>• Effects range from short-term to long-term.<br>• Beneficial effects would be minor to moderate, long-term and widespread. | • Same as Alternative A, with the exception of:<br>• Reduction in hiking, rock climbing, etc., group size a beneficial resource impact.<br>• Short-term adverse, localized impacts from constructing new facilities. | • Same as Alternative A, with the exception of:<br>• Increased erosion, turbidity, and sedimentation could occur if overgrazing takes place. |

| Issues | Alternative A – No Action | Alternative B Proposed Action | Alternative C |
|---|---|---|---|
| ***Biological Resources*** | | | |
| **Wildlife Habitats (General)** | • Overall net beneficial impacts on habitat from fire program, invasive species control, and other activities such as exclusion from Special Use Area.<br>• Impacts are moderately beneficial.<br>• Effects are short-term to long-term and widespread | • Similar to but somewhat more beneficial than Alternative A.<br>• Reduction in hiking group size a beneficial resource impact. | • Same as Alternative B, but with additional minor impacts from increasing public use in the SUA.<br>• Possibility of moderate to major, localized, long-term damage to grassland habitats from overgrazing. |
| **Native Fauna** | • Overall moderately beneficial, long-term effects from current management (including invasive species control).<br>• Adverse effects from reduced forage due to maintaining non-native fauna (longhorns).<br>• Effects would be localized to widespread (Refuge-wide and beyond due to bison initiative) | • Even more beneficial than Alternative A due to estimated increase in bison (and perhaps deer and elk) population because of decrease in longhorn population.<br>• Reduction in hiking group size a potential minor beneficial resource impact. | • Superficially more beneficial than Alternatives A and B due to possible reintroduction of wolves and pronghorn antelope; however, these proposed reintroductions may not be ecologically or politically feasible.<br>• Potential adverse impact to bison if longhorn population is allowed to increase.<br>• Additional minor to moderate adverse impacts on wildlife from increasing public use in the SUA due to habitat effects and disturbance. |
| **Non-Native Fauna** | • Maintaining Texas longhorn cattle population as a living cultural resource, which is minor to moderately beneficial, given existing directives.<br>• Effects are long-term and localized to widespread (Refuge-wide and beyond).<br>• Efforts to control feral hogs and mussels restrict impacts to localized, long-term, and minor. | Same as Alternative A, except that longhorn population might (subject to results of evaluation) be managed at lower level or relocated (to allow for increase in bison population). | • Same as Alternative A, except that longhorn population might (subject to results of evaluation) be managed at higher level.<br>• May not be realistic to maintain higher longhorn population for several reasons, including increased bison herd, adding wolves, and available forage. |

| Issues | Alternative A – No Action | Alternative B Proposed Action | Alternative C |
|---|---|---|---|
| **Federal Trust Species** | • Long-term, moderately beneficial effects on black-capped vireo and populations of other Federal trust species.<br>• Population impacts would be widespread because they would help overall recovery of species that range well beyond Refuge's boundaries. | • Likely to be somewhat more beneficial for the black-capped vireo and other Federal trust species than Alternative A. | Same as Alternative B. |
| ***Socioeconomic Resources*** | | | |
| **Hunting** | • Beneficial effect on hunting would be moderate, long-term, and localized to widespread. | Same as Alternative A. | • Potentially more beneficial than Alternative A because of addition of turkey and feral hog hunts.<br>• However, feral hog hunts use too many Refuge resources and are not an effective method for hog control. |
| **Fishing** | • Beneficial effect on fishing would be moderate, long-term, and localized to widespread. | More beneficial than Alternative A because of additional facilities and opportunities. | • Even more beneficial than Alternative B because of additional fishing piers beyond those offered under Alternative B. |
| **Wildlife Observation and Photography** | • Beneficial effect on wildlife observation and photography would be minor to moderate, long-term, and localized to widespread. | • More beneficial than Alternative A because of additional facilities and opportunities.<br>• Opportunities will be organized according to use density zones. | • Mixed beneficial and adverse effects.<br>• Beneficial effects from potentially increased bison population and proposed new facilities.<br>• Potential adverse effects (minor to moderate, long-term, localized) from added hunts, further restricting access to observers and photographers for part of the year. |
| **Interpretation** | • Beneficial effect on interpretation would be moderate, long-term, and localized to widespread. | • More beneficial than Alternative A because of additional facilities and opportunities. | Same as Alternative B. |
| **Environmental Education** | • Beneficial effect on environmental education would be moderate, long-term, and localized to | • More beneficial than Alternative A because of additional facilities and opportunities. | Same as Alternative B. |

| Issues | Alternative A – No Action | Alternative B Proposed Action | Alternative C |
|---|---|---|---|
| | widespread. | | |
| **Bicycling** | • Beneficial effect on bicycling would be moderate, long-term, and localized to widespread. | • More beneficial than Alternative A because of additional facilities and opportunities. | • Even more beneficial than Alternative B because of re-opening Burma Road to bicycling. |
| **Boating** | • Beneficial effect on boating would be moderate, long-term, and localized to widespread. | • More beneficial than Alternative A because of additional facilities. | Same as Alternative B. |
| **Camping** | • Beneficial effect on camping would be moderate, long-term, and localized. | • More beneficial than Alternative A because of encouraging opportunities off-Refuge. | Same as Alternative B. |
| **Hiking** | • Beneficial effect on hiking would be moderate, long-term, and localized to widespread.<br>• Hiking experience and trail quality likely to decrease due to increasing pressures and use. | • Minor adverse effect due to limitations on group size.<br>• Minor beneficial effect on hiking experience in Wilderness due to group size management.<br>• Beneficial effects from increase in accessible opportunities, increased trail maintenance, and redistribution to appropriate density zones.<br>• Overall net effect would still be moderately beneficial, long-term, and localized to widespread. | • Similar to Alternative B, with some exceptions.<br>• Minor added beneficial effect from additional opportunities in the high use density area.<br>• Potential adverse effect due to increased hunting opportunities. Overall net effect would still be moderately beneficial, long-term, and localized to widespread. |
| **Picnicking** | • Beneficial effect on picnicking would be moderate, long-term, and localized to widespread. | • More beneficial than Alternative A because of encouraging opportunities off-Refuge and improving existing sites on-Refuge. | • Moderate adverse effect due to loss of opportunities. |
| **Rock Sports** | • Beneficial effect on rock sports would be moderate, long-term, and localized to widespread. | • Same as Alternative A except for minor adverse effect due to loss or change of opportunities for groups larger than 15 in the Wilderness area and larger than 30 in the medium density use zone.<br>• Overall net effect would still be moderately beneficial, long-term, and localized to | • Moderate to major adverse impacts due to elimination of technical rock climbing. |

| Issues | Alternative A – No Action | Alternative B Proposed Action | Alternative C |
|---|---|---|---|
| | | widespread. | |
| **Special Uses** | • Beneficial effect to public uses would be negligible to minor over the long-term and would occur over the localized to widespread geographic scale.<br>• Adverse effects would be negligible to minor and would occur over the long-term, localized to widespread geographic scale. | • Same as Alternative A except the Refuge would require a Special Use Permit for each activity.<br>• Beneficial effect to public uses would be negligible to minor over the long-term and would occur over the localized to widespread geographic scale. | Same as Alternative A or B (depending on the use). |
| **Commercial Uses** | • Beneficial and adverse effects would be negligible to minor over the long-term and widespread scale.<br>• All uses would be conducted in support of one of the six wildlife-dependent recreational uses. | • Same as Alternative B, except all uses would require a Special Use Permit.<br>• Beneficial and adverse effects would be negligible to minor over the long-term and widespread scale. | Same as Alternative A or B (depending on the use). |
| **Wilderness** | • Beneficial effect on designated wilderness area would be moderate, long-term, and localized to widespread.<br>• There would likely be some loss of the solitude that now prevails in the Wilderness due to increasing visitation pressures. | • More beneficial than Alternative A from managing wilderness visitation and improved trail maintenance.<br>• Would preserve more of wilderness character by limiting activities and group size in Wilderness areas. | Same as Alternative B. |
| **Special Use Area/Research Natural Area** | • Beneficial effect on special use area would be moderate, long-term, and localized to widespread. | Generally similar effects as Alternative A, plus designation of Research Natural Area at Special Use Area boundary. | • Minor to moderate adverse effect on habitat and wildlife values from increased public use in special use area.<br>• Minor beneficial effect due to increased recreational opportunities. |
| **Facilities and Administrative Areas** | • Effect on facilities and administrative areas is neutral, long-term, and localized. | • Beneficial, long-term, localized impacts from new and rebuilt facilities.<br>• Beneficial, long-term, localized impacts from monitoring and mitigations. | Same as Alternative B. |

| Issues | Alternative A – No Action | Alternative B Proposed Action | Alternative C |
|---|---|---|---|
| **Socio-economics** | • Minor to moderate beneficial effects on the local economy from Refuge visitation and expenditures.<br>• Impacts would be long-term and localized to widespread. | Same as Alternative A. | Same as Alternative A. |
| **Cultural Resources** | • Neutral to beneficial effects in general from managing according to directive and NHPA.<br>• Effects would be minor, long-term, and localized. | • Moderately beneficial, which is more beneficial than Alternative A because of proposed surveys and increased monitoring.<br>• Impacts would long-term and localized. | • More beneficial than Alternative B because of risk assessment of sites in the Public Use Area and additional sites nominated for National Register of Historic Places.<br>• Impacts long-term and localized. |
| **Scenery** | • Adverse impacts would be negligible to minor, long-term and localized to widespread.<br>• Moderately beneficial, long-term, widespread impact. | Same as Alternative A. | Same as Alternative A. |

# Chapter 5 – Cumulative Impacts

Cumulative impacts include those impacts on the environment that result from incremental effects of the alternatives when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Occasionally, different actions counterbalance one another, partially cancelling out each other's effects on a resource. But more typically, multiple effects add up with each additional action contributing an incremental impact on the resource. Implementing Alternative B would reduce the potential for cumulative impacts because of the integrated approach to managing programs. Overall, under all action alternatives, management actions would be better coordinated in the Refuge management arena for scientific soundness and will be closely monitored. Ecological and biological integrity would be at the forefront of management actions.

The following section addresses the potential cumulative effects for all the alternatives and is intended to consider the activities on the Refuge in the context of other actions on a larger spatial and temporal scale. The impacts of past and present actions that have taken place on the Refuge are reflected in the current resource conditions (affected environment) as described in Chapter 3 of the CCP. The impacts of proposed future actions (for all alternatives) are discussed in earlier parts of this EA. The Service also considered past, present, and future planned actions on other State, Federal and private lands surrounding the Refuge. Based on this analysis, the Service has concluded that proposed Refuge management actions (for all alternatives), when added to other past, present, or future proposed actions, would not result in significant cumulative impacts, as summarized in the following text. The benefits to habitat, wildlife, and public use opportunities that the proposed actions would achieve greatly outweigh any of the adverse impacts discussed in this document.

## 5.1 Cumulative Impacts on Physical Resources

### Air Quality

In 1977, Congress recognized the uniqueness of the Wichita Mountains Wilderness by naming it a Class I air quality area and giving it special protection under the Clean Air Act. The Service has the responsibility to protect the air quality and air quality related values (AQRVs) of the area from anthropogenic air pollution. These AQRVs include vegetation, wildlife, soils, water quality, visibility, odor, and cultural and archaeological resources (National Park Service 2006).

Despite this protected status, at present, air pollution does impact the Refuge and its Wilderness area. This pollution comes from a number of off-Refuge sources, including industry, power plants, and automobiles in the wider region. Haze from pollution sometimes reduces visibility within the Wilderness area.

The Service participates in a nationwide program to better understand air pollution causes and effects at Wichita Mountains, in partnership with the national Interagency Monitoring of Protected Visual Environments (IMPROVE) program. As part of this program, the Refuge operates a fine particle sampler that measures the pollutants in the air responsible for visibility impairment, primarily sulfur aerosols, and nitrate particles. The Service is working cooperatively with industry and the Air Quality Division of the Oklahoma Department of Environmental

Quality to reduce air pollutant emissions and protect the air quality and AQRVs of Wichita Mountains (National Park Service 2006). The National Atmospheric Deposition Program/Mercury Deposition Network (MDN) monitors weekly mercury concentrations and depositions near the Refuge Headquarters building. Wet deposition rates vary seasonally but tend to be highest in the summer. In the coming decades, it is expected that mercury deposition rates will begin to decline as a result of implementation of EPA's mercury regulation efforts, including from coal-fired power plants and other sources (EPA 2010).

As noted earlier in this document, ozone emissions could increase due to climate change (Bell et al. 2007), which could have long-term, cumulative detrimental effects on human health and the Refuge's vegetation.

At Fort Still, adjacent to the southern edge of the Refuge, fires are started from explosives and other military activities. These fires generate smoke that periodically impairs air quality over the Refuge. At times, it could conceivably add to smoke from prescribed fires or wildfires originating on the Refuge, temporarily aggravating air quality on the Refuge more than any given wildland fire would.

Over the long term, management and conservation of the Refuge's habitats and vegetation communities would tend to be beneficial for air quality, as noted earlier.

Overall, the cumulative effects on air quality from each of the Refuge's management alternatives under consideration and all other factors would probably be somewhat beneficial. That is, at the close of the CCP's 15-year planning horizon, overall air quality on the Refuge is expected to be relatively improved over that which exists at present. As a result of continuing implementation of the Clean Air Act Amendments of 1990, EPA's ongoing mercury emission regulation efforts, and region-wide and nationwide air quality programs, including EPA's Regional Haze Program, levels of "criteria pollutants" (regulated as part of the National Ambient Air Quality Standards) as well as the toxic contaminant mercury, would be reduced from today's levels. These beneficial cumulative effects on air quality are expected to be minor, long-term, and widespread.

### Water Management and Quality

As noted in the sections on Water Quality, each of the alternatives would have both adverse and beneficial impacts on water quality. The long-term adverse impacts on water quality from all Refuge actions would largely be of negligible to minor intensity and on a localized to moderate scale. The beneficial effects from each of the alternatives would tend to be long-term, of minor to moderate intensity, and on a localized to moderate scale.

There are several outside influences that have a bearing on cumulative effects related to water quality on the Refuge. These include the several drainages entering the Refuge from Fort Sill, the septic systems at the Job Corps and Holy City Sites, and mercury loadings from mercury in precipitation. To date, no adverse effects have been documented from the previous two influences. Mercury deposition is being monitored at one MDN site on the Refuge. While mercury is a toxic heavy metal harmful to both wildlife and humans in relatively low concentrations, especially as methyl mercury ($CH_3Hg$), no specific harm to either wildlife or humans has yet been documented on the Refuge, although there could well be undocumented

sub-lethal, chronic effects. In the coming decades, rates of mercury deposition on the Refuge should decline as a result of gradual and ongoing implementation of a number of regulations controlling the release of mercury from a variety of sources by EPA (UFLDWEC 2008).
As a result of increasing $CO_2$ levels in the atmosphere from the growing combustion of fossil fuels around the world, it is possible that both rainwater falling on the Refuge and surface water on the Refuge may become more acidic (i.e., have a lower pH) because of the formation of carbonic acid ($H_2CO_3$), a weak acid formed when $CO_2$ dissolves in water. The extent of this problem and its effect on the Refuge are unknown, but acid rain is a well-documented problem elsewhere in the nation (particularly in regions with poorly buffered rocks and soils).

If this possible acidification does not emerge as problematic over the 15-year life of the CCP, then overall cumulative effects on the Refuge's water quality from the combination of all on-Refuge and off-Refuge causes are expected to be of minor benefit, long-term, and widespread.

With regard to water quantity, no cumulative effects on the Refuge's water resources are anticipated from concurrent off-Refuge actions. However, as predicted long-term climate changes begin to occur over the coming 15 years, there could well be incipient hydrological consequences for the Refuge's water resources. Among predicted effects are more extreme weather events such as heavy downpours and droughts. The length of time between individual rainfall events will probably increase, even while these events become more intense. That is, more rain is predicted to fall per hour. This increased intensity will result in more runoff and flash flooding. At the same time, increases in evaporation and sustained droughts are expected to occur; more droughts and higher temperatures would increase the potential for wildfires, which as noted earlier, could have an indirect effect on water quality and quantity by encouraging erosion, turbidity, and sedimentation in water bodies. A reduction in water availability and quality is anticipated, as well as recharge of shallow water aquifers. This in turn could reduce water flow at springs, both natural and modified, which could have a detrimental effect on wildlife that depends on water availability at these sites.

Thus, the probable long-term cumulative effects on water resources would be minor to moderately adverse and widespread, though over the 15-year planning period, the severity or intensity of these likely adverse effects would have to be judged as uncertain, due to the complex interactions of many variables and chance.

**Soils**

The cumulative effect of management actions on the Refuge over the 15-year planning period of the CCP would tend to benefit its soils due to the protection of vegetative cover across all habitat types. Protecting vegetative cover allows for the process of soil formation to proceed relatively unhindered under relatively undisturbed conditions. Soil formation deepens soils, improves their structure, and increases their fertility, but it is an extremely slow process. Construction sites, road edges, trails, and other disturbed sites, where soils do not have a chance to continue to develop under a protective layer of vegetation, constitute a tiny minority of all soils on the Refuge. The mining of gold prior to the establishment of the Refuge has left some lingering effects to the soil, such as open pits and shafts, mine tailings, and traces of mercury and other contaminants, but these areas constitute a small total area of the Refuge and remediation occurs where necessary. Prescribed fires and fire suppression activities would affect soils over larger areas, but in most

instances, because they would not be hot-burning and severe, they would not damage soils and may even increase their fertility by recycling nutrients such as nitrogen, phosphorus, calcium, magnesium, and potassium that have been locked up in overlying vegetation. This greater nutrient availability can lead to a burst of plant growth afterwards. Overall, as a result of all cumulative impacts, the condition of soils on the Refuge at the conclusion of the 15-year planning period should be slightly better than at present.

One possible caveat concerning the generally improved condition of Refuge soils relates to the uncertain influence of outside factors, such as continuing mercury deposition and lower-pH (more acidic) rainfall from rising $CO_2$ concentrations in the atmosphere. Due to Federal regulatory efforts to control mercury emissions, the rate of mercury deposition is likely to fall over the coming 15 years, though there could still be a gradual increase in mercury concentrations in soils as a result of the cumulative buildup.

## 5.2 Cumulative Impacts on Biological Resources

### Habitats

Cumulative impacts on wildlife habitats would result from the effects of the Refuge's management actions over the life of the CCP, combined with the influence of outside factors. Habitat influences from the only semi-natural area adjoining the Refuge —Fort Sill on the south—are not expected to change over the coming 15 years. The Refuge would continue to have to address invasive plant species and occasional wildfires that originate on Fort Sill, both of which adversely affect the Refuge's habitats to a limited extent, but given continuing Refuge diligence, these are not expected to have cumulative adverse effects in the future.

The cumulative effects of all three management alternatives considered in this EA on the Refuge's habitats would be largely beneficial. That is, in general, the various types of habitat found on the Refuge would be in equal or better condition at the end of the 15-year planning period as a result of the Refuge's management actions, including invasive species control, prescribed fire, grazing, control of grazers' populations, aquatic and lake management, and the public use program. As a result of the additional efforts of Alternatives B and C to link up with and conserve riparian corridors off the Refuge, their benefits may exceed those of Alternative A.

As in several previous instances, one caveat to this generally favorable outlook for the Refuge's habitats concerns the potential effects of climate change over the 15-year life of the plan. Over the longer term, as the effects of climate change become more pronounced, the Refuge's habitats would have to respond to a climate that will become less predictable, more prone to extreme events (i.e., more powerful storms with more intense rainfall and stronger winds), and more subject to longer-lasting droughts of greater severity. Grasslands, wooded areas, and aquatic habitats may all face drier conditions in the future, leading to greater fire frequency, moisture stress, and a tendency to shift towards more fire and drought-resistant vegetation. Insect and disease outbreaks may accompany these periods of heightened moisture stress. However, it should be emphasized that it is impossible to predict the extent to which these probable changes will manifest themselves in the coming 15 years, a period of time which is quite short compared to the centuries of time over which climate change is expected to occur.

**Wildlife**

Alternative A is not expected to result in noticeable cumulative impacts on the Refuge's wildlife. That is, as a result of the combined influence of all the Refuge's management actions and all other off-Refuge activities, actions, and environmental trends, the general condition of wildlife on the Refuge should be comparatively unchanged from what it is at present. No changes are predicted in species abundance, distribution, or composition. This does not mean certain changes will not occur, because nature is never static, rather that such changes are inherently unpredictable; these cumulative effects could be due to random chance and variation, such as from unusual or extreme weather events, but not from the predictable or probable outcome of the suite of management actions proposed under Alternative A.

Alternative B is expected to result in cumulative beneficial impacts on wildlife in two ways, both of which would occur as a result of proposed Refuge actions over the life of the CCP. First, populations of the native American bison are expected to increase over the 15-year planning period under Alternative B. Second, as a result of Alternative B's emphasis on protecting and improving the habitat quality of riparian corridors on and off the Refuge (through close collaboration with landowners and other partners), numerous species of wildlife would be eventual beneficiaries of long-term, cumulative, multi-party efforts. The Oklahoma Department of Wildlife Conservation (2000) lists scores of vertebrates that are associated with riparian corridors in central and western Oklahoma, including mammals such as the eastern pipistrelle, big brown bats, red bats, evening bats, raccoon, swamp rabbit, beaver, and muskrat; birds such as several species of grebes, many ducks and geese, herons, cranes, shorebirds, owls, kingfisher, red-bellied woodpecker, and songbirds such as the alder and willow flycatchers, white-eyed and Bell's vireo, fish crow, tree swallow, and veery; reptiles, including numerous species of turtles and snakes; amphibians such as frogs, toads, and salamanders; and fish such as the mosquitofish, largemouth bass, green sunfish, orange-spotted sunfish, warmouth, black and white crappie, bluegill, redear sunfish, catfish, and many other species. All of these wildlife species could presumably benefit from a concerted effort to expand riparian corridor conservation and restoration.

With respect to non-native, invasive species such as the feral hog and zebra mussel, Alternative B's long-term cumulative effects would also likely be beneficial, resulting in a reduction of the potential threat these organisms pose to native species, both terrestrial and aquatic, on the Refuge.

With regard to riparian corridors, Alternative C's cumulative impacts on wildlife would be comparable to Alternative B's. In many other respects, Alternative C's cumulative impacts would also be similar to Alternatives A and B. However, with regard to bison, elk, deer, and Texas longhorns, all of which are already present on the Refuge, and pronghorn antelope and wolves, which are proposed for reintroduction under Alternative C, cumulative impacts are much more difficult to predict. As noted earlier in the effects analysis, trying to increase longhorn populations while simultaneously reintroducing antelope and maintaining the size of bison and elk herds would amount to a large-scale, long-term ecological experiment with an uncertain outcome. Achieving intended population objectives is one possibility, but it seems more likely that all grazer populations would suffer declines from trying to exceed the range's aggregate grazer carrying capacity, as we currently understand it.

The reintroduction of wolves in Alternative C would represent a great deal of ecological uncertainty for all large mammals, both native and non-native, on and near the Refuge. As observed earlier, in all probability, the Refuge and other nearby protected public landscapes and ecosystems are not large enough to support a viable wolf population without constant and costly managerial interventions. If such a population could be maintained, predictable outcomes include reduced populations of bison, elk, deer, antelope, and longhorn from increased predation pressure on the Refuge, as well as increased depredation of livestock off the Refuge. The eventual outcome is uncertain but would probably not be healthy or sustainable due to large herds of bison, elk, deer, antelope, and longhorns living in balance with one or more wolf packs. While natural populations of ungulates are able to regulate with the presence of apex predators, the existence of a large game fence on the Refuge may make escapes (that would normally occur in nature) from predation impossible.

An important caveat to the previous discussion concerns the unpredictable, indirect effects of accelerating climate change on wildlife populations and diversity over the 15-year planning horizon. As discussed earlier, predicted changes in climate as a result of anthropogenic "forcing"—continuing increases in the emissions and atmospheric concentrations of $CO_2$, $CH_4$ (methane), and other greenhouse gases—could eventually, gradually, or even suddenly, bring about striking changes in the Refuge's vegetation and habitats, though the extent to which this will occur in the coming 15 years is unknown and unknowable. Changes in habitat, in turn, will strongly affect the presence, abundance, diversity and distribution of wildlife species the Refuge is capable of supporting.

## 5.3 Cumulative Impacts on the Human Environment

**Public Use Opportunities**

In Section 4.6.1 it was stated that the overall impact of all three alternatives on public use opportunities would be moderately beneficial, long-term, and localized to widespread. The main factor needing to be accounted for in analyzing the cumulative effects of the three alternatives on public use opportunities is visitation trends. Visitation to the Refuge is generally increasing from year to year and decade to decade. This tends to put greater pressure on facilities, programs, staff, and resources, which in turn can cause gradual degradation or decline in the quality and/or quantity of the same.

There are five Wildlife Management Areas managed by the Oklahoma Department of Wildlife Conservation in the surrounding counties. Most of these offer some of the same outdoor recreation opportunities as Wichita Mountains Wildlife Refuge, including hunting, fishing, wildlife observation and photography (ODWC, no date). Great Plains State Park is located on Tom Steed Reservoir, 10 miles west of the Refuge. This park offers camping, fishing, hiking and many of the same activities offered on the Refuge. Each of them provides benefits to Oklahomans, and each of them is also subject to potential demographic pressures and overuse as Oklahoma's population grows.

Almost 90 percent of Oklahoma is in private ownership, and thus the State offers fewer public recreation opportunities than most states. Although much of the land base continues to be rural, these lands provide limited opportunities for recreational experiences for most people since they

are primarily private property. Furthermore, in recent years several public agencies at the State level, as well as local municipalities, have sought to privatize responsibility for public properties. Those efforts may have an adverse effect on the general population, which has increasingly limited access to outdoor recreation spaces (Oklahoma Tourism and Recreation Department 2007).

Under Alternative A, staffing and visitor use facilities would generally remain the same in response to the growing demand for recreation and public use on the Refuge. This would tend to give rise to overuse and degradation of facilities and resources. It would also lead to a reduction in the quality of the visitor experience on the Refuge due to lines, comparative crowding, and a growing maintenance backlog. Thus, the cumulative beneficial impact of Alternative A on Refuge public use opportunities at the conclusion of the planning period would be less than it might be if facilities and staffing could keep pace with expected increases in visitation. Cumulative impacts of Alternative A on the Refuge's public use opportunities would be minor and beneficial. In considering consumptive and non-consumptive outdoor recreation opportunities in the region as a whole, the relatively low existing population density and the fairly modest growth rate of that population, suggest that existing facilities are likely to continue to be at least adequate through the life of the plan, although not as ample as if expansion commensurate with population growth were to be undertaken.

Both Alternative B and C would invest more in facilities, infrastructure, maintenance, and programs and staffing. These two alternatives would tend to maintain cumulative benefits that are moderately beneficial, long-term, and widespread. Overall, both would be better than Alternative A. In a State with a limited number of areas and facilities set aside for public outdoor recreation, Alternatives B and C would go some way to meeting gradually rising demand.

**Socioeconomics**

According to the U.S. Census Bureau, the total population in Oklahoma is projected to grow by about six percent to the year 2025 (U.S. Census Bureau 2005). Similarly, Comanche County is projected to grow from 123,600 to 135,800 over the same 15-year period, also an increase of 10 percent (Oklahoma Department of Commerce 2003). The Census Bureau projects similar growth rates to 2030 (U.S. Census Bureau 2005). In all likelihood, these rising local and State populations will drive an increase in the demand for recreation and public use on all public lands in Oklahoma, including Wichita Mountains Wildlife Refuge.

Given these demographic trends, the Refuge's contributions to the local economy from visitor spending—in the form of income, jobs and boosted tax revenues—are expected to continue to gradually increase in the coming years. All three alternatives would have cumulative socioeconomic effects that are minor to moderately beneficial, long-term, and localized to widespread. Alternatives B and C propose an expansion of the Refuge. While an expansion is intended to connect wildlife corridors and increase the Refuge's habitat footprint, public use opportunities may be improved and/or increased as well. These changes could result in an even larger increase to the Refuge's contribution to the local economy.

### Cultural Resources

No external factors have been identified that would contribute either positively or negatively to cumulative effects on the Refuge's cultural resources. Thus, cumulative effects would be a function of the Refuge's actions and natural processes alone. Depending on the alternative, these effects are predicted to range from minor to moderately beneficial, long-term, and localized to widespread. At the close of the planning period, it is anticipated that both the condition of the Refuge's cultural resources and society's knowledge and appreciation of them would be somewhat better than at present.

### Scenic Resources

Wichita Mountain Wildlife Refuge's scenic resources and visual quality are especially important in view of its designation as a Class I Airshed, a distinction enjoyed by few national wildlife refuges. The Refuge's management would not change the character or quality of its scenic resources substantially under any of the alternatives. For example, the spectacular view towards the Refuge from the summit of Mt. Scott is not expected to change either for better or worse. However, two off-Refuge factors and trends could impinge on scenic resources in opposite ways. Long-term State and nationwide efforts to improve air quality, such as efforts to control regional haze, may improve air quality, in particular visibility (the ability to see features sharply and far away). The success of these endeavors would improve scenic resources on the Refuge. However, pushing in the opposite direction are growth trends in the area. Adding vehicles and industrial development would raise emissions of air pollutants that tend to compromise visibility. Moreover, development outside the Refuge's boundaries, such as the recent construction of a wind farm to the east, will gradually fill the formerly rural landscape with a number of structures that many visitors might regard as unsightly clutter. On balance, it seems more likely that these adverse factors will predominate. The Refuge's natural landscape character would become even more important in the future.

## 5.4 Short-Term Uses Versus Long-Term Productivity

The habitat protection and management actions under the proposed action alternative are dedicated to maintaining the long-term productivity of Refuge habitats. The benefits of this CCP for long-term productivity far outweigh any impacts from short-term actions, such as the construction or expansion of administrative facilities or creation of new trail linkages. While these activities would cause short-term negative impacts, the educational values and associated public support gained from the improved visitor experience would produce long-term benefits for the Refuge and improve the integrity of the central mixed-grass prairie and Crosstimbers habitats found on the Refuge.

## 5.5 Unavoidable Adverse Effects and Mitigation Measures

Under Alternative B, the proposed action, there will be some unavoidable impacts as described here. These impacts are expected to be minor and/or short-term in duration. However, the Refuge would attempt to minimize these impacts wherever possible. The following sections describe the measures the Refuge would employ to mitigate and minimize the potential impacts that could result from implementation of the proposed action.

***Soil and Vegetation Disturbance***
Foot traffic on new trails is expected to have a negligible impact on vegetation and soil erosion. To minimize the impacts from public use, the Refuge would include informational signs that request trail users to remain on the trails to avoid causing potential erosion problems.

***Wildlife Disturbance***
Disturbance to wildlife is an unavoidable consequence of any public use program, regardless of the activity involved. All of the public use activities under the proposed action alternative would be planned to avoid unacceptable levels of impact. Impacts of public use activities will be monitored, and if disturbance to wildlife becomes significant, especially for the endangered black-capped vireo, public use activities will be modified to reduce disturbance.

***Other Unavoidable and Adverse Impacts***
Potential development of the Refuge's buildings, trails, and other improvements could lead to minor, short-term, negative impacts on vegetation, soils, and some wildlife species. When building the administrative facilities, efforts would be made to use environmentally sensitive products. To avoid the loss of habitat, the facilities would be built mostly within their same footprint. All construction activities would comply with the requirements of Section 404 of the Clean Water Act; the National Historic Preservation Act; and other applicable regulatory requirements.

## 5.6 Irreversible and Irretrievable Commitments of Resources

Most management actions identified in this document will require a commitment of funds that would then be unavailable for use on any other Service projects. At some point, commitment of funds to these projects would be irreversible, and once used, these funds would be irretrievable. Non-renewable or non-recyclable resources committed to projects identified in the CCP, such as fuel for Refuge vehicles, would also represent irreversible and irretrievable commitments of resources.

## 5.7 Environmental Justice

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" was signed by President Clinton on February 11, 1994, to focus Federal attention on the environmental and human health conditions of minority and low-income populations, with the goal of achieving environmental protection for all communities. The order directed Federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The order is also intended to promote nondiscrimination in Federal programs substantially affecting human health and the environment and to provide minority and low-income communities with access to public information and opportunities for participation in matters relating to human health or the environment.

None of the management alternatives described in this environmental assessment will disproportionately place any adverse environmental, economic, social, or health impacts on minority and low-income populations. Implementation of any action alternative that includes public use and environmental education is anticipated to provide a benefit to the residents residing in the surrounding communities.

## 5.8 Indian Trust Assets

No Indian Trust Assets have been identified in the Comanche County area the Wichita Mountains Wildlife Refuge is contained within. There are no reservations or ceded lands present. Some archaeological resources exist on the Refuge and are preserved in place by stabilizing the surrounding soils or restricting human use so as not to disturb these sites any further. No significant impacts are anticipated to result from implementation of any alternative described in the EA.

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**United States Fish and Wildlife Service**
**Environmental Action Statement**

Within the spirit and intent of the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act (NEPA), and other statutes, orders, and policies that protect fish and wildlife resources, I have established the following administrative record and determined that the action of implementing the Wichita Mountains Wildlife Refuge Comprehensive Conservation Plan is found not to have significant environmental effects as determined by the attached *Finding of No Significant Impact* (following) and the *Comprehensive Conservation Plan and Environmental Assessment*.

Joy E Nicholopoulos — 9/12/13

Dr. Benjamin N. Tuggle, Regional Director
U.S. Fish and Wildlife Service, Region 2

Date

Tony Booth — 2-20-2013

Tony Booth, Refuge Manager
Wichita Mountains Wildlife Refuge

Date

Aaron Archibeque — 9/11/13

Aaron Archibeque, Regional Chief
NWR System, Region 2

Date

Carol A. Torrez — 9/10/13

Carol Torrez, NEPA Coordinator
Division of Planning, Region 2

Date

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# FINDING OF NO SIGNIFICANT IMPACT

## ENVIRONMENTAL ASSESSMENT FOR THE WICHITA MOUNTAINS WILDLIFE REFUGE COMPREHENSIVE CONSERVATION PLAN U.S. FISH AND WILDLIFE SERVICE

The U.S. Fish and Wildlife Service (Service) has developed a Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA) for the Wichita Mountains Wildlife Refuge (Refuge) located in Comanche County, Oklahoma. The CCP provides management direction to present and future Refuge managers for the next 15 years. It describes management activities that occur on the Refuge and provides management goals, measurable objectives, and management actions or strategies designed to enhance and protect existing habitats for the benefit of wildlife. The goals and objectives shall guide management toward the Refuge vision or the ecologically desirable outcome for the Refuge. The CCP also addresses wildlife-dependent recreation and other compatible uses that will be allowed on the Refuge; fish, wildlife and habitat management; development of compatible facilities; and implementation of related programs.

An Environmental Assessment was completed in compliance with the National Environmental Policy Act (NEPA) of 1969 to inform the public of the possible environmental consequences of implementing the CCP for the Refuge. It provided a decision-making framework that 1) explores a reasonable range of alternatives to meet project objectives, 2) evaluates potential issues and impacts to the refuge, resources and values, and 3) identifies mitigation measures to minimize the degree or extent of these impacts. The CCP/EA evaluated and analyzed three alternatives for potential impacts on the human environment, which are discussed below.

## ALTERNATIVES CONSIDERED AND ANALYZED

**Alternative A: Current Management (No Action Alternative)**

This alternative is the baseline for comparison with the action alternatives because it does not involve change from current management programs and emphases. It represents biological management and public use activities presently occurring and those that have occurred on Wichita Mountains Wildlife Refuge during the last 10 or so years. Management activities such as prescribed fire, wildlife management, public uses such as photography, interpretation, environmental education, hunting, and fishing would continue without any major changes.

Under Alternative A, the Refuge would continue to manage native fauna (elk, deer, and bison) and longhorn cattle at or near carrying capacity, promote the fire-grazing interaction that historically occurred, and monitor Refuge lands and waters for invasive species. Invasive species would be managed according to the forthcoming Integrated Pest Management Plan. The Refuge would continue to manage its riparian areas as it part of the surrounding ecosystem and construct and/or maintain low water crossings or bridges where necessary. The Refuge would continue to manage its Special Use Area to allow for natural processes but would continue to allow facilitated interpretive tours hunts in the area. The Refuge would not expand much beyond its 10 percent allowance as it would continue to have no Land Protection Plan in place.

The Refuge would continue to allow opportunities throughout its Public Use Area for the six wildlife-dependent recreation uses that include hunting, fishing, wildlife observation, photography, interpretation, and environmental education, and also continue to provide opportunities for some other recreational uses that are supportive of the six uses mentioned above. These uses include hiking, rock climbing, picnicking, camping, bicycling, and boating. In addition, the Refuge would continue to allow some occasional commercial uses and other special uses that support wildlife-dependent recreational uses.

The Refuge would continue to maintain its public use and administrative facilities. The Treasure Lake Job Corps would continue to be managed on the Refuge according to a Memorandum of Agreement (MOA) and the Holy City would continue to be managed under a Special Use Permit. Cultural resources would continue to be protected.

**Alternative B: Proposed Action**

This alternative would provide for a proactive approach to making concerted strategic decisions, through the consideration and analysis of the best available science, based on the Refuge management goals. This alternative was developed based on input received from the public, Oklahoma Department of Wildlife Conservation (ODWC), ecoregion partners, Service staff, Service biological and visitor services reviews, and the professional judgment of the planning team. This alternative is based on successful pre-existing Refuge management strategies and has incorporated ecological principles that apply to the Central Mixed-Grass Prairie Ecoregion.

This is the alternative that would best achieve Refuge purposes, vision, and goals and would best contribute to the Refuge System mission. Alternative B, with associated goals, objectives, and strategies, comprises the CCP for the Wichita Mountains Wildlife Refuge. This alternative would also stress the use of adaptive resource management based on observation and the most current scientific research, and improve landscape-scale conservation through participation in the Great Plains Landscape Conservation Cooperative.

Under Alternative B the Refuge would manage populations of bison, elk, and deer to allow for habitat variability. The Refuge would evaluate increasing, through a revised Habitat Management Plan (HMP), the bison herd to a genetically effective population size and would continue to implement the Department of the Interior Bison Initiative model. The Refuge would evaluate decreasing or moving the longhorn herd to an alternate location for the purpose of increasing the bison herd. The Refuge would develop an Integrated Pest Management Plan that provides for removal of feral hogs by trapping, aerial gunning, and opportunistic shooting. The Refuge would continue to monitor its lakes for zebra mussels as under Alternative A; none currently occur in these lakes. The Refuge would also coordinate with other agencies and organizations such as ODWC to develop more aggressive and proactive measures to avoid zebra mussel introduction, such as by adding a boat wash station at Lake Elmer Thomas. The Refuge would re-designate the Special Use Area as a Research Natural Area to formalize this area's management and better protect it in perpetuity.

The Refuge would improve opportunities for the six priority wildlife-dependent public uses through increased facilities improvement, increased information, signage, and facilitation by

Refuge staff. The Refuge would also continue to allow, and in some cases improve opportunities for other uses that are supportive of the six priority public uses. Commercial and special uses would be managed, depending on the use, by Special Use Permit so that the Refuge can monitor and manage these types of uses and their impacts, and also so that the permittee clearly understands the sideboards and stipulations of conducting a particular use on the Refuge. The Refuge would divide the Public Use Area into three 'density zones' to better manage and distribute public use and relieve pressure on some overused areas.

The Refuge would remodel, improve, or enhance its public use and administrative facilities depending on age, accessibility, and energy efficiency of the current facility. Both the Treasure Lake Job Corps and Holy City would continue to be managed on the Refuge. The Refuge would consider partnership opportunities with Job Corps for Refuge projects. Holy City's use would be monitored to determine if effects to Refuge resources are occurring and whether management needs to be adapted. Cultural resources would continue to be protected and systematic archaeological surveys would be completed Refuge-wide. The integrity of known sites would be monitored.

**Alternative C**

Alternative C is based on input received from the public, ODWC, ecoregion partners, Service staff, and biological and visitor services reviews. This alternative responds to the issues of habitat management for megafauna and the request for greater public access throughout the Refuge. Alternative C would depart from Alternative A by increased emphasis on wildlife and habitat management and increased public access and use opportunities.

Under Alternative C, the Refuge would consider introductions of pronghorn antelope and wolves in addition to increasing the longhorn herd size.

The Refuge would also consider adding more public use opportunities with the exception of rock sports, where the Refuge would eliminate technical (gear assisted) rock climbing. Additional public use opportunities would include adding more fishing piers, re-opening the Burma Road to bicycling, and developing additional hiking opportunities in the high density use zone.

Public use and administrative facilities would continue to be maintained and/or improved. However, he Refuge may consider the expansion of some facilities under this alternative.

Under Alternative C, the Treasure Lake Job Corps would be relocated off-Refuge and the Refuge would remove facilities and structures at the Holy City. The Refuge would identify archaeological sites in the Public Use Area at a greater risk of disturbance. The Refuge would also nominate additional sites for the National Register of Historic Places.

## DECISION: THE SELECTED ALTERNATIVE

Alternative B was selected over the other alternatives because it best achieves the Refuge's vision for the future, the purposes for which the Refuge was established, and the habitat, wildlife, and visitor services goals identified in the CCP. This alternative is the basis for the Comprehensive Conservation Plan and describes how habitat objectives will be accomplished through a combination of management activities to encourage ecological integrity, maintain

megafauna, improve or maintain habitats, and provide for recreational opportunities and Refuge facilities. Future management actions will generally have a neutral or positive impact on the local economy and the proposed action in the CCP will ensure that Refuge management is consistent with the mission of the National Wildlife Refuge System and U.S. Fish and Wildlife Service. One portion of Alternative C was selected over Alternative B. The Public Use Area hiking provisions developed for Alternative C were selected over the Public Use Area hiking provisions of Alternative B due to public comments and additional Refuge discussion. That alternative allows the Refuge to consider more hiking trails on the east side of the Refuge in the future should resources and demand for these opportunities exist. A strategy was added to Chapter 4 of the CCP to consider additional developments in the high density use zone to relieve pressure in the medium density and low density use zones and to help preserve wilderness character.

**SUMMARY OF EFFECTS**

Implementation of the Service's decision would be expected to result in environmental, social and economic effects as outlined in the CCP/EA and summarized here. The CCP describes habitat management, wildlife management, and land conservation objectives that would result in improved habitat conditions. The proposed recreational opportunities management would result in enhanced experiences for Refuge visitors.

Refuge management activities (prescribed burning, invasive species control, new construction, etc.) would result in short- and long-term negligible to moderate adverse impacts to soils, air, water, habitat, and wildlife as described in the EA; however, the long-term impacts are expected to be beneficial. These habitat management activities would mimic heterogeneous conditions created by the historic fire-grazing interaction and healthy landscape conditions. Alternative B would benefit and improve habitat quality on the Refuge's prairie grasslands.

The Refuge would work to expand its conservation footprint through the establishment of conservation corridors and/or the expansion of the Refuge. In general, conservation corridors provide for the movement of animals and plants between larger areas of adequate protected habitat and thus help arrest the negative effects of habitat fragmentation and genetic isolation on populations and ecological communities. The Refuge would develop a Preliminary Project Proposal (PPP) and, upon approval, a Land Protection Plan (LPP) to identify and prioritize lands adjacent to the Refuge where conservation and protection is both achievable and vital. These lands may be acquired if a willing seller or donor becomes available or, perhaps in addition, the Refuge would work toward conservation easements or cooperative agreements. Expanding the Refuge would increase acreage available for the conservation of valuable habitat for trust species and would allow the Refuge more management flexibility for wildlife and habitat management.

The creation of a Research Natural Area (in the area of the SUA) would provide a stronger level of protection for habitat over the long-term and could eventually yield information that would lead to future improvements in habitat management. The Refuge would likely experience increased monitoring and research projects due to the attention on the Refuge generated by the RNA's establishment which could, in turn, benefit the Refuge's habitat management techniques. Other uses and management would likely remain the same with the exception of adaptive

management. Adaptive management would be incorporated as a management tool if and when resources are at risk.

The selected alternative would allow for an increase some public uses and facilities in this alternative. However, any additions to public use opportunities would be small and produce only a minor effect on habitats. New facilities would remain within the already developed footprint so as to prevent habitat loss, with the small exception of the expansion of corrals. Short-term habitat disturbance may occur from expanding the existing corrals needed for the management of bison and longhorn. The public use management actions and associated facilities improvements proposed (such as implementation of group size limits, public use density zoning, improvement of hiking opportunities, construction of new piers and observation blinds, and road improvements) will have minor to moderate impacts on habitat at the local scale but would also have a beneficial effect to public use opportunities on the widespread scale. Also, these actions help the Wichita Mountains Wildlife Refuge and National Wildlife Refuge System meet habitat related outreach and education goals at a local to widespread scale. Public use density zoning may shift human pressure and impacts from west to east, resulting in equal amounts of positive and negative effects at the local scale. Trail improvements would occur primarily along existing roads and trails and may have a minor to moderate long-term adverse impact on habitat quality at the local scale, but a long-term benefit to public use opportunities. Public use improvements are not expected to significantly increase the amount of public use on the Refuge but redirect and improve the management of it.

Disturbance to wildlife at some level is an unavoidable consequence of any public use program, regardless of the activity involved. Obviously, some activities innately have the potential to be more disturbing than others. The management actions to be implemented have been carefully planned to avoid high levels of impact. As currently proposed, the known and anticipated levels of disturbance associated with management actions are considered minimal and well within the tolerance levels of know wildlife species and populations present in the area.

The increased opportunities for wildlife-related recreational opportunities on the refuge would also have beneficial impacts on the local economy through increased visitation and revenue. Partnerships with county, state and federal agencies, private landowners, and conservation groups would enable the refuge to achieve goals and objectives, minimize costs, and bridge relationships with others.

Implementing the Service's management action is not expected to have any significant adverse effects on wetlands and floodplains, pursuant to Executive Order 11990 and 11988, because there would be no development of Refuge facilities within wetland or floodplain areas. There would be no adverse effect on threatened, endangered, proposed or candidate species and/or critical habitat, as documented in the intra-service Section 7 (Endangered Species) Consultation completed with the Tulsa Ecological Services Field Office and signed on April 16, 2012. In addition, archeological and/or historical resources would not be impacted.

The Refuge is not aware of any other past, present, or reasonably foreseeable future planned actions that would result in a significant cumulative impact when added to the Refuge's proposed action, as outlined in Alternative B.

## PUBLIC OUTREACH, REVIEW AND COMMENT

Development of the Wichita Mountains Wildlife Refuge CCP has been coordinated with all interested and/or affected parties.

Formal scoping began with publication of a Notice of Intent to prepare a CCP and EA, which was published in the *Federal Register* on November 5, 2008 (Volume 73, Number 215, pp. 65872-65873). When the Notice of Intent was published, the team distributed a Planning Update requesting public feedback and informing community members of upcoming public scoping meetings. The planning team solicited public comments on Refuge issues to aid in CCP development through four open house meetings held in January – February 2009. Approximately 100 participants attended these meetings.

The Planning Team held an ecoregion-wide coordination meeting at the Refuge Environmental Education Center on December 2, 2009, to gain a better understanding of the issues within the Central Mixed-Grass Prairie ecoregion, where the Refuge is located, and to determine the Refuge's role in addressing issues impacting fish, wildlife, and their habitats within the larger landscape. Seventeen participants attended this meeting.

The Refuge also met with the State (ODWC) in February 2010 and sent a letter to potentially affected tribes to solicit feedback on concerns on the Refuge. The Refuge met with one tribe, the Delaware Nation, as a result.

In addition to the scoping meetings, the Refuge also held an open house at the Refuge Visitor Center on January 25, 2011. The purpose of this open house was to introduce the new Refuge Manager and to give the public an opportunity to discuss various Refuge projects and programs, including the planning process. Approximately 20 individuals attended.

Comments were solicited on the draft CCP and the EA for the Wichita Mountains Wildlife Refuge from August 9, 2012 to September 10, 2012 (77 FR47657). The public was notified of the release of the draft CCP and the EA through the NOA, through local media outlets, and public notices were posted on various community bulletin boards. The draft CCP and EA were made available online, at the Regional Office in Albuquerque, at the Refuge, and at three public libraries in surrounding communities. Two public meetings were held on August 13 and August 14, 2012. Approximately 50 participants attended these meetings. The Service received 86 comment letters, emails, forms, and phone calls. The comments were thoroughly reviewed, and the CCP did not change substantially based on public comment. See the Wichita Mountains Wildlife Refuge CCP Appendix L: Response to Comments for more information.

## FINDINGS

Based on the analysis documented in the environmental assessment and with due consideration given to comments from the public and through consultation with the State of Oklahoma, it is my determination that the proposed action does not constitute a major Federal action that will have a significant effect on the quality of the human environment under the meaning of Section 102 (2)(C) of the National Environmental Policy Act of 1969 (as amended). As such, it is my conclusion that an environmental impact statement is not required for this plan and the selected

alternative may be implemented as soon as practicable. This determination is based on the following factors (40 C.F.R. 1508.27), as addressed in the Environmental Assessment, which is attached.

1. Both beneficial and adverse effects have been considered and this action will not have a significant effect on the environment (Environmental Assessment, pages A-52 – A-120).

2. The actions will not have a significant effect on public health and safety (Environmental Assessment, pages A-86 – A-113).

3. The project will not significantly affect any unique characteristics of the geographic area such as proximity to historical or cultural resources, wild and scenic rivers, or ecologically critical areas (Environmental Assessment, pages A-111 – A-113).

4. The effects on the quality of the human environment are not likely to be highly controversial (Environmental Assessment, pages A-86 – A-113).

5. The actions do not involve highly uncertain, unique, or unknown environmental risks to the human environment (Environmental Assessment, pages A-86 – A-113).

6. The actions do not establish a precedent for future actions with significant effects nor do they represent a decision in principle about a future consideration (Environmental Assessment).

7. There will be no cumulatively significant impacts on the environment. Cumulative impacts have been analyzed with consideration of other similar activities on adjacent lands, in past action, and in foreseeable future actions (Environmental Assessment, pages A-121 – A-128).

8. The actions will not significantly affect any site listed in, or eligible for listing in, the National Register of Historic Places, nor will they cause loss or destruction of significant scientific, cultural, or historic resources (Environmental Assessment, pages A-111 – A-112).

9. The actions are not likely to adversely affect threatened or endangered species, or their habitats (Environmental Assessment, pages A-81 – A-86; Appendix C: Intra-Service Section 7 Consultation).

10. The actions will not lead to a violation of federal, state, or local laws imposed for the protection of the environment (Environmental Assessment, pages A-3 – A-4).

Recommended: _____ Feb. 20, 2013

Tony Booth, Refuge Manager
Wichita Mountains Wildlife Refuge

Date

Approved: for _____ 9/12/13

Dr. Benjamin N. Tuggle, Regional Director
U.S. Fish and Wildlife Service, Region 2

Date