**National Park Service**
**U.S. Department of the Interior**

# Tallgrass Prairie National Preserve

**Kansas**

# Bison Management Plan

**Environmental Assessment**

**September 2009**

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# EXECUTIVE SUMMARY

In 2000, the National Park Service completed a General Management Plan / Environmental Impact Statement (GMP) for the 10,894-acre Tallgrass Prairie National Preserve (Preserve). That overarching management plan called for reintroducing bison (*Bison bison*) to the Preserve, but did not include a detailed strategy for the reintroduction. This Bison Management Plan / Environmental Assessment—developed in partnership with The Nature Conservancy (TNC), the primary landowner—describes four alternatives for reintroducing and managing bison at the Preserve. They are:

**Alternative A - The No Action Alternative / Bison in Windmill Pasture Year-round:** This alternative is based on the approved General Management Plan and therefore, is considered the baseline or No Action Alternative. Under this alternative, bison would be reintroduced to the 1,074-acre Windmill Pasture. Bison would remain in this pasture year-round. Cattle would no longer graze Windmill Pasture. Maximum carrying capacity for this alternative would be approximately 100 animals, with 73 animal unit equivalents (AUE)[1] as the average herd size.

**Alternative B – Bison in Big Pasture Year-round:** In Alternative B, bison would be reintroduced to the 3,711-acre Big Pasture. Bison would remain in this pasture year-round. Cattle would no longer graze Big Pasture. Maximum carry capacity for this alternative would be approximately 300 animals, with 247 AUE's as the average herd size.

**Alternative C – Bison in Windmill and Big Pastures Year-round:** In Alternative C, bison would be reintroduced to Windmill and Big Pastures year-round. Total acres available to bison would be approximately 4,785 acres. Cattle would no longer graze Windmill or Big pastures. Maximum carrying capacity for this alternative would be approximately 500 animals, with 398 AUE's as the average herd size.

**Alternative D – Bison in Windmill Pasture / Off-season Grazing in Big Pasture:** This alternative is similar to Alternative A in that the same number of bison would be reintroduced and allowed to graze the 1,074-acre Windmill Pasture. The difference between the two alternatives is, Alternative D would provide managers with the option to open the 3,711-acre Big Pasture (immediately north of Windmill Pasture) to the bison during the dormant or off-season months. Cattle would no longer graze Windmill Pasture, but would continue to graze Big Pasture during the growing season months. Maximum carrying capacity for this alternative would be the same as Alternative A, which would be approximately 100 animals, with 73 AUE's as the average herd size.

The GMP recommended that bison reintroduction areas be considered in addition to what was proposed in that document. Alternatives B, C and D provide a slightly different alternative than proposed by the GMP, have different effects on the Preserve's resources, and are all consistent with the intent and direction of the GMP.

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[1] A 1,000 lb. cow is the standard measurement of an animal unit.

The primary purposes of the bison reintroduction and management are to; restore and conserve a keystone native species, promote and sustain ecological health and biological diversity, restore and conserve a cultural and ethnographic resource, and increase visitor satisfaction and experiences. Bison management would be consistent with this plan and the respective agency policies and guidelines.

**The Preferred Alternative is Alternative A.** Alternative A is outlined in the preserve's GMP as the recommended location for the bison reintroduction. The pasture is centrally located and surrounded by preserve pastureland on three of the four sides. Currently, a hiking trail and ranger-led bus tours pass through Windmill Pasture allowing visitors opportunities to view the bison.

The reintroduction and management of bison at the Preserve is not anticipated to negatively conflict with other Preserve resources or management objectives. None of the alternatives analyzed in this environmental assessment would impair Preserve resources or values.

**Public Comment**

This environmental assessment will be on public review for 30 days. Our practice is to make comments, including names, addresses, phone numbers, and email addresses of respondents available for public review. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – might be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so. Submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be available for public inspection in their entirety.

**Comments must be received by October 1, 2009. Please address written comments to:**

Superintendent
Tallgrass Prairie National Preserve
P.O. Box 585, 226 Broadway
Cottonwood, KS 66845

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# INTRODUCTION AND PURPOSE AND NEED

Bison (*Bison bison*) are currently absent from Tallgrass Prairie National Preserve (Preserve), although the Preserve is located within the historic range of the species and contains suitable year-round habitat. Prior to European settlement bison were common in the tallgrass region, but the species came perilously close to extinction in the late 1800s due to over harvest. Bison have since recovered so that they now exist in several National Park Service units and other public lands; however, most of the bison herds are outside of the tallgrass biome. In 2000, the National Park Service (NPS) completed a General Management Plan / Environmental Impact Statement (GMP, EIS) that called for reintroduction of bison to the Preserve. However, that document did not include a specific strategy or a detailed assessment of impacts of such a reintroduction; rather, it deferred those decisions to a later planning effort. This document comprises that planning effort.

Since completion of the GMP, The Nature Conservancy, a non-profit conservation organization, has become the key partner in the growth and operation of the Preserve. The Nature Conservancy owns all but 34.44 acres of the 10,894-acre Preserve, including the area where the reintroduction of bison is planned.

This document analyzes alternatives for reintroducing bison to the Preserve and the potential impacts of the alternatives on the natural and cultural environments in and around the Preserve. This document will also serve as a long-term management plan for bison at the Preserve, but may be modified if conditions warrant.

## PURPOSE OF AND NEED FOR THE PROPOSED ACTION

### Purpose

The primary purposes for this plan and the proposed action are to:

- Implement bison reintroduction called for in the Preserve's GMP (National Park Service 2000*b*);
- Restore and conserve a keystone native species;
- Improve and sustain the ecological health and biological diversity of the Preserve;
- Restore and conserve a cultural and ethnographic resource; and,
- Increase visitor satisfaction and experiences at the Preserve.

Bison are a significant grazer in grassland ecosystems and considered by many a keystone species in tallgrass ecosystems (Knapp et al. 1999). Their presence sustains natural conditions and processes in grassland ecosystems and promotes biological diversity.

### Need

The following statements provide the rationale for the proposed action and answer the question "Why is a reintroduction of bison needed at Tallgrass Prairie National Preserve?"

- The Preserve's GMP calls for the reintroduction of bison.

- NPS policies call for the reintroduction of bison (Natural Resource Management 4.1.5. NPS Management Policies, 2006).

- The landowner and key partner, The Nature Conservancy, wishes to restore bison (see Appendix IV).

- Visitors to Tallgrass Prairie National Preserve expect to see a vignette of the American tallgrass prairie. Bison are a symbol and component of that prairie and important to visitor understanding and satisfaction.

## PURPOSE AND SIGNIFICANCE OF THE PRESERVE

Tallgrass Prairie National Preserve is located in eastern Kansas, in the Flint Hills physiographic region (Figure 1). Congress established the Preserve on November 12, 1996 (PL 104-333; aka, Tallgrass Prairie National Preserve Act of 1996). The authorizing legislation stated that the purposes of the Preserve are:

> *"to preserve, protect, and interpret for the public an example of a tallgrass prairie ecosystem…and to preserve and interpret for the public the historic and cultural values represented on the Spring Hill Ranch."*

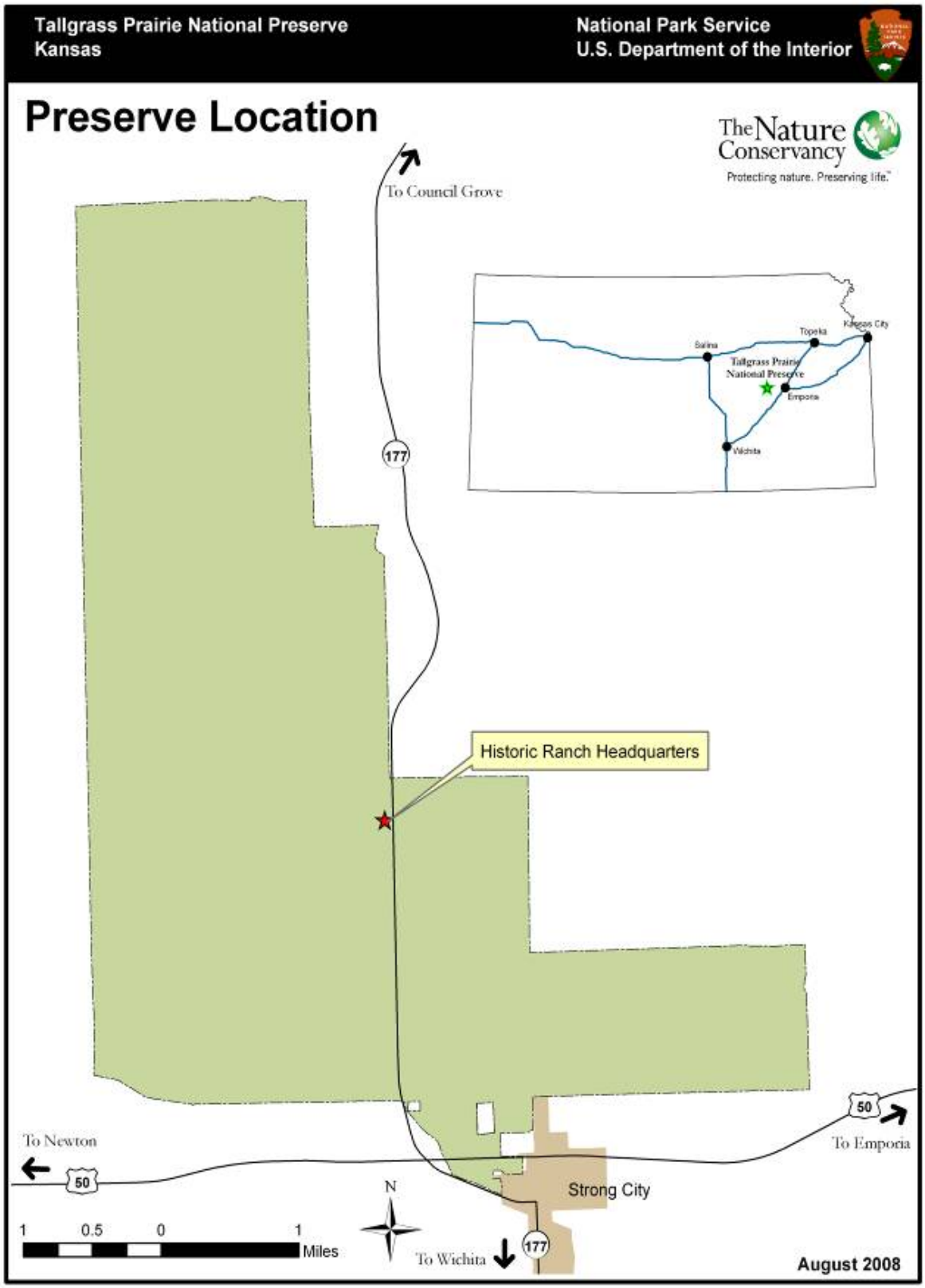


Figure 1. Location of Tallgrass Prairie National Preserve

The Preserve developed a GMP (National Park Service 2000*b*) that evaluated several broadly defined alternatives for meeting the authorized purpose of the Preserve. The Preserve selected an alternative that would:

> *"focus on the integrated management of the natural and cultural resources of the Preserve. This alternative is based on the ideas that the Preserve was established to preserve, protect, and interpret a remnant of the tallgrass prairie ecosystem and that the remnant prairie exists today because of a complex history of interaction between people and the land."*

This alternative placed a high emphasis on conservation of the prairie landscape and vegetative species diversity with bison being an "important element" (while at the same time still accommodating visitor needs and the Flint Hills ranching legacy: Figure 2). The alternative explicitly called for the reintroduction of bison within the "prairie landscape area." The GMP stated:

> *"Bison (certified disease free and genetically pure) would be introduced into this area. Prior to this action, a Bison Management Plan would be completed, with public participation, that would provide a review of the current state of scientific and resource management knowledge related to bison management. Under the direction of this plan, long-term objectives and goals would be developed for bison management within the Preserve. The location of the suggested bison reintroduction area would be refined and possibly adjusted. Actual numbers of animals for the initial reintroduction area would be identified, and additional management concerns such as budget, personnel, and safety/health issues would be addressed. The Preserve would begin with a small herd of bison. The Recommended Bison Reintroduction Area, as identified in Figure 4* (of the GMP*), is believed to be the best location pending the development of a Bison Management Plan. The population would be managed to maintain effective social and behavioral interactions and dynamics. Visitors would be able to see bison in a tallgrass setting and to observe their effects on the prairie."*

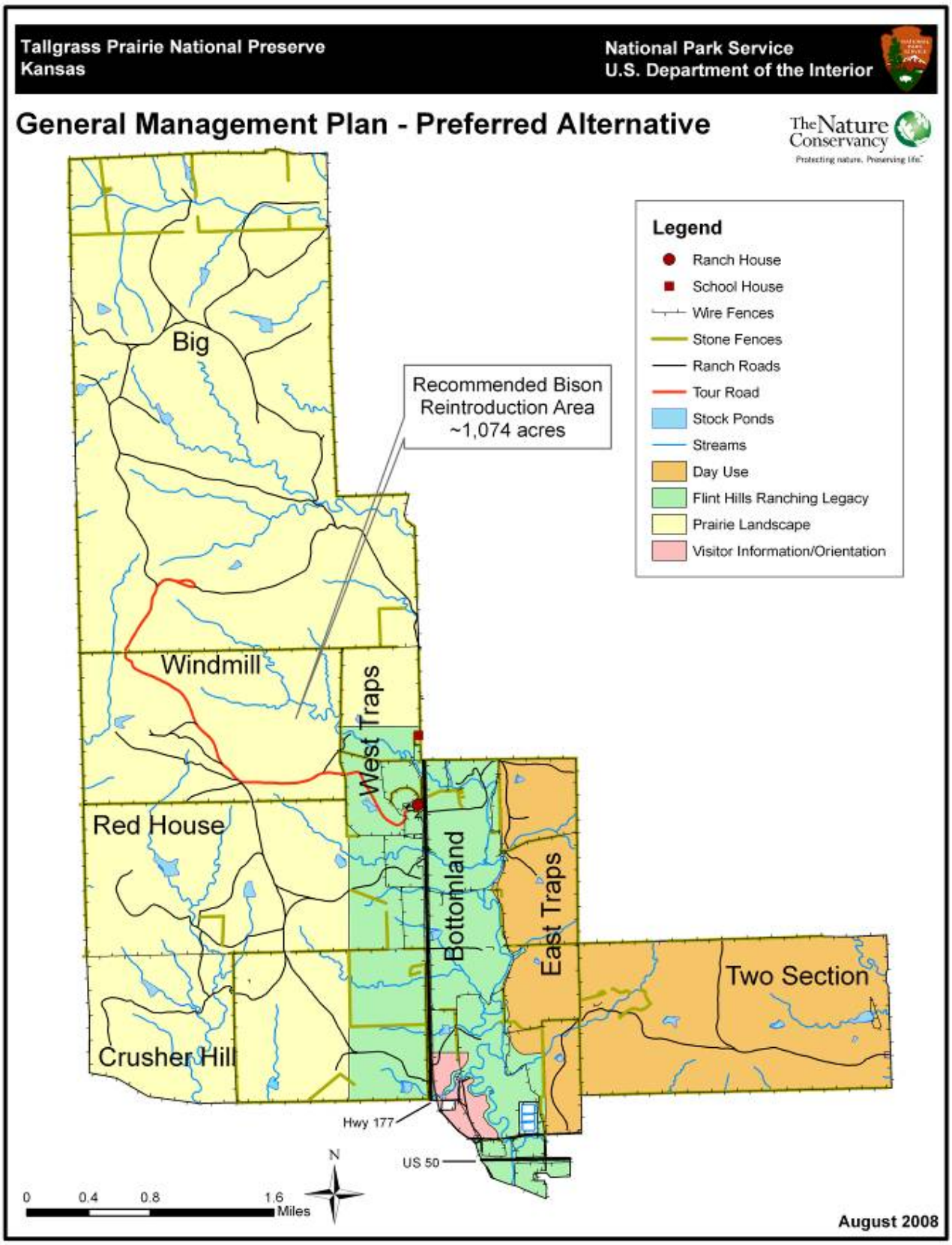


Figure 2. Preferred Alternative from the General Management Plan

For a thorough account of natural resources at Tallgrass Prairie National Preserve, see the Preserve's GMP (National Park Service 2000*b*). The following information is excerpted from that document with additional information pertinent to bison reintroduction and the significance of the Preserve to bison conservation. The following also shows the significance of the Preserve to the region in terms of prairie conservation.

Tallgrass prairie was the dominant pre-Columbian vegetation type in the eastern third of the Great Plains, occupying approximately 170 million acres. Today, only about four percent of this historic total remains (Samson and Knopf 1994). The most extensive portion of this imperiled ecosystem—nearly two-thirds of the remaining total—is a narrow, north-south strip of relatively intact tallgrass prairie located in the Flint Hills landscape of eastern Kansas and northern Oklahoma. Largely protected from the plow by thin rocky soils, and maintained by fire and grazing, the Preserve contains a nationally significant remnant of the tallgrass ecosystem (Figure 3).

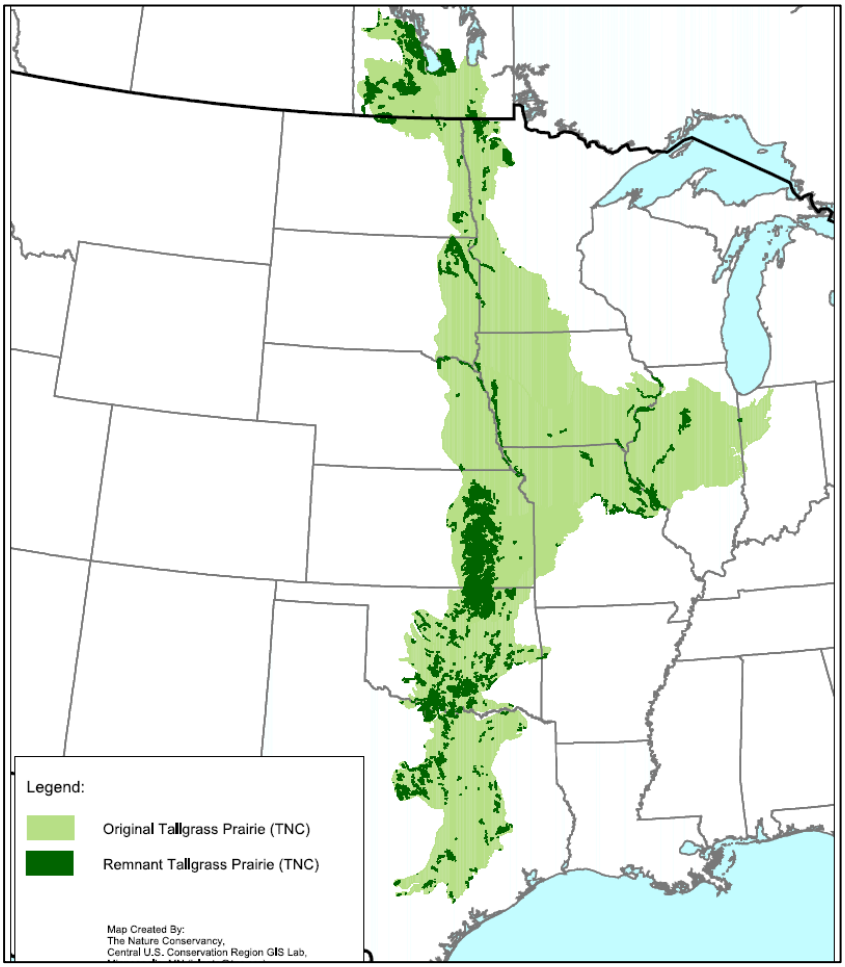


Figure 3. Extent of intact tallgrass prairie ecosystem

The tallgrass prairie is the dominant vegetation community within the Preserve and constitutes a unique and important resource at both a national and global scale. Tallgrass prairie is listed as state prime habitat (Kansas Department of Wildlife and Parks. Strategic Plan 1991-1996). The many springs, seeps, and streams are also prime habitat within the state (Kansas Department of Wildlife and Parks, Strategic Plan 1991- 1996). All of the perennial and intermittent streams

within the Preserve provide potential habitat for the Topeka shiner (*Notropis topeka*), a small minnow listed as endangered by the federal government.

Since as early as 1856, the predominant use of Flint Hills pastures has been to graze steers and heifers shipped in from other locations to take advantage of the region's high quality forage. While a number of year-round cow-calf operations exist within the Flint Hills, the area remains predominantly as pasture for transient cattle. Until the late 1950s, many of the grass-fattened cattle were shipped directly to slaughter houses. Today, most pastured cattle in the Flint Hills are shipped to feedlots for final finishing. A recent, but now common grazing regime in the Flint Hills, is intensive early stocking, whereby roughly twice the number of cattle are stocked (compared to year-round stocking rates for the site) in late April and removed by mid to late July. Pastures are typically burned annually with this grazing regime. This approach is thought to create a more homogenous (uniform) habitat than what occurred prior to European settlement (Fuhlendorf and Engle 2001). By using fire and grazing regimes that more closely mimics natural processes, the Preserve can contribute to landscape heterogeneity and structural diversity, which should result in an increase in biological diversity in the Preserve (Hamilton 2007).

## BISON ECOLOGY AND MANAGEMENT

The following discussion is not a comprehensive review of bison ecology and management. Rather, it is a brief summary of the information and issues relevant to the proposed action, and provides context for that action. For a more comprehensive review of bison ecology and management see Reynolds, et al (2003).

North American bison are often referred to as buffalo; however, that name is scientifically incorrect. True buffalo, which do not possess shoulder humps, are found in Africa and Asia and are not closely related to North American bison. Bison are members of the family Bovidae, which includes domestic cattle, sheep, and goats. They are members of the genus *Bison* (Wilson and Reeder 2005), although some authors suggest moving them to the genus *Bos*, which they would share with domestic cattle (see Reynolds et al. 2003). This close phylogenic relationship with cattle allows for cross breeding, disease transmission, similar husbandry in captive populations, and the use of one species as a surrogate for the other. There are two commonly recognized subspecies of bison in North America: the wood bison (*Bison bison athabascae*) of northern Canada and Alaska and the more familiar plains bison (*Bison bison bison*) of the Great Plains.

Adult male bison average 1,500-2,000 pounds while the average weight of adult females is closer to 1,000 pounds; however, there is variability across the species' range depending in part on climatic and nutritional differences. Adult bison at the Konza Prairie Biological Station in Kansas (about 60 miles north of the Preserve and similar habitat) averaged 1,600 pounds for males and 1,000 pounds for females at 7.5 years of age (Towne 1999). Female bison from Wind Cave National Park—a likely source population for a reintroduction at Tallgrass Prairie National Preserve—average around 900-1,100 pounds, depending in part on their reproductive status. Both sexes reach maximum size around 10 years of age (National Park Service 2006*a*). Albino and gray-haired bison are occasionally observed; these animals are held in high reverence by some Native American tribes. McHugh (1972) speculated that these genetic aberrations occur at the rate of one per 100,000-1 million animals.

Bison are primarily grazers and are often the largest consumer of forage in prairie ecosystems. Their grazing behavior, along with their other characteristics, has earned them the title of a

keystone species by some researchers (Knapp et al. 1999). Compared to cattle, bison are better able to digest low quality, high-fiber, low-protein forage (Table 1; however, there is little difference between the species in digesting high quality forage). A study at a tallgrass preserve in Oklahoma found that grasses and sedges comprised 98% of the bison diet in all seasons (Coppedge et al. 1998). Across their range, bison diets consist of about 90 percent or more grasses while cattle diets consist of about 70 percent grasses (Plumb 1993). Selective grazing of grasses by bison releases forbs from competition pressure and increases plant species diversity (Collins 1987, Coppedge et al. 1998); however, different forbs may respond differently to bison versus cattle grazing (Damhoureyeh and Hartnett 1997).

Other bison behaviors, such as wallowing, horning trees, wandering when grazing, and the bison's tendency to graze closer to the ground, also differ from cattle behavior and can alter species richness and grassland biodiversity (Hartnett 1996, Coppedge and Shaw 1997). For example, deer mice (*Peromyscus maniculatus*) abundance is higher in areas grazed by bison than those grazed by cattle, perhaps due to bison creating larger grazed patches or perhaps due to the increase in seed-producing forbs on the bison sites (Matlack et al. 2001). Sometimes the biodiversity benefits of bison are more subtle and indirect. For example, when snow is on the ground bison disproportionately graze hilltops where the wind-blown snow cover is less. This pattern may enhance habitat for the early spring courtship and dancing rituals of prairie grouse.

Table 1. Differences between Bison and Cattle

| | **Bison** | **Cattle** |
|---|---|---|
| Forage Digestibility | Bison are better able to digest low quality, high-fiber, and low-protein forage. | Do not digest low quality, high-fiber, low-protein forage as well as bison, although they do digest high-quality forage at a comparable rate. |
| Forage Selectivity | Bison diets consist of about 90% grasses. | Cattle diets are only about 70% grass with the remainder forbs and some woody material. |
| Foraging Behavior | Bison move farther distances while grazing and are more likely to graze steep slopes and hilltops. | Cover less ground while grazing and less likely to reach hard to access areas. |
| Behavior | Bison wallow, thereby creating microhabitats in grassland landscapes. Rutting bison roll and paw at the ground disturbing the soil and altering vegetation. Rutting bison may horn trees, while all ages and sexes may rub them, injuring and sometimes killing them. | Domestic cattle do not display the localized soil-disturbing behaviors that bison do, thereby not creating the same type and frequency of microhabitats on the landscape. |
| Wetlands and Riparian Areas | Bison spend less time in riparian areas thereby have comparatively less impacts on water quality, woody vegetation, and moist soil plants. | Domestic cattle derive from wild species associated with wetland habitats. They are more likely to use and loiter in wetlands, riparian areas, and other moist soil sites. |
| Metabolism | Slows down during the winter to conserve energy. | Does not noticeably slow in the winter. |
| Climate | Much better to withstand extreme temperatures, including extreme cold periods. | Can succumb to extreme cold conditions, especially when experienced in combination with food deprivation. |

Bull bison tend to take a higher proportion of warm season (C4) grasses than female bison, juveniles, or calves (Post et al. 2001). Calves tend to have the highest quality diets, although these differences could be driven more by social and behavior factors than they are by selective foraging. However, the diet for all sex and age classes can change throughout the year. For example, in the tallgrass regions bison select warm season grasses during the summer months and cool season (C3) grasses during other seasons (Vinton et. al. 1993, Post et. al. 2001). During winter months, bison often rely heavily on high quality shortgrass species, such as buffalo grass (*Buchloe dactyloides*), blue grama (*Bouteloua gracilis*), and hairy grama (*Bouteloua hirsuta*). Because these shortgrass species are typically scarce in tallgrass regions, bison not supplemented in tallgrass prairies often lose weight during the winter.

Bison have a strong relationship with fire in the tallgrass ecosystem (Pfeiffer and Hartnett 1995, Coppedge and Shaw 1998, Biondini et al. 1999, Fuhlendorf and Engle 2004, Hamilton 2007). Fire creates high quality forage by increasing nutrient content of vegetation and reducing the ratio of dead to live plant material. This attracts bison and other grazers, often for considerable periods (Biondini et al. 1999) and from considerable distances. In turn, heavy grazing reduces plant biomass, dead material, and fuel loads, thereby reducing fire intensity and affecting fire spread and behavior. The inter-relationship of fire and grazers can create a diverse landscape consisting of early seral stages (i.e., plant community in the early stages of succession) in close proximity to late seral stage habitats comprised of high concentrations of biomass and dead material. However, certain grazing regimes designed to maximize production may create less diverse seral stages and habitat conditions (Fuhlendorf and Engle 2001).

Although the source of much debate, some scholars feel that bison did not historically migrate long distances. Rather, they may have found all of their life needs within certain regions. This hypothesis conforms to historic accounts of small bison herds wintering in upland areas of the Flint Hills, where they were presumably grazing shortgrass prairie micro sites. However, there remains speculation that bison may have been lured from short and mixed-grass prairies to recently burned tallgrass prairie sites during spring and summer months. Regardless of the distance traveled, bison maximized their use of resources by seeking high quality forage. The presence of water and recent fire events likely influenced these movements. Within their home ranges, bison typically establish trails and crossings that aid movement.

Bison mating occurs during the peak of summer (typically July-August). During the mating season, adult males join the large herds comprised of cows and young animals. Males become increasingly aggressive toward each other, with much bellowing, gesturing, and sparring. Serious fights, including those that result in serious injuries or fatalities, are less common, but do occur. Males will tend receptive females and will not tolerate other males nearby. Often times, several males will aggressively pursue females.

Birthing takes place around March-April in the Southern Plains (Coppedge et al. 1998), although a small number of calves may be born before and after that period. Prior to parturition, females may wander away from the main herd to give birth; this behavior may be more common in habitats with more woody vegetation (Lott 1991). Single calves are the norm. The sex ratio of fetuses tends to lean toward males; however, survival tends to be higher for female calves. The calf sex ratio at Konza Prairie in Kansas is typically about 1:1 (Towne 1999). Cow-calf pairs maintain close contact at first, but the calves become more independent as time goes on. Calves in larger herds and bull calves tend to display more independence at a younger age. Cows will on occasion defend their calves against other bison and perceived predators, including people. Cows may not calve every year, especially if parturition in the previous year occurred later in the

season (thereby reducing the likelihood of their being ready to breed during the summer rut: Green and Rothstein 1991), or if nutritional needs are not met. Bison on a lightly grazed tallgrass prairie in Oklahoma had a 72% weaned calf crop (Hamilton 2007). Prime age males (6-9 years old) typically do most of the breeding and may be sought out by females. As a result, a few males often do a disproportionate amount of the breeding, meaning that the "effective population size" (in genetics terms) is often considerably smaller than the total population (Halbert 2003, Gross and Wang 2005). Female bison typically first breed at the age of two.

Wolves (*Canis lupus*) are the primary natural predator of bison; however, the degree to which they regulate bison populations is debatable. Joly and Messier (2001) suggested that disease-free bison populations are regulated at a high density by food limitations whereas in the presence of diseases, such as brucellosis and tuberculosis, wolves become the primary regulatory mechanism and the bison population is maintained at a much lower density. Accidents, most notably drowning because of breaking through thin ice, do occur to bison at all age classes. In the absence of natural predators (i.e., wolves, bears) bison can live 15-20 years.

Chronic diseases such as pneumonia, arthritis, arteriosclerosis, brucellosis, and tuberculosis along with parasites are likely the main cause of natural death in captive herds. Although bison and cattle are closely related and share many parasites, the presence of a disease or parasite in one species does not necessarily mean the other species will have it. For example, Van Vuren and Scott (1995) found that even when bison and cattle share a range they do not have the same levels or types of parasites. For a list of diseases relevant to bison see the notes from an NPS bison workshop conducted at the Preserve in 2003 (National Park Service 2004) or the bison management plan for Wind Cave National Park (National Park Service 2006*a*).

Brucellosis is an especially noteworthy disease because of its impacts, potential impacts, and perceived impacts on cattle. The disease has recently been the source of much controversy, management effort, and research at Yellowstone National Park (National Park Service 2000*a*). Brucellosis appears to be an exotic disease brought over by domestic cattle (Meagher and Meyer 1994). It is a contagious bacterial disease that in one form (*Brucella abortus*) can infect both bison and cattle. In bison, it can cause a cow to abort a fetus; however, the animals soon develop immunity to it and successfully reproduce in later years. However, no such resistance develops in cattle. The disease is transmitted through ingested organic materials, including placentas and uterine discharges. The disease can also reside in elk. In the 1960-80s, Wind Cave National Park shot several hundred bison in a successful effort to eradicate brucellosis from their bison herd (National Park Service 2006*a*). Yellowstone National Park and partner agencies have recently made a commitment to eliminate the disease from the Greater Yellowstone Region (National Park Service 2000*a*). States such as Kansas (site of the Preserve) and South Dakota (likely source of reintroduced bison) are currently declared brucellosis-free states; presently, only two cattle herds in two states, Louisiana and Montana, remain infected.

Bovine tuberculosis is also a noteworthy disease. Bison appear to have first contacted the disease from domestic cattle (Tessaro et. al. 1990). The bacterium *Mycobacterium bovis* can be transmitted through the air or by ingested milk, urine, feces, and other bodily fluids, although inhalation appears to be the primary transmission in bison (Tessaro et. al. 1990). Bison and cattle respond similarly to the disease.

Kansas State Law requires that all bison be tested for tuberculosis and brucellosis prior to entering the state. Specifically, Kansas law directs the livestock commissioner "to protect the health of domestic animals of the state from all contagious or infectious diseases and for this

purpose is hereby authorized and empowered to establish, maintain and enforce such quarantine, sanitary and other regulations as necessary." In accordance with this and other statutory provisions, the Kansas animal health department enacted K.A.R. 9-7-12: "Buffalo or bison shall be accompanied by an official health certificate. They shall have passed a negative brucellosis test within the preceding thirty (30) days if six (6) months of age or over."

Bison have a strong social order that has implications for management, especially for management of small populations and/or on small reserves. Mature bulls tend to spend most of the year in very small groups or alone, only associating with the cows for extended periods during the summer mating season. Cows, juveniles, and calves form larger herds that generally persist in size throughout the year although individuals may move between herds. The herds are often lead by a matriarchal animal with the subordinate animals having an established pecking order. Dominance is often strongly correlated with age (Rutberg 1983). Disruption to the herd composition and social hierarchy can lead to altered behavior and patterns and increased tension within the herd. In one incident, calves introduced into an established herd were the recipients of high levels of antagonism by resident animals (Coppedge et al. 1997).

Bison can be aggressive to people under some circumstances and have caused human fatalities at national and state parks. Cows with young calves and bulls are especially dangerous. All bison are potentially dangerous and should be treated with respect during roundup and capture operations. Bison managers often advise visitors to stay at least 25 yards away from bison. At some sites, managers may take extra precautions during the breeding season including regular oversight of visitors near bison. Agitated or aggressive bison do display warning signs including prolonged direct eye contact with the intruder, head waving, snorting and grunting, pawing of the ground, a bucking action, and a raised tail.

The conservation status and history of bison is well chronicled. Bison may have once numbered in the tens of millions (Shaw 1995), but were almost extirpated in the late 1800s. At their population nadir, there may have been less than a thousand bison (both plains and wood subspecies) left in the world. Through public and private efforts, they recovered from those perilous lows. By one estimate, there were 385,000 animals as of 2001 (Bragg et al. 2002). However, many of these herds are in private ownership managed primarily for profit and sometimes to the detriment of conservation goals. For example, private herds may have degraded genetics and skewed demographics (Halbert 2003, Bragg et al. 2002). Genetic integrity and diversity remains a very high concern (Halbert et al. 2007). Halbert (2003) found considerable evidence of cattle introgression in bison, especially in private and state herds. Evidence of limited cattle introgression was found in the Badlands and Theodore Roosevelt National Park herds whereas the Wind Cave National Park herd shows no evidence of cattle introgression and is therefore highly sought after by conservation groups and others looking to start new herds.

All bison herds in the Great Plains are fenced to varying degrees. Welded mesh wire fencing is commonly used, although many private herds rely simply on 5-strand barbed-wire fencing or electric high-tensile fences. Such fences typically cost a few thousand dollars per mile to erect. Cattle guards are effective in blocking bison movements at gates. Grandin (1999) provides guidance on handling bison and the construction of handling facilities.

Reynolds et al. (2003) stated, “There is a misconception that the North American bison as a wildlife species is secure and will survive in perpetuity.” As a result of the genetic and other concerns, the International Union for the Conservation of Nature and Natural Resources (IUCN:

also known as the World Conservation Union) places the "American bison" in the "Lower Risk, Conservation Dependent" category in the Red List of Threatened Species. The organization has recently made bison conservation a high priority and has developed a Bison Specialist Group operating under the Species Survival Commission.

There are approximately 850, 600, and 400 bison at Badlands, Theodore Roosevelt, and Wind Cave National Parks, respectively. Yellowstone National Park and Grand Teton support another 3,600 free-ranging animals between them. The U.S. Fish and Wildlife Service has six herds ranging from hundreds of animals to just a few dozen, bringing the Department of the Interior population up to about 8,500 animals (Halbert et al. 2007). On October 28, 2008, the Department of the Interior finalized a document that established a framework for bison management by department bureaus (including the NPS).

The National Park Service policies call for three widely recognized elements of biological conservation: i.e., the preservation of natural conditions, processes, and species composition (National Park Service 2006b). These policies are followed to the extent practicable when it comes to bison management. For example, Wind Cave National Park culls yearlings at a 1:1 sex ratio (taking enough of that age class to meet range objectives: National Park Service 2006*a*). This results in a relatively natural sex and age structure, but is also conducive to handling of the animals and disposing of the surplus (i.e., recipients generally desire the yearling age class). No attempt is made to select for morphological or behavioral features. Wind Cave and the other national parks in the Great Plains typically cull animals every year. This does not provide for substantial inter-year fluctuations in density within the parks (which likely happened under natural conditions); however, it avoids genetic bottlenecks and logistical challenges of disposing of large numbers of bison. All three parks in the Northern Great Plains do vary slightly in how they manage and cull bison. Wind Cave National Park recently completed a management plan (National Park Service 2006*a*) while Badlands and Theodore Roosevelt do not currently have approved plans. Millspaugh et al. (2008) used data from Badlands, Theodore Roosevelt, and Wind Cave National Parks to develop a bison culling model and they evaluated the impacts of four culling scenarios (including annual versus non-annual culling).

The three parks in the Northern Great Plains with bison all have permanent corrals and processing facilities. Roundups take place over a couple days in October and involve dozens of people to process the animals (including veterinarians on site). Animals are typically pushed into the corrals via helicopter. Once inside the holding pens the calves are separated from the adults. The two groups are pushed to appropriately sized squeeze chutes. Once in the chute the animals are marked with microchips (implanted in the ear). Various morphological, health, and genetic measurements and samples are taken. The animals may be tested for brucellosis and tuberculosis depending on state requirements (both the state in which the park is located and the state where surplus bison may be relocated to). Costs for the roundups and associated expenses are paid by the entities receiving the bison on a reimbursable basis (in other words, the parks cannot profit from the disposition of the bison). The prorated costs usually come to about $250-$450 per bison (National Park Service 2006*a*). The recipients of surplus bison from the parks are typically Native American Tribes as directed by Department of the Interior policies and solicitor guidance, although conservation organizations, state parks, and other non-profits have received a few animals.

The Nature Conservancy has developed internal bison management guidelines that are designed to apply to all units with bison (Bragg et al. 2002). TNC currently has bison on eight Preserves in the Great Plains, totaling about 5,000 animals (Bragg et al. 2002), and would like to see bison

reintroduced to the Preserve (see Appendix IV). Bison management on TNC properties has many similarities to bison management on NPS sites; however, there are differences (Table 2). TNC determines stocking densities similar to the NPS approach in that TNC uses a forage allocation approach to determining stocking levels. For year-long grazing, the guidelines recommend allocating approximately 25% of the forage production to bison intake, with another 25% going to other wildlife and the remaining 50% for regrowth. Tallgrass Prairie Preserve in Oklahoma allocates 20% for bison consumption and assumes another 20% is loss indirectly (Hamilton 2007). Typically, TNC forage allocations tend to be more conservative when compared to U.S.D.A. Natural Resource Conservation Service guidelines, which call for a 50-60% total removal. Specific bison objectives may vary among TNC units, but as a general statement bison production for purposes of revenue generation is an important by-product of managing bison on TNC lands.

TNC actively uses fire to influence bison movements and to produce landscape diversity (Biondini et al. 1999). TNC's Tallgrass Prairie Preserve in Oklahoma has a very progressive fire program that burns patches of the prairie on a random 3-year cycle in part to restore natural bison movements (Hamilton 2007). When infrastructure allows it, TNC may implement seasonal rotation between summer and winter management units. When repeated over several years this can create two different types of vegetative communities. This approach is viewed as only slightly more costly than year-long grazing regimes.

Table 2. Comparison of Bison Management in NPS and TNC

| | **National Park Service** | **The Nature Conservancy** |
|---|---|---|
| Objectives | Emphasis on managing for natural conditions and processes. | Emphasis on managing for natural conditions and processes. |
| Demographics | Natural age and sex structure. | Emphasis on cows and young animals for purposes of increased recruitment. |
| Forage Allocation | No explicit guidance but Parks typically allocate 25% for consumption by wildlife. | Guidance calls for 25% of forage to bison intake. May increase to 40% under short duration grazing. |
| Marking | Hidden or barely visible markings so as not to detract from visitor experience. | Sometimes use visible external markings such as brands to aid in management. |
| Culling | Animals cannot be sold for profit. Must follow established prioritization in disposing of surplus animals (i.e., first to other DOI units, secondly to tribes, then to non-government conservation organizations). | Sold with no restrictions on who receives surplus animals. |
| Carrion/Disposal of Dead Animals | Policies explicitly call for leaving carrion in situ. | No explicit policy or guidance. |
| Supplemental Food | Discouraged under all circumstances. | Provision for using to help capture bison or to lessen the |

| | | |
|---|---|---|
| | | likelihood of breakouts or negative impacts to the range. |
| Supplemental Water | Discouraged but recognized as necessary under some circumstances. | Recognized as necessary under some circumstances. |
| Minerals | Discouraged. | Provided only when deemed necessary |
| Fire | Used for altering vegetation and maintaining ecosystem processes, but not specifically to move bison. | Used for altering vegetation and maintaining ecosystem processes. |
| Cross-fencing | Not used. | Discouraged. |

TNC bison guidelines discourage the use of dietary supplements except as a tool to facilitate roundups. The 21,000-acre bison grazing unit at the Tallgrass Prairie Preserve in Oklahoma does not provide any supplemental protein or energy (Hamilton 2007). However, the TNC guidelines recognize that emergency measures may need to be taken during extreme conditions (drought, severe winter, large fires) and that supplemental food may sustain bison as well as reduce the frequency of escapes and impacts to neighbors. TNC bison guidelines state that, "mineral supplements should be provided since pasture boundaries will usually exclude access to these highly localized resources" (Bragg et. al. 2002).

As a general statement, NPS policies lean more toward the naturalness of bison management (National Park Service 2006b; Soukup 2007) than do TNC guidance. Although bison are managed for ecological sustainability at TNC sites, fiscal realities often force the organization to consider revenue generation more than NPS sites. For example, NPS policies call for the management of natural conditions (including sex and age rations), whereas the TNC bison guidance document calls for herd demographics that produce an "optimum number of calves each year, while minimizing male aggressive behavior, containment problems and the amount of forage going to unneeded bulls." Specifically, the TNC guidelines call for a cow:bull ratio of 10:1 and the culling of bulls at six years of age, resulting in an age structure skewed toward the younger age classes. The State of Kansas classifies bison as livestock. The Nature Conservancy adheres to state laws in managing bison.

## RELATED PROJECTS, PLANS, AND POLICIES

The action alternatives in this plan are consistent and compatible with current projects, plans, and policies regarding the Preserve. A thorough list of applicable laws, executive orders, and policies that affect park management can be found in Appendix 5 of the Preserve GMP (National Park Service 2000*b*). Plans, policies, and laws that relate to the actions proposed in this bison management plan / environmental assessment are summarized below.

**National Park Service Management Policies.** *National Park Service Management Policies* (National Park Service 2006b) are the overarching policies for the agency. The policies call for the conservation of natural conditions and processes and the reintroduction of native species when appropriate (section 4.4.2.2., Restoration of Native Plant and Animal Species). Specifically, the policies state that species should be considered for reintroduction when:

- Adequate habitat to support the species either exists or can reasonably be restored in the park.

- The species does not, based on an effective management plan, pose a serious threat to the safety of people in parks, park resources, or persons or property within or outside park boundaries.

- The genetic type used in restoration most nearly approximates the extirpated genetic type.

- The species disappeared or was substantially diminished as a direct or indirect result of human–induced change to the species population or to the ecosystem.

- Potential impacts upon park management and use have been carefully considered.

Various documents tier from these policies and provide guidance that is more detailed. Most relevant to the proposed action are the Natural Resource Management Reference Manual #77 and NPS-28, Cultural Resource Management Guideline.

**Department of the Interior Bison Initiative.** On October 28, 2008, the Department of the Interior finalized a document that established a framework for bison management by department bureaus (including the NPS). The goal of the document was to improve bison management and strengthen partnerships with states, Native American tribes, landowners, agricultural interests, conservationists, and others interested in bison. The document explicitly recognized the proposed reintroduction of bison at the Preserve when it stated, "Tallgrass Prairie National Preserve has a plan to establish a new herd which may serve as a satellite population for Wind Cave." The framework identified action items regarding disease management, genetics, and collaboration.

**Tallgrass Prairie National Preserve General Management Plan.** All NPS units are expected to develop a General Management Plan that gives broad guidance on how a specific park unit will be managed. In 2000, the NPS completed a General Management Plan/Environmental Impact Statement for Tallgrass Prairie National Preserve (National Park Service 2000*b*). The plan provides a broad direction for all phases and elements of Preserve management. Such plans typically are operational for 10 to15 years.

**Tallgrass Prairie National Preserve Resource Management Plan.** A Resource Management Plan for the Preserve was prepared in 1994 and a revision was completed in 2003. This plan addresses bison management issues in terms of project statements. Specific project statements include genetic research, population management, and management of rangeland resources for wildlife. The plan also identifies the need for a management plan for bison.

**Tallgrass Prairie National Preserve Fire Management Plan.** A Fire Management Plan and Environmental Assessment is currently being updated and will provide guidance and procedures for using fire to restore and perpetuate natural conditions and processes in the Preserve.

**Tallgrass Prairie National Preserve Cultural Landscape Report.** This report, completed October 2004, identifies spatial organization of cultural resources and the built environment of the former Spring Hill / Z-Bar ranch. The plan provides treatment and management guidelines for rehabilitation of the cultural landscape.

**National Environmental Policy Act (NEPA).** As a federal entity, the NPS is subject to the provisions of NEPA, which require an evaluation of impacts associated with federal actions.

**Endangered Species Act (ESA).** Federal agencies are required by the Endangered Species Act (ESA) of 1973 to ensure that their actions do not jeopardize the continued existence of any species listed as an endangered or threatened under the ESA or Critical Habitat.

**National Historic Preservation Act (NHPA).** Federal agencies are required to take into account the effects of their actions on properties listed or eligible for listing on the National Register of Historic Places. The Preserve contains numerous historic buildings, cultural landscapes, and archeological resources of significance and was designated a National Historic Landmark in February 1997. All undertakings with the potential to affect the historic character of the Preserve require Section 106 compliance review (as mandated by the National Historic Preservation Act) to ensure protection of cultural resources.

**Guidelines for Bison Management: The Nature Conservancy.** The Nature Conservancy is a key partner in Preserve operations, owning the land where the bison will be restored and the animals themselves. The mission of The Nature Conservancy is to preserve the plants, animals, and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. In regards to bison, TNC has developed this detailed policy and guidance document (Bragg et al. 2002). The objective of these guidelines is to provide a standard operating reference so that TNC staff responsible for bison will function according to similar principles and methods. TNC will review these guidelines every five years and update as necessary.

## SCOPING

Scoping is the effort to involve agencies and the public in developing and planning for a project / environmental assessment. Scoping determines important issues, allocates assignments among team members and participating agencies, identifies related projects and associated documents, identifies permits, surveys, or consultations required by other agencies; and creates a schedule for preparation and distribution of the environmental document for public review and comment prior to making a final decision.

At a minimum, NPS scoping includes input from the State Historic Preservation Officer, the U.S. Fish and Wildlife Service, and Native American tribes affiliated with the Preserve. During development of this environmental assessment, the Preserve contacted the Kansas State Historic Preservation Officer, the U.S. Fish and Wildlife Service, and affiliated tribes by letter. A summary of the scoping activities, contact list, letters, and other correspondence is located in Appendix VI.

Scoping for this project began shortly after the Preserve was established in 1996 and the general management plan process was initiated. In 2000, a GMP was completed that included bison restoration in the selected alternative; however, that document was lacking in details regarding the reintroduction. In August of 2003, an internal scoping meeting was held at the Preserve that included representatives of other NPS units, TNC, Kansas Wildlife and Parks, and bison experts from universities and private bison ranches (National Park Service 2004). That workshop developed a series of recommendations regarding bison reintroduction and management at the

Preserve. Subsequent meetings have identified desired future conditions for the Preserve's bison herd and methods to achieve those conditions.

## ISSUES

Issues and concerns regarding the proposed reintroduction of bison were identified during the GMP process (National Park Service 2000*b*) and through more recent internal and public scoping. The main issues associated with the reintroduction and management of bison at Tallgrass Prairie National Preserve include

- Bison management area location
- Real or perceived effects on adjacent property owners
- Herd ownership
- Joint handling facility issues between bison and cattle
- Herd health management - maintaining a disease free herd
- Disease testing and vaccination
- Maintaining a genetically pure herd
- Maintaining a viable and sustainable herd through sustainable management practices
- Water sources – spring developments and stock ponds
- Cover – protection for year round sustainability
- Internal and external fencing of bison and cattle
- Visitor access, experience, enjoyment, and safety
- Culture resource protection and landscape integrity
- Prairie management maintenance and enhancement
- Fire and grazing interaction and management practices
- Ecological management versus generalized livestock management (NPS policy)
- Range (vegetation) monitoring
- Stocking rate – introduction #, population size and composition
- Social and behavior interaction and dynamics on limited acreage
- Genetic stability relative to stocking rate
- Supplemental management strategies (i.e. drought conditions)
- Herd monitoring and tracking
- Culling/replacement strategies
- Handling, processing, distribution of surplus, sick or dead animals
- Management needs in terms of personnel and associated costs
- Infrastructure – funding, design, construction and maintenance of livestock handling facility, fencing, cattleguards, roads, etc…

## IMPACT TOPICS

### Derivation of Impact Topics

Impact topics are used to focus the evaluation of the potential environmental consequences of the alternatives. Candidate impact topics were identified based on legislative requirements for the Preserve, executive orders, topics specified in *Director's Order #12 and Handbook* (NPS 2001), *National Park Service Management Policies* (NPS 2006b), input from other agencies, public concerns, and resource information specific to Tallgrass Prairie National Preserve. A brief rationale for the selection of each impact topic is provided below, as well as the rationale for dismissing specific topics from full evaluation.

## Impact Topics Fully Analyzed in this Bison Management Plan and Environmental Assessment

**Vegetation:** Bison are a significant herbivore in grassland ecosystems, with an average-size lactating cow consuming about 30 pounds of forage per day. In addition to plant consumption, bison trampling, wallowing, and other behaviors affect vegetation directly and indirectly. Furthermore, the presence of bison influences fire patterns to create a diversity of vegetation communities and seral stages. Therefore, this impact topic was retained for full evaluation.

**Wildlife:** Bison are considered by many as a keystone species in grassland ecosystems, with their presence affecting many other wildlife species. These impacts can be direct and obvious or indirect and subtle. Therefore, this impact topic was retained for full evaluation.

**Endangered and Threatened Species:** The Endangered Species Act (1973), as amended, requires an examination of impacts on all federally-listed threatened or endangered species. NPS policy also requires examination of the impacts on federal candidate species, as well as state-listed threatened, endangered, candidate, rare, declining, and sensitive species. Bison may utilize habitat for the federally-endangered Topeka shiner (*Notropis topeka*) and several state-listed species. Therefore, this impact topic was retained for full evaluation.

**Soils:** Bison are the largest native wildlife species in the tallgrass biome. They remove plant cover with their foraging, compact soils with their walking, and disturb soils with their wallowing and pawing of the ground. Furthermore, they often travel in large herds compounding these impacts. Therefore, this impact topic was retained for full evaluation.

**Water Quality and Hydrology:** Bison are large herbivores that consume about 15 gallons of water per day per adult in the summer. No new water developments will be needed, however they can have substantial direct and indirect impacts on water quality and hydrology, such as soil disturbance along stream banks. Therefore, this impact topic was retained for full evaluation.

**Preserve Operations:** Bison reintroduction and long-term management of bison could affect preserve operations. For the purpose of this analysis, preserve operations refer to personnel and budget in terms of quality and effectiveness of maintaining the Preserve's infrastructure and implementing management plans to ensure protection of resources and to provide for an effective visitor experience. Bison management could increase staff workload, require hiring additional staff, and would likely need funding to cover associated expenses. Therefore, this impact topic was retained for full evaluation.

**Cultural Resources:** Cultural resources, comprising archeological resources, cultural landscapes, ethnographic resources, historic and prehistoric structures, and museum collections are defined in the National Park Service Management Policies (NPS 2006b) and in NPS-28: Cultural Resource Management Guidelines. For the purposes of this environmental analysis it was determined that ethnographic resources, prehistoric structures, and museum collections would not be affected; therefore, they were dismissed from further analysis.

However, archeological resources, the physical remains of past cultures and archeological sites, are known to exist within the proposed bison reintroduction area and could be impacted. In addition, cultural landscapes defined as representing a complex subset of cultural resources resulting from the interaction between people and the land, and reflect the influence of human beliefs and actions on the natural landscape is an important preserve-wide resource; therefore,

could be impacted by the reintroduction of bison. Historic structures also occur within the proposed bison reintroduction area in the form of dry-laid stone fences that delineate original pasture plots. These three specific cultural resource subtopics were retained under the Cultural Resource topic for full evaluation.

**Visitor Use and Experience:** Tallgrass Prairie National Preserve is managed in accordance with the Organic Act of 1916, the General Management Plan for the Preserve (2000*b*), and the *Management Policies* (NPS 2006*b*), all of which place a high emphasis on visitor use and experience. The reintroduction and management of bison at the Preserve may affect visitation patterns and experiences; therefore, this impact topic was retained for full evaluation.

**Neighboring Lands and Operations:** Land surrounding the preserve is privately owned and primarily used for cattle grazing purposes. The reintroduction and management of bison on the Preserve may affect neighboring cattle operations; therefore, this impact topic was retained for full evaluation.

## Impact Topics Dismissed From Further Analysis

The impact topics described in this section are not fully evaluated in this environmental assessment because they were not identified during scoping as being of concern nor is it anticipated that implementing any of the alternatives would substantially affect these resources. Additional information regarding their dismissal is provided for each potential impact topic.

**Air quality:** There would be no significant impacts on air quality because of implementing any of the alternatives. Vehicle emissions and small amounts of dust could be generated from the use of vehicles during management actions; however, they would only contribute short-term negligible effects on local air quality. The number of bison being considered for reintroduction is small in proportion to the land area and would have no impact on air quality. Therefore, we dismissed this topic from further analysis.

**Ecologically critical areas or other unique natural resources:** None of the alternatives would affect any designated ecologically critical areas, wild and scenic rivers, or other unique natural resources, as referenced in the Wild and Scenic Rivers Act, *National Park Service Management Policies* (NPS 2006b), 40 CFR 1508.27, or the 62 criteria for national natural landmarks. Therefore, we dismissed this topic from further analysis.

**Energy requirements and conservation potential:** The NPS reduces energy costs, eliminates waste, and conserves energy resources by using energy-efficient and cost-effective technology whenever possible. None of the alternatives would appreciably change the Preserve's short- or long-term energy use or conservation practices. The energy used (primarily gasoline and diesel fuel) for bison reintroduction and management would not be detectable on a daily or annual basis compared to current levels of energy use in the Preserve and surrounding area. Therefore, we dismissed this topic from further analysis.

**Environmental justice:** Executive Order 12898 (General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations) requires that all federal agencies address the effects of policies on minorities and low-income populations and communities. None of the alternatives would have disproportionate effects on minority populations as defined by the U.S. Environmental Protection Agency's 1996 guidance on environmental justice. Therefore, we dismissed this topic from further analysis.

**Ethnographic resources**: *National Park Service Management Policies* (National Park Service 2006b) and *NPS-28, Cultural Resource Management Guidelines* direct the NPS to consider ethnographic concerns when making management decisions. However, ethnographic resources were dismissed from full analysis in this document because the question of the importance of bison in the history and belief systems of American Indian tribes associated with the Preserve was addressed in the GMP. Therefore, we dismissed this topic from further analysis.

**Indian trust resources:** Indian trust assets are owned by American Indians, but are held in trust by the United States. Requirements for management of such resources are included in the Secretary of the Interior's Secretarial Order 3206: American Indian Tribal Rites, Federal – Tribal Trust Responsibilities, and Secretarial Order 3175: Departmental Responsibilities for Indian Trust Resources. Indian trust assets do not occur within the Preserve. Therefore, we dismissed this topic from further analysis.

**Museum collections:** The National Historic Preservation Act, 36 CFR 800, American Antiquities Act, Archaeological Resources Protection Act, Archaeological and Historic Preservation Act, Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation, Director's Order 28, and *National Park Service Management Policies* (National Park Service 2006b) guide the analysis of effects on museum collections. Museum collections would not be affected by any of the alternatives under evaluation. Therefore, we dismissed this topic from further analysis.

**Prime and unique agricultural lands:** The Council on Environmental Quality 1980 memorandum on prime and unique farmlands states that prime farmlands have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. Unique agricultural land is land other than prime farmland that is used for production of specific high-value food and fiber crops. The actions called for in this plan will not alter the farmland status and therefore, we dismissed this topic from further analysis.

**Socioeconomics:** The Preserve's GMP (National Park Service 2000*b*) analyzed the impacts of several potential management alternatives and found that none of them would appreciably affect the socioeconomic environment, including the selected alternative, which includes the reintroduction and management of bison. Because the potential impacts on the socioeconomic environment were fully analyzed in the GMP, we dismissed this topic from further analysis.

**Wilderness**: Tallgrass Prairie National Preserve does not contain nor is it adjacent to any designated or proposed wilderness areas. Signs of human use and development are widely present and easily visible. Tallgrass Prairie National Preserve is not under consideration for wilderness designation under the 1964 Wilderness Act, Director's Order 41, or *National Park Service Management Policies* (NPS 2006b). Therefore, we dismissed this topic from further analysis.

**Urban quality and design of the built environment:** The proposed actions would not result in any effects on urban quality or affect the built environment. Therefore, we dismissed this topic from further analysis.

## INTRODUCTION TO ALTERNATIVES

This environmental assessment fully analyzes four alternatives:

1) Alternative A - The No Action Alternative / Bison in Windmill Pasture Year-round

2) Alternative B – Bison in Big Pasture Year-round

3) Alternative C – Bison in Windmill and Big Pastures Year-round

4) Alternative D - Bison in Windmill Pasture / Off-season Grazing in Big Pasture

The Preserve's GMP (National Park Service 2000*b*) and accompanying Record of Decision (ROD) clearly called for reintroducing bison to the Preserve. Therefore, this document views the reintroduction of bison as the baseline, i.e., No Action Alternative. Because the No Action includes the reintroduction of bison, the only decisions yet to be resolved are the questions of how, when, and where bison will be reintroduced. The GMP suggested that the Windmill Pasture be a likely place for such a reintroduction; therefore, restoring animals to that site is the No Action. However, the GMP also states that other sites would be evaluated. Alternatives B, C, and D are each a modification of what was proposed in the GMP and consistent with the intent and direction of the GMP and accompanying ROD. These alternatives differ primarily in terms of where and how many acres bison will have access to (Figure 4). The stocking rate for each alternative will be based on total grazeable acres available to the animals, which differ with each alternative. Additional alternatives were considered, but were dismissed from full evaluation. They are briefly discussed in the section "Alternatives Considered but Dismissed."

There are numerous considerations and management actions that are independent of which alternative is chosen. Examples include population size, herd demographics (e.g., sex and age ratios), culling strategies, disease management, genetics, water management, handling/corral facility, record keeping and identification, supplemental forage and minerals, routine check and maintenance of fence, and daily observations. These considerations or management plan actions are discussed in more detail in the section titled "Actions Common to All Alternatives."

### Alternative A - The No Action Alternative / Bison in Windmill Pasture Year Round

Alternative A serves as the baseline for this analysis (i.e., No Action alternative, because it was described in the Preserve's GMP/EIS and approved in the ROD). This document builds off that decision by exploring the action in more depth and three variations of that action. Under Alternative A, bison would be reintroduced to the approximate 1,074-acre Windmill Pasture (Figure 4). Bison would remain in this pasture year-round. Cattle grazing would no longer occur in Windmill Pasture.

Based on a 2006 range assessment by the Natural Resources Conservation Service (NRCS), there are 873.7 animal-unit months (AUMs) available in Windmill Pasture (see Appendix II for more discussion of AUMs and forage allocation). Alternative A proposes a maximum carrying capacity of approximately 100 animals, with 73 animal unit equivalents (AUEs) as the average herd size.

Current fencing of Windmill Pasture consists of five strands of barbed wire along all sides with remnant limestone fencing also bordering all four sides. It is bounded on the north, south, and east by Big, Red House, and West Trap Pastures, and on the west by the Mulvane Ranch, a

privately owned cattle operation. The Windmill Pasture fence is adequate for containing cattle, but would require an upgrade for bison. The upgrade would be the addition of an electrified strand of smooth or barbed wire using an offset insulator between the second and third wire. Six miles of fence would require this improvement. Approximately 1.6 miles of stone fence would be excluded completely from bison in this alternative by barbed wire fencing.

**Alternative B – Bison in Big Pasture Year-round**

In Alternative B, bison would be reintroduced to the 3,711-acre Big Pasture (Figure 4). Bison would remain in this pasture year-round. Cattle would no longer graze Big Pasture.

Based on a 2006 range assessment in 2006 by NRCS, there are 2,964.7 AUMs available in Big Pasture (see Appendix II for more discussion of AUMs and forage allocation). Alternative B proposes a maximum carrying capacity of approximately 300 animals, with 247 AUEs as the average herd size.

Current fencing of Big Pasture consists of five strands of barbed wire along all sides with remnant limestone fencing bordering all sides. It is bounded on the south by Windmill Pasture, on the west by the Mulvane Ranch, on the north by the Division Ranch, and on the east by the Fox Creek Ranch, all privately owned cattle operations. Big Pasture fence is adequate for containing cattle, but would require an upgrade for bison. Improvements would include replacing 4.5 miles of fence on the east side and northeast corner, as well as installing an electrified strand of smooth or barbed wire using an offset insulator between the second and third wire along the pasture's periphery, which is 11 miles of fence line. Two miles of stone fencing would be excluded completely from bison in this alternative by barbed wire fencing and one mile of stone fencing in the interior of the pasture would not be protected.

**Alternative C – Bison in Windmill and Big Pastures Year-round**

In Alternative C, bison would be reintroduced to both Windmill and Big Pastures (Figure 4). Total acres available to bison would be approximately 4,785 acres. Cattle grazing in Windmill and Big Pastures would no longer occur under this alternative.

Based on a 2006 range assessment by NRCS, there are 4,785.4 AUMs available in Windmill and Big Pastures (see Appendix II for more discussion of AUMs and forage allocation). Alternative C proposes a maximum carrying capacity of approximately 500 animals, with 398 AUEs as the average herd size.

Current fencing of Windmill and Big Pastures consists of five strands of barbed wire along all sides with remnant limestone fencing bordering all sides. They are bounded on the south by Red House Pasture and partially on the east by West Traps Pasture and on the west by the Mulvane Ranch, on the north by the Division Ranch, and partially on the east by the Fox Creek Ranch, all privately owned cattle operations. Windmill and Big Pasture fencing is adequate for containing cattle, but would require an upgrade for bison. Improvements would include replacing approximately 4.5 miles of fence on the east side and northeast corner of Big Pasture, as well as installing an electrified strand of smooth or barbed wire using an offset insulator between the second and third wire along each pasture's periphery, which is 13 miles of fence line. The barbwire fence between Windmill and Big Pastures would likely be removed. Approximately

4.6 miles of stone fencing would be excluded from bison by barbed wire fencing and one mile of stone fencing in the interior of the pasture would be unprotected from bison in this alternative.

**Alternative D - Bison in Windmill Pasture / Off-Season Grazing in Big Pasture**

This alternative is similar to Alternative A in that the same number of bison would be located in the 1,074-acre Windmill Pasture during the growing season (mid-April through September); however, the bison would have access to the 3,711-acre Big Pasture during the dormant/off-season months (Figure 4). Cattle grazing would no longer occur in Windmill Pasture, but would continue in Big Pasture during the growing season. While this option was not identified in the Preserve's GMP/EIS (National Park Service 2000*b*), it is considered a reasonable modification of what was proposed, and thus should be considered and analyzed.

Based on a 2006 range assessment in 2006 by NRCS, there are 873.7 AUMs available in Windmill Pasture (see Appendix II for more discussion of AUMs and forage allocation). Alternative D proposes a maximum carrying capacity of approximately 100 animals, with 73 AUEs as the average herd size.

Current fencing of Windmill and Big Pastures consists of five strands of barbed wire along all sides with remnant limestone fencing bordering all sides. They are bounded on the south by Red House Pasture and partially on the east by West Traps Pasture and on the west by the Mulvane Ranch, on the north by the Division Ranch, and partially on the east by the Fox Creek Ranch, all privately owned cattle operations. Windmill and Big Pasture fencing is adequate for containing cattle, but would require an upgrade for bison. Improvements would include replacing approximately 4.5 miles of fence on the east side and northeast corner of Big Pasture, as well as installing an electrified strand of smooth or barbed wire using an offset insulator between the second and third wire along each pasture's periphery, which is 13 miles of fence line. Fencing improvements would be the same for Alternatives C and D. Approximately 4.6 miles of stone fencing would be excluded from bison by barbed wire fencing and 1 mile of stone fencing in the interior of the pasture would be unprotected from bison in this alternative.

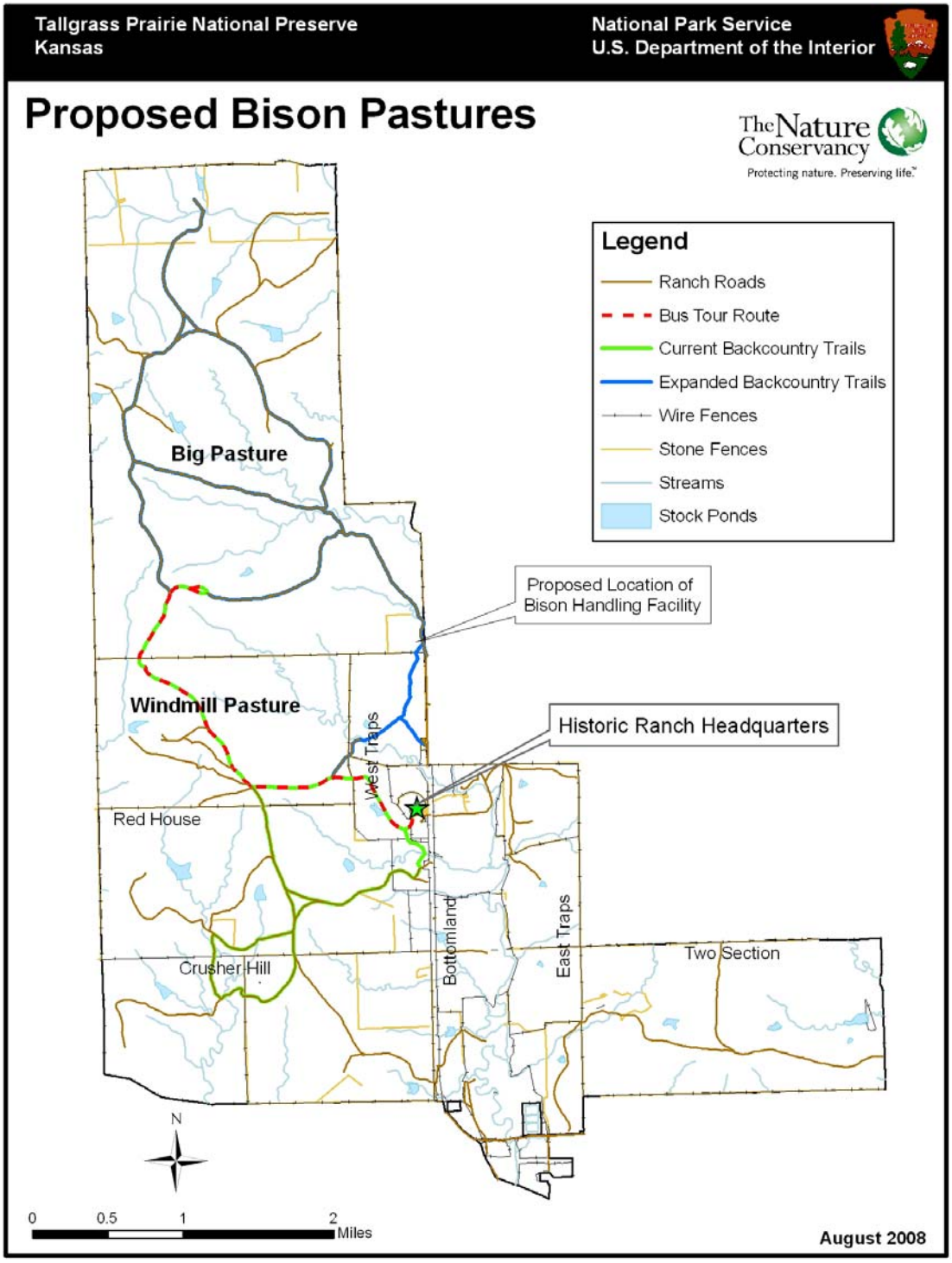


Figure 4. Pasture identification and feature location

## BEST MANAGEMENT PRACTICES AND MITIGATION MEASURES

Under each alternative, best management practices and mitigation measures would be used to prevent or minimize potential adverse effects associated with the reintroduction and management of bison. For example, areas with identified sensitive resources such as archeological sites would be off-limits to vehicular activity and/or other mitigating measures would be taken to avoid impacts to such areas. NPS, state, or other veterinarians would be consulted as needed regarding bison health, disease, and regulatory issues. The impact analyses in the "Affected Environment and Environmental Consequences" assumed that these best management practices and mitigation measures were implemented, and the analyses take the minimization of effects into account.

## ALTERNATIVES CONSIDERED BUT REJECTED

Other alternatives were considered by the planning team for this environmental assessment, but were rejected early in the initial evaluation process because they did not meet project objectives, were deemed unrealistic, or were inconsistent with agency or Preserve policies and mission. These alternatives and the reasons they were dismissed from further consideration are described below.

- **Reintroduce bison to other areas/pastures on the Preserve.**

  All other pastures in the Preserve are located within management zones designated for other uses, such as the Flint Hills Ranching Legacy, Visitor Information and Orientation, and Day Use areas; therefore, the presence of bison would be an inappropriate use, as defined by the GMP (see Figure 2).

  Participants at a 2003 bison workshop (National Park Service 2004) identified the Red House Pasture as the preferred pasture; however, approximately 1/5 of that pasture is within the Flint Hills Ranching Legacy area. In regards to that management zone, the GMP states:

  > *This management area would serve as the primary focal point for interpreting the story of ranching in the Flint Hills region …Historic breeds of domestic livestock would be the predominant grazing animals in this area.*

  The only area designated by the GMP as suitable for bison is the Prairie Landscape area, which includes Windmill and Big Pastures in their entirety. Other pastures, such as the northern West Traps Pasture, may be used for a short time to accommodate round-ups and transfers of bison; however, the predominant grazers in the remaining pastures, as defined by the GMP management zones, will be cattle.

- **Temporarily restore bison to the site for short-term grazing.**

  Under this alternative, animals could be rented, leased, or borrowed from other herds (private or public), restored to the Preserve for a short period of time, and then removed. This alternative was not considered for detailed evaluation in this environmental assessment because it was deemed inconsistent with the intent and spirit of the Preserve's GMP and NPS

policy. Furthermore, it was viewed as excessively costly, unreliable, and fraught with other challenges.

## THE ENVIRONMENTALLY PREFERABLE ALTERNATIVE

The environmentally preferable alternative is the alternative that would best promote national environmental policy expressed in the National Environmental Policy Act (NEPA) as well as NPS *Director's Order #12* (NPS 2001) and *Management Policies* (NPS 2006b). The environmentally preferred alternative would cause the least damage to the biological and physical environment, and would best protect, preserve, and enhance historical, cultural, and natural resources.

Section 101(b) of the National Environmental Policy Act identifies six criteria to help determine the environmentally preferred alternative. The act directs that federal plans should:

1. Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.

2. Assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings.

3. Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences.

4. Preserve important historical, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment that supports diversity and variety of individual choice.

5. Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities.

6. Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

In the NPS, continuing current management may be considered in identifying the environmentally preferred alternative. Alternative A, the No Action Alternative, represents the current management direction for Tallgrass Prairie National Preserve. Under Alternative A, bison would be reintroduced to the approximate 1,074-acre Windmill Pasture (Figure 2). Bison would remain in this pasture year-round. Cattle grazing would no longer occur in Windmill Pasture.

The primary difference between the alternatives is the number of acres removed from cattle grazing and converted to bison grazing. Stocking rate for all alternatives is calculated the same and is considered conservative averaging approximately 15 acres per bison AU. One exception to the stocking rate is Alternative D. Although bison would have the option to graze Big Pasture during the dormant season, the stocking rate would be based only on the 1,074-acre Windmill Pasture, since cattle would be allowed to graze this pasture during the growing season.

Alternative A would restore bison to 1,074 acres, Alternative B would restore bison to 3,711 acres, Alternative C would restore bison to 4,785 acres and Alternative D would restore bison to 1,074 acres with access to 3,711 acres, if necessary, during the winter months.

Based on the environmental analysis portion of this EA, Alternative C would better meet the environmentally preferred criteria because it would allow a larger herd to access more acres with more suitable micro-habitats to sustain the herd year-round. A larger population on more acres would benefit herd demographics and habits, and allowing more natural grazing patterns and behavior, enhancing preserve landscape heterogeneity, thus promoting biological diversity. At this time, Alternative C is determined to be the environmentally preferred alternative.

## PREFERRED ALTERNATIVE

Alternative A – The No Action Alternative/Bison in Windmill Pasture Year-round – would best meet the purpose and need for the project as defined earlier in this environmental assessment. Alternative A better meets current logistical, fiscal, personnel, and infrastructure constraints. This alternative was originally discussed in the GMP and recommended with public participation, to be the preferred location and acreage for bison reintroduction. The pasture is surrounded by Preserve land on three of its four sides, limiting potential impacts to neighbors. Based on these reasons, Alternative A is determined to be the preferred alternative.

## ABILITY OF ALTERNATIVES TO MEET OBJECTIVES

All of the alternatives meet the objectives or fulfill the needs identified in the "Purpose and Need" section. All alternatives meet the following objectives:

- Meet NPS policy to reintroduce and conserve native species
- Implement actions called for in GMP
- Promote vegetation health
- Promote and conserve faunal biological diversity
- Improve visitor experiences
- Collaborate with Preserve partners on the project
- Educate the public about bison restoration and conservation

A full discussion supporting these findings is presented in the specific impact topic analyses presented in the "Affected Environment and Environmental Consequences" section.

## ACTIONS COMMON TO ALL ALTERNATIVES

Countless variations and details should be considered in a bison reintroduction and management plan. However, to describe all of the possible permutations as separate alternatives would be incomprehensible and impractical. Therefore, these variations and details are discussed here. They generally apply equally to all of the alternatives. The approving official for this document may choose to select certain options described herein this document, the Finding of No Significant Impact (FONSI), or other approval document.

Adaptive management also applies to all alternatives and involves choosing a course of action based on the current state of knowledge, monitoring the results of the action, and then using the results to update knowledge and determine new management actions (e.g. stocking rates may vary based on range condition). No matter the alternative, adaptive management will be utilized in planning and implementing the framework set forth in this plan for bison management to ensure that the program is revised as necessary to reflect current knowledge and the best results for all stakeholders.

## Desired Population Size

There is no universal or inherently correct bison population size or density, even for similar habitats and forage productivity. Ultimately, the proper stocking rate depends on the management objectives for the site (see Appendix II). All of the NPS units in the Northern Great Plains and all TNC properties use some form of a forage allocation model as a basis in establishing bison population goals.

In August of 2003, the NPS convened a workshop to evaluate and make recommendations regarding the proposed bison reintroduction and management (National Park Service 2004). The participants recommended an average stocking rate of 80 Animal Units (AU) for a 1,100-acre pasture (an AU may include a cow-calf pair so the total number of animals would be slightly higher). The participants identified a range of 30 AU to 130 AU for the site; however, they stated that 100 AU be maximum until monitoring suggests otherwise.

*Proposed Action*

All alternatives will use the same forage based management strategy in determining desired population size. The proposed bison stocking rate at the Preserve will allocate approximately 25 percent of the annual herbage production intake at a rate of 26 pounds of air-dried herbage per animal per day (3 percent of body weight per day). Over a twelve-month grazing period, each animal unit (AU) would require approximately 9,500 pounds of forage (Appendix II).

## Herd Demographics

The National Park Service manages for natural conditions. This includes the composition of a population, also known as demographics, specifically, sex and age ratios. In many parts of the country, NPS units are the only place where game populations (e.g., deer, elk) approximate natural herd demographics because hunting is not allowed (although there may still be some deviation from natural conditions due to the absence of predators and other factors). The scientific literature contains some dramatic examples of unforeseen negative effects due to unnatural herd demographics (Slotow et al. 2000). Bison populations under natural conditions (i.e., no modern hunting and in the presence of predators) tend to have an adult male:female ratio of about 40:60 and a fairly curvilinear age structure tailing off around the 10-15 year age classes (Millspaugh et al. in press). Badlands, Theodore Roosevelt, and Wind Cave National Parks all cull surplus animals in a way that leaves their herds close to a 1:1 sex ratio.

However, many for-profit bison herds are managed at a cow:bull ratio of up to 10:1. The Nature Conservancy strives to manage for naturalness, but sometimes must make concessions for generating revenue, which helps further their mission. TNC preserves are encouraged to manage

for a sex structure skewed towards females and an age structure skewed toward younger (and therefore, more fecund) animals (Bragg et al. 2002). From a conservation perspective, one of the downsides of this approach is the loss of genetic material (Gross and Wang 2005).

In 2003, the NPS convened a workshop to evaluate options for bison reintroduction and management (National Park Service 2004). Many participants at the workshop advocated the use of young animals (especially for the reintroduction) and a sex ratio skewed toward females in part because of the ease of handling such a herd. A discussion and simulation of various culling strategies on herd demographics is presented in Appendix III.

*Proposed Action*

Regardless of alternative, the initial reintroduction will be approximately 20 bison (60:40 to 50:50 bull to cow ratio) and will be culled from the Wind Cave National Park herd. The Wind Cave National Park herd has been chosen as the parent herd for the Preserve because of its high levels of genetic variation and heterozygosity, brucellosis and bovine tuberculosis free status, and recent studies that suggest the herd is free of cattle genetics (Halbert 2003). The Preserve's GMP states "*Bison (certified disease free and genetically pure) would be introduced into this area."*

Wind Cave's population and demographics strategy is based on culling (removing) yearlings each year and balancing the sexes in the yearling age class. In 2008, Wind Cave did not have a roundup so those bison to be culled in 2009 will be one and two–years old. The number of requests for bison from the Wind Cave herd may affect the exact number and sex ratio of the animals that the Preserve will receive.

Once the bison herd has been introduced to the Preserve, herd demographics (sex and age structure) will trend toward a 50:50 male-female ratio throughout all age classes. To achieve and maintain a relatively natural demographic, the Preserve will implement a culling strategy that removes 45% of the individuals in all age and sex classes every third year.

## Culling Strategies

Bison reintroduced to Tallgrass Prairie National Preserve will be enclosed within fences and therefore unable to emigrate. Furthermore, there will be no native predators to reduce or regulate the size of the bison population. Hence, management will need to implement some type of bison population control or the animals will soon outgrow available resources and exceed population targets. This reality is faced by managers of natural areas throughout the world, i.e., how to reduce large prey populations in the absence of predators?

National Park Service policies allow for a suite of tools to be considered and used in controlling overabundant wildlife. Included among those are chemical and surgical reproductive control (e.g., contraceptives, sterilization), destruction of the animals (e.g., sharpshooting) by authorized personnel, and transporting surplus animals out of the park unit. The latter approach is used for bison by NPS units in the Northern Great Plains. NPS units cannot sell wildlife (or parts thereof), but can recover the costs of disposing of such wildlife to suitable recipients. In the case

of bison, those recipients are other federal land managers, recognized Indian tribes, and non-profit organizations. An NPS workshop in 2003 recommended culling bison at the Preserve every third year.

TNC typically removes surplus bison by rounding the animals up and selling them live on the open market. The approach is reliable, relatively easy to implement, and has the additional benefit of generating revenue.

*Proposed Action*

The proposed culling strategy is for all alternatives and involves two phases – 1) the strategy or plan itself describing what animals would be removed from the herd in terms of sex and age and 2) the physical removal of the animals from the herd. As stated under herd demographics above, the Preserve's plan is to control the population and maintain natural herd demographics by removing 45% of individuals in all age and sex classes every third year. Culling every third year is not currently used in NPS units due in large part to the logistics of handling so many animals in the culls; however, it warrants consideration in small herds such as that at Tallgrass Prairie National Preserve; it was the recommended approach at a bison workshop conducted at the Preserve (National Park Service 2004).

The model below starts with a young age structure, population size of 100 animals, and a 50:50 sex ratio, which is a reasonable demographic for a newly started herd. Figure 5 provides an example of population response to culling the herd every third year while maintaining relatively natural age and sex structures. The initial herd size is 20 animals and culling will not begin until the herd size is near the identified range of AUMs for the pasture(s).

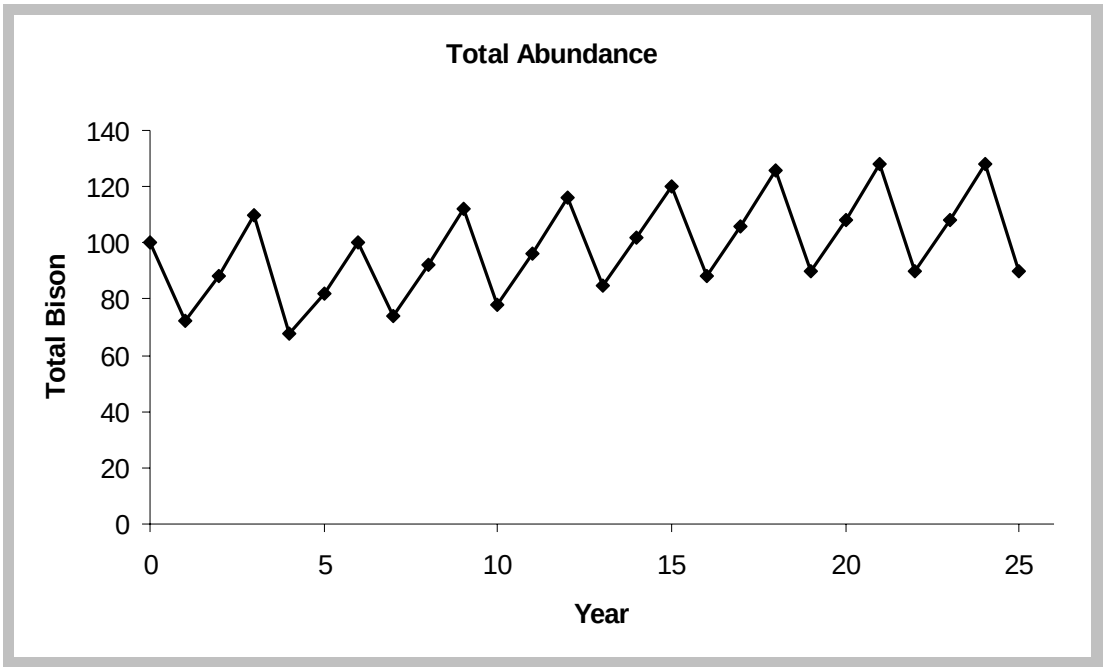


Figure 5. Population Response to Proposed Culling Strategy

Physical removal of excess animals from the Preserve would occur through one of two ways: 1) rounding up bison into corrals with live distribution to other sources or 2) field harvesting animals by trained and experienced individuals. In some cases, culled animals may be used to augment other DOI or private herds for conservation of the species. The Nature Conservancy will maintain the rights to distribute animals per their policy. Field harvesting (shooting) of bison is often considered the most humane method, as animals are not stressed by confined quarters in transportation and at slaughterhouses.

**Disease Management**

Like all wildlife and domestic stock, bison are susceptible to a wide variety of diseases (National Park Service 2006*a*). Brucellosis and bovine tuberculosis are especially noteworthy because of their potential and perceived impact on livestock. Kansas State Law requires that bison be tested for tuberculosis and brucellosis prior to entering the state.

National Park Service units in the Northern Great Plains test bison for disease when required by states that will be receiving surplus bison. Most commonly, bison are tested for brucellosis and occasionally tuberculosis. The parks are able to recoup the costs of these tests as part of their reimbursement charge to the recipients of the bison. The parks in the Northern Great Plains no longer vaccinate bison for brucellosis because they are located in certified brucellosis-free states. Necropsies are conducted on dead animals when conditions allow.

The NPS convened a workshop in 2003 to evaluate bison management approaches, including disease issues (National Park Service 2004). The notes from the workshop recommended that bison be tested for tuberculosis, brucellosis, and Johne's disease as well as de-wormed before being reintroduced to the Preserve.

At this time, the State of South Dakota (i.e., Wind Cave National Park) is a Certified (Brucellosis) Free State and an Accredited (TB) Free State (South Dakota Animal Industry Board 2004). Vaccination of WICA bison for brucellosis was discontinued in 1997. The park has elected not to vaccinate bison for any other diseases in an attempt to allow the population to be as free from human intervention as possible.

*Proposed Action*

Prior to acceptance and entry into the state of Kansas and the Preserve, the initial reintroductory herd of 20 or so bison from Wind Cave National Park will be tested for brucellosis, tuberculosis, and Johne's disease as well as de-wormed.

Kansas is certified as a brucellosis-free state, vaccination for brucellosis is optional; nevertheless, Preserve bison will be tested for brucellosis and calves vaccinated during roundups until determined otherwise. After the initial reintroduction and as a part of the culling operations (i.e., every third year) Preserve bison will be tested for tuberculosis and brucellosis. Bison will be de-wormed once a year using Safeguard in range cubes.

## Genetics

Small populations that originate from a few individuals (founders) and are reproductively isolated may ultimately be compromised by inbreeding and loss of genetic diversity. This may negatively affect population viability. Bison genetics remain a high conservation concern (Halbert 2003, Gross and Wang 2005). These animals show no evidence of cattle introgression and have a relatively high level of genetic diversity.

Most DOI bison herds are approximately a few hundred animals. Gross and Wang (2005) recommended a bison herd of a thousand animals for long-term genetic health. DOI has developed a framework for bison conservation management that provides guidance to enhance ecological recovery of bison, The framework addresses genetic integrity and recommends that satellite herds be developed from the Wind Cave National Park herd to help maintain its genetic integrity and maximizing their genetic diversity.

*Proposed Action*

The Wind Cave National Park herd has been chosen as the parent herd for the Preserve because of its high levels of genetic variation and heterozygosity, and recent studies have found no evidence of cattle gene introgression into the parks bison herd (Halbert 2003). Approximately 20 animals that show no sign of cattle introgression will be introduced to the Preserve. The Preserve may in the future augment the herd genetics by bringing in new bison if information suggests that it is needed or beneficial to bison conservation.

Bison and cattle will not be mixed to minimize the risk of genetic contamination. To prevent the risk of mixing, fencing would be upgraded and maintained to keep cattle and bison separated. For the most part, yearling steers are the primary cattle grazer on the Preserve and to the west of the Preserve. There is a cow-calf herd operation to the north of the preserve. Periodically to ensure genetic integrity and variability, genetic testing will be performed.

## Water Management

Prior to European settlement, bison movements were probably influenced strongly by water availability. During periods of drought, bison likely spent a disproportionate amount of time within a day's walk of water (e.g., perennial streams). During periods of abundant surface water, bison likely wandered throughout the landscape. However, modern bison in the Great Plains are now enclosed within fenced reserves. Some conservation areas have adequate and reliable year-round surface water, but others do not. Those that are not must develop water sources for bison. A cow bison can consume 15 gallons of water daily so these supplies must be substantial in some cases. On large tracts, the availability of water can be used to influence grazing patterns.

*Proposed Action*

Water is readily available throughout the areas proposed in all alternatives for bison reintroduction (see Figure 3). Thus, there will be no additional water development as a part of the bison reintroduction.

## Handling Facilities

Almost all NPS and TNC sites with bison have permanent roundup and handling facilities. These facilities are usually about an acre in size and consist of fixed metal fences, gates, chutes, and pens that are often sturdier versions of the common cattle handling facilities. Most of the NPS sites with permanent bison facilities have bison populations consisting of hundreds of animals on tens of thousands of acres and many conduct roundups and cull surplus animals annually, which may not be necessary at Tallgrass Prairie National Preserve.

The Preserve's GMP (National Park Service 2000*b*) implies that a permanent structure would be developed:

> *"a dual purpose handling facility and improved fencing would be developed for the bison and cattle operations. A handling facility for use by both cattle and bison would reduce construction costs and help reduce and manage impacts to the cultural, natural, and visual resources."*

TNC bison management guidelines provide guidance on bison handling facilities (Bragg et al. 2002).

*Proposed Action*

A handling facility will be constructed for bison and cattle operations, which will include wing fences, sorting pens, and a squeeze chute. The facility will be located within a previously tilled area in the southeast portion of Big Pasture (Figure 4). This location will accommodate all alternatives and is included in the impact analysis.

## Marking Bison

Almost all bison managers, both public and private, mark individual animals by some means. This greatly aids bison management in many ways in closed NPS herds in the Northern Great Plains and in TNC herds. However, the organizations differ in how they typically mark animals. The National Park Service tends to use discrete and barely visible markings whereas The Nature Conservancy uses markings that are more visible.

The National Park Service typically implants an individually coded, passive, integrated transponder in the ear. The tag is read with an electronic scanner waved near the ear. This marking usually stays with the animal for the life of the animal. The agency also clips a small aluminum tag to the outer lobe of the ear. This tag can sometimes be observed at close range or under certain conditions (e.g., when it reflects the sun), but is usually not noticeable from afar. These two marks are consistent with the NPS goal of natural conditions and visitor experience.

In contrast, The Nature Conservancy uses markings that are more visible. For example, Tallgrass Prairie Preserve in Oklahoma uses small plastic ear tags with an imbedded electronic transponder microchip. The tag is attached to the ear by the standard stud system used with cattle ear tags. An advantage of this system is that the external tag is retrievable and reusable when the animal is culled. The tags are somewhat visible which can facilitate herd management,

but can detract from visitor experiences. In addition, TNC often brands bison on the hip. These brands sometimes consist of an identifier for the year the animal was born. A similar system is used at Custer State Park in South Dakota.

*Proposed Action*

All Preserve bison will be identified using individual coded transponder microchips embedded in the back of the ear, which will be read with an electronic scanner waved near the ear. A metal or indiscriminant plastic ear tag may also be used to mark the animals. A metal ear band will be used to mark vaccinated calves.

**Supplemental Forage and Minerals**

National Park Service policies discourage the use of supplemental forage or minerals for wildlife. None of the park units in the Northern Great Plains with bison provides supplemental forage or minerals, although the need for mineral supplements has been considered in a couple of the parks.

TNC policies are more considerate of such supplements, especially when they can reduce the likelihood of problems such as animal breakouts or nutritional stress. It is TNC's policy to manage bison herds under a "minimum supplement strategy". Use of protein or energy supplements is discouraged, with a possible exception being a short period during roundup to bait the herd to the corrals. This strategy means that bison are never to be grazed under restrictions that will place the bison short of forage. This policy is to be honored during both growing and nongrowing seasons. The policy has widespread effects on management plans, the conceptual basis for which has been described as *"Ecological Bison Management"* in a TNC white paper by Al Steuter (2001).

The need for supplements may be greater on smaller tracts where there are typically fewer and less variable resources. For example, a smaller site is less likely to have salt deposits available for bison. A smaller site may also be less likely to have a diversity of vegetation types.

*Proposed Action*

Bison will be managed under a "minimum supplemental strategy" under all alternatives as warranted. Two known conditions which may require supplemental feed are; 1) to assist in moving (baiting) animals into the corral for culling operations and veterinary work, 2) during times where forage availability levels are decreased due to events such as fire, drought, or heavy snowfall or sleet. Salt and/or trace mineral supplements will be provided since pasture acreages are relatively small and these highly localized resources may not be available. Salt and mineral sites are currently located throughout preserve pastures for supplementing cattle. These same sites would be utilized for bison supplementation, if or when necessary, which would mitigate any additional or new impacts to vegetation.

**Fences**

Parks in the Northern Great Plains with bison typically have mesh (woven-wire)-fences that are 7-feet high. However, there are portions of the fence at Wind Cave and Theodore Roosevelt NP

that are barbed-wire due to difficult topography. In addition, part of the bison range at Badlands NP is not fenced at all; the badlands topography provides a natural barrier preventing bison escapes. Throughout the Northern Great Plains, many private herds are maintained with simple barbed-wire fences and cattle guards similar to what is used for cattle.

The existing perimeter (boundary) fence at the Preserve is comprised of mostly four and five strand barbed wire. In combination with the barbed-wire fencing, there are stone fence ruins (approximately 2 feet in height) that outline the entire Windmill Pasture and most of Big Pasture (Figure 3).

*Proposed Action*

For all alternatives, the existing barbed-wire fence around each pasture has been adequate for cattle grazing, but will require varying degrees of repair or replacement of fence to contain bison. The primary difference between each of the alternatives is varying acreage between Windmill and Big Pastures. The larger the bison management area, the more distance of fence will require upgrading. Independent of the alternative chosen, the specifications for the bison fence is a 5-strand barbed wire fence with an electric wire offset between the second and third wire.

**Disposition of Parts and/or Dead Animals**

NPS units typically leave dead bison on the range, as directed by agency policies. Carrion is an important natural process and supports many animals. The NPS units in the Northern Great Plains will sometimes remove the head from dead animals found near areas with high human traffic. This discourages theft since bison skulls are valued by collectors. In addition, the Department of the Interior is directed by several laws and policies to make wildlife parts available for recognized Indian Tribes for ceremonial and religious uses.

The notes from an August 2003 workshop attended by federal and state government, non-profit, and university bison experts recommend that bison be allowed to die in situ and that the NPS use such events for interpretive purposes (National Park Service 2004).

TNC also typically leaves a dead bison on the range and believes carrion is an important natural process that supports many animals. However, TNC (like NPS) may dispose of the carcass in an area removed from the herd and/or visitor use area.

*Proposed Action*

The Preserve will allow dying animals to occur as naturally as possible and typically leave the bison carcass as is. Cause of death will be determined whenever possible. If needed, a necropsy (examination) may be conducted on-site by appropriate personnel (i.e. biologist) and veterinarian. In the event of serious injury or suspicious illness, euthanasia may occur. Following euthanasia or natural death, if a bison carcass is visually apparent to visitors, the carcass may be moved to a remote site. Some euthanized animals may also be slaughtered at the discretion of TNC. Because the bison herd will be owned by The Nature Conservancy, laws and policies regarding Native American use would not apply.

## Escape Procedures

Escape procedures vary from each park or preserve that have bison. Different set of circumstances require different techniques. Theodore Roosevelt National Park uses low stress techniques to herd the bison back into the park, i.e. two people applying enough pressure from a distance directing the animal to go a specific direction. In the past 15-20 years, only two animals have had to be put down due to failed attempts and/or safety. TNC Tallgrass Prairie Preserve in Oklahoma uses the bait and lure method, which has been very successful.

Bison escapes at most parks and preserves are minimal if not rare. Routine check and maintenance of fencing is the most effective way to prevent escapes.

*Proposed Action*

Should a bison escape from the fenced grazing area but still remain on the preserve, initial attempts at either herding it back into the enclosed bison area or attracting it back using feed, grain, water, or some other attractant will be made. Should several attempts fail, then immobilization with dart gun and tranquilizers will be an option or the animal will be field harvested at that time.

Should a bison escape off the preserve onto neighboring land, then immediate notification of the appropriate landowner/land manager will be made. Initial attempts at either herding it or luring it back onto preserve property will be made. Should these attempts fail, then immobilization with dart gun and tranquilizers will be used or the animal will be field harvested at that time.

Should a bison escape off the preserve onto nearby road rights–of-way, then immediate notification to Chase County Police Department will be made for traffic control assistance. Initial attempts at either herding it or luring it back onto preserve property will be made. Should these attempts fail in a timely and safe manner; the animal will be harvested at that time.

## Visitor Use Patterns

Bison are a significant resource at many NPS and TNC units in terms of visitor experience. They are symbolic of the Great Plains and its history. Bison roundups attract thousands of visitors to some sites (e.g., Custer State Park in South Dakota).

Bison are dangerous - they are large, fast, and agile animals that are not always predictable. Bulls in rut and cows with young calves can be especially dangerous. Visitors to national and state parks have been threatened, injured, and even killed by bison. Although experienced people may have a good feel for unsafe situations and for bison warning signs, most visitors to the Preserve are unlikely to have this knowledge. Many visitors are especially interested in seeing newborn calves in the spring and summer and adult bulls during the rut.

*Proposed Action*

Hiking is currently allowed and will continue to be allowed in areas where bison will be reintroduced for all alternatives. Alternative hiking trails where bison do not occur will also be available to visitors (Figure 4). The current bus tour route runs through both Windmill and Big Pasture, the two pastures encompassing all four alternatives and will remain available for visitor

viewing opportunities. Information, such as safe bison-viewing distances, will be made available to visitors by the NPS ranger staff.

**Liability and Responsibility**

The authorized boundary for Tallgrass Prairie National Preserve consists of 10,894 acres. However, the federal government owns in fee only a small portion of the area (34.44 acres) within the boundary. The Nature Conservancy is now the principal landowner within the boundary and owns in fee the lands where the bison will be restored. This partnership has many positives; however, it can also create confusion about roles and responsibilities. With both the NPS and TNC having a stake in the reintroduction and management of bison there is the potential for confusion about ownership and liability. However, in accordance with the authority granted in Section 1005(d)(2) of the Tallgrass Prairie National Preserve Act of 1996, 16 U.S.C. §§ 698u-3(d), NPS agrees to hold harmless and indemnify TNC in full from and against any suit, claim, demand or action, liability, judgment, cost or other fee arising out of any claim of death, personal injury or property damage that occurs in connection with the operation of the Preserve.

## SUMMARY OF IMPACTS

Table 5 summarizes the effects of the alternatives on the impact topics that were retained for analysis. More detailed information on the effects of the alternatives is provided later in this chapter for each impact topic. See Table 5 for definitions of impact topic thresholds.

Table 3: Summary of Effects by Impact Topic

| | **Alternative A - The No Action Alternative / Bison in Windmill Pasture Year-round** | **Alternative B – Bison in Big Pasture Year-round** | **Alternative C – Bison in Windmill and Big Pastures Year-round** | **Alternative D - Bison in Windmill Pasture / Off-season Grazing in Big Pasture** |
|---|---|---|---|---|
| **Vegetation** | Direct and indirect effects to vegetation resources would be beneficial, minor, and long-term.<br><br>Cumulative effects would be beneficial, moderate, and long-term.<br><br>There would be no impairment of vegetation resources or values. | Direct and indirect effects to vegetation resources would be beneficial, minor, and long-term.<br><br>Cumulative effects would be beneficial, moderate, and long-term.<br><br>There would be no impairment of vegetation resources or values. | Direct and indirect effects to vegetation resources would be beneficial, minor to moderate, and long-term.<br><br>Cumulative effects would be beneficial, moderate, and long-term.<br><br>There would be no impairment of vegetation resources or values. | Direct and indirect effects to vegetation resources would be beneficial, minor to moderate, and long-term.<br><br>Cumulative effects would be beneficial, moderate, and long-term.<br><br>There would be no impairment of vegetation resources or values. |
| **Wildlife** | Direct and indirect effects on the wildlife community would be beneficial, minor, and long-term.<br><br>Cumulative effects would be beneficial, moderate, and long-term.<br><br>There would be no impairment of wildlife resources or values as a result of the implementation of Alternative A. | Direct and indirect effects on the wildlife community would be beneficial, minor, and long-term.<br><br>Cumulative effects would be beneficial, moderate, and long-term.<br><br>There would be no impairment of wildlife resources or values as a result of the implementation of Alternative B. | Direct and indirect effects on the wildlife community would be beneficial, minor, and long-term.<br><br>Cumulative effects would be beneficial, moderate, and long-term.<br><br>There would be no impairment of wildlife resources or values as a result of the implementation of Alternative C. | Direct and indirect effects on the wildlife community would be beneficial, minor, and long-term.<br><br>Cumulative effects would be beneficial, moderate, and long-term.<br><br>There would be no impairment of wildlife resources or values as a result of the implementation of Alternative C. |
| **Endangered and** | The Topeka shiner is present in Windmill Pasture. The alternative | The Topeka shiner is present in Big Pasture. The alternative may | The Topeka shiner is present in Windmill and Big Pastures. The | The Topeka shiner is present in Windmill and Big Pastures. |

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|---|---|---|---|---|
| **Threatened Species** | may affect, but is not likely to adversely affect, the species as defined by the ESA. | affect, but is not likely to adversely affect, the species as defined by the ESA. | alternative may affect, but is not likely to adversely affect, the species as defined by the ESA. | The alternative may affect, but is not likely to adversely affect, the species as defined by the ESA. |
| **Soil** | Impacts should be beneficial, minor, and long-term.<br><br>Cumulative effects would also be beneficial, negligible, and long-term.<br><br>There would be no impairment of soil resources or values as a result of the implementation of Alternative A. | Impacts should be beneficial, minor, and long-term.<br><br>Cumulative effects would also be beneficial, negligible, and long-term.<br><br>There would be no impairment of soil resources or values as a result of the implementation of Alternative B. | Impacts should be beneficial, minor, and long-term.<br><br>Cumulative effects would also be beneficial, negligible, and long-term.<br><br>There would be no impairment of soil resources or values as a result of the implementation of Alternative C. | Impacts should be beneficial, minor, and long-term.<br><br>Cumulative effects would also be beneficial, negligible, and long-term.<br><br>There would be no impairment of soil resources or values as a result of the implementation of Alternative D. |
| **Water** | Impacts on water quality would be beneficial, minor, and long-term.<br><br>Cumulative effects would also be beneficial, minor, and long-term.<br><br>There would be no impairment of water resources or values as a result of the implementation of Alternative A. | Impacts on water quality would be beneficial, minor, and long-term.<br><br>Cumulative effects would also be beneficial, minor, and long-term.<br><br>There would be no impairment of water resources or values as a result of the implementation of Alternative B. | Impacts on water quality would be beneficial, minor, and long-term.<br><br>Cumulative effects would also be beneficial, minor, and long-term.<br><br>There would be no impairment of water resources or values as a result of the implementation of Alternative C. | Impacts on water quality would be beneficial, minor, and long-term.<br><br>Cumulative effects would also be beneficial, minor, and long-term.<br><br>There would be no impairment of water resources or values as a result of the implementation of Alternative D. |
| **Preserve Operations** | Direct, indirect, and cumulative effects to preserve operations would be long-term, adverse and minor. | Direct, indirect, and cumulative effects on preserve operations would be long-term, adverse and moderate. | Direct, indirect, and cumulative effects on preserve operations would be long-term, adverse and moderate. | Direct, indirect and cumulative effects on preserve operations would be long-term, adverse, and moderate. |

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|---|---|---|---|---|
| **Cultural Resources** | These effects would be negative, minor, and long-term.<br>Cumulative effects would be negative and minor. There would be no impairment of cultural resources or values as a result of the implementation of Alternative A. | These effects would be negative, moderate, and long-term.<br>Cumulative effects would be negative and minor. There would be no impairment of cultural resources or values as a result of the implementation of Alternative B. | These effects would be negative, moderate, and long-term.<br>Cumulative effects would be negative and minor. There would be no impairment of cultural resources or values as a result of the implementation of Alternative C. | These effects would be negative, moderate, and long-term.<br>Cumulative effects would be negative and minor. There would be no impairment of cultural resources or values as a result of the implementation of Alternative D. |
| **Visitor Experience and Use** | Direct, indirect, and cumulative effects to visitor use and experience would be short- and long-term, minor, and beneficial. | Direct, indirect, and cumulative effects to visitor use and experience would be short- and long-term, minor, and beneficial. | Direct, indirect, and cumulative effects to visitor use and experience would be short- and long-term, moderate, and beneficial. | Direct, indirect, and cumulative effects to visitor use and experience would be short- and long-term, moderate, and beneficial. |
| **Neighboring Landowners** | Direct, indirect, and cumulative effects to neighboring lands and operations would be short-term, adverse, and negligible to minor. | Direct, indirect, and cumulative effects to neighboring lands and operations would be short-term, adverse, and negligible to minor. | Direct, indirect, and cumulative effects to neighboring lands and operations would be short-term, adverse, and negligible to minor. | Direct, indirect, and cumulative effects to neighboring lands and operations would be short-term, adverse, and negligible to minor. |

# AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section describes the Tallgrass Prairie National Preserve and the general setting, the methods used for evaluating impacts, the resources that could be impacted, and an assessment of the impacts (i.e., environmental consequences) associated with the alternatives. It is organized by impact topic, which allows a standardized comparison between alternatives based on issues. The analysis considers the context, intensity, and duration of impacts, the indirect and cumulative impacts, and measures to mitigate impacts. National Park Service policy also requires evaluation of "impairment" of resources in all environmental compliance documents (National Park Service 2001).

## GENERAL SETTING

Tallgrass Prairie National Preserve is located in eastern Kansas in Chase County, two miles north of the town of Strong City. The Preserve administrative headquarters is located in the town of Cottonwood Falls. The Preserve is within the Flint Hills physiographic region, which is part of the tallgrass prairie biome. Due to shallow soils and underlying limestone and chert deposits, a sizable portion of the Flint Hills landscape is unplowed. The region supports some of the most extensive and high quality tracts of tallgrass prairie in existence, including those within the Preserve boundary.

The Preserve was established on November 12, 1996. The Preserve boundary encompasses 10,894 acres; however, the federal government owns in fee only 34.44 acres. The Nature Conservancy, a non-profit conservation organization, owns the bulk of the land within the Preserve.

Numerous springs, seeps, and stock ponds dot the landscape. A historic ranch headquarters area is located near the middle of the Preserve just off State Highway 177, which divides the Preserve. A prominent 3-story limestone barn and a Second Empire style 19th century limestone house showcase the ranch headquarters site. A number of less prominent archeological and cultural features have been identified throughout the Preserve. The Preserve is surrounded primarily by privately owned ranchland.

The National Park Trust was originally the primary partner with the Preserve. However, in 2005 The Nature Conservancy assumed that role when it purchased most of the land within the Preserve boundary. National Park Service regulations and policies apply to these lands, with the consent of The Nature Conservancy. The enabling legislation established an advisory committee to advise the NPS regarding the development, management, and interpretation of the Preserve.

The Preserve is located within the NPS Heartland Inventory & Monitoring Network. This multi-park effort is in the early phases of long-term ecological monitoring program. This program should provide feedback to resource managers on the changes and impacts associated with bison reintroduction and management at the Preserve.

For a thorough description of the Preserve, its history and current management, see the Preserve's General Management Plan (National Park Service 2000*b*).

## METHODOLOGY

For each impact topic, the analyses include a description of the affected environment and an evaluation of the impacts of implementing each alternative. Impacts on natural resources (e.g., vegetation, wildlife) were defined as how the action changes the resource in regards to preserving natural conditions and processes, per the goals of the GMP for the prairie management zone and per agency policies (National Park Service 2000*b*, 2006*b*). Explicit comparisons between the alternatives are generally not made, but can be inferred from comparing how the alternatives differ in regards to meeting natural conditions and processes.

The analysis of impacts was conducted using information provided by Preserve staff and subject matter experts, scientific literature, and other information. The impact analyses involved the following steps:

1) define issues of concern,

2) identify the geographic area that could be affected,

3) define the resources within that area that could be affected,

4) impose the action on the resources within the area of potential effect, and,

5) identify the effects caused by the action.

For all of the impact topics (except endangered and threatened species) the effects caused by the alternative were categorized as to:

- whether they would be neutral (could include both beneficial and adverse impacts, but there would be no net change), beneficial (positive), or adverse (negative),

- whether the intensity of the effect was negligible, minor, moderate, or major as defined by thresholds specific to each impact topic (Table 5),

- whether the duration of the effect was short-term or long-term as defined by thresholds specific to each impact topic (Table 5),

- whether the effect would be a direct result of the action or would occur indirectly because of a change to another resource or impact topic.

For the topic, threatened and endangered species, the analysis of impacts used the terms, thresholds, and implementing regulations of the Endangered Species Act. Specifically, the impacts are classified as:

No effect: listed species or designated critical habitat would not be affected.

May affect, but not likely to adversely affect: effects on listed species or critical habitat would be discountable (i.e., unlikely to occur or could not be measured, detected, or evaluated) or the effects would be completely beneficial.

Likely to adversely affect: adverse effects on a listed species or critical habitat likely to occur as a result of the proposed action, and the effect would either not be discountable or completely beneficial.

Likely to jeopardize the continued existence of a species or adversely modify critical habitat: effects could jeopardize the continued existence the species or alter critical habitat.

The Council on Environmental Quality (CEQ, 1978) regulations implementing the National Environmental Policy Act (NEPA) require an assessment of cumulative effects in the decision-making process for federal projects. Cumulative effects are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7).

Cumulative effects are considered for all alternatives and presented at the end of each impact topic analysis. They were determined by combining the effects of the alternative with other past, present, and reasonably foreseeable future actions in the vicinity.

NPS *Management Policies* (NPS 2006b) provide guidance on addressing impairment of Preserve resources. Impairment is an impact that, "in the professional judgment of the responsible NPS manager, would harm the integrity of Preserve resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. Whether an impact meets this definition depends on the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts."

Any park resource can be impaired, but an impact would be more likely to result in impairment if it affects a resource or value whose conservation is:

Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the Preserve,

Key to the natural or cultural integrity of the Preserve or to opportunities for enjoyment of the Preserve, or,

Identified in the Preserve's general management plan or other relevant NPS planning documents as being of significance.

Preserve operations, visitor use and experience, and neighboring lands and operations are not resources that Tallgrass Prairie National Preserve was established to protect. Therefore, impairment findings are not included as part of the impact analysis for these topics.

Table 4. Impact Topic Threshold Definitions

| Impact Topic | Negligible | Minor | Moderate | Major | Duration |
|---|---|---|---|---|---|
| Vegetation | The alternative has a negligible affect in moving vegetation toward or away from natural conditions and processes. The changes or effects would not be measurable or perceptible. | The alternative has a minor affect in moving vegetation toward or away from natural conditions and processes. Effects on vegetation would be measurable or perceptible, but localized and not ecologically meaningful. While impacts on individual plants might occur, the viability of plant species would not be affected. | The alternative has a moderate affect in moving vegetation toward or away from natural conditions and processes. The change in the plant community would occur over a relatively large area and be ecologically meaningful. The change would be measurable in terms of abundance, distribution, or species composition. | The alternative has a major effect in moving vegetation toward or away from natural conditions and processes. The change would occur over most of the Preserve and be ecologically profound. The change would be measurable in terms of abundance, distribution, or species composition. | Temporary – Vegetation returns to the original condition within a year of implementing the action.<br><br>Long-term – Vegetation stays at the new state as long as the action is implemented. |
| Wildlife | The alternative has a negligible affect in moving wildlife toward or away from natural conditions and processes. The changes or effects would not be measurable or perceptible. | The alternative has a minor affect in moving wildlife toward or away from natural conditions and processes. Effects on wildlife would be measurable or perceptible, but localized and not ecologically meaningful. While impacts on individual animals might occur, the viability of | The alternative has a moderate affect in moving wildlife toward or away from natural conditions and processes. The change in the wildlife community would occur over a relatively large area and be ecologically meaningful. The change would be measurable in terms of abundance, distribution, or species composition. | The alternative has a major effect in moving wildlife toward or away from natural conditions and processes. The change would occur over most of the Preserve and be ecologically profound. The change would be measurable in terms of abundance, distribution, or composition. | Temporary – Wildlife returns to the original condition within a year of implementing the action.<br><br>Long-term – Wildlife stays at the new state as long as the action is implemented. |

| Impact Topic | Negligible | Minor | Moderate | Major | Duration |
|---|---|---|---|---|---|
| | | populations would not be affected. | | | |
| Soil | Soil would not be affected, or the effects would not be measurable or perceptible. | Effects on soil would be measurable or perceptible, but localized. The general characteristics of the soil would not be affected. | A change in soil structure, composition, or processes would occur over a relatively large area within the Preserve. The change would be readily measurable and perceptible. | A change in soil structure, composition, or processes would occur over a relatively large area within the Preserve and would dramatically affect other resources. | Short-term – Recovers in less than one century.<br><br>Long-term – Takes more than one century to recover. |
| Water | The alternative has a negligible affect in moving water toward or away from natural conditions and processes. The changes or effects would not be measurable or perceptible. | The alternative has a minor affect in moving water toward or away from natural conditions and processes. Effects on water would be measurable or perceptible, but localized and not ecologically meaningful. | The alternative has a moderate affect in moving water toward or away from natural conditions and processes. The change in the water conditions would occur over a relatively large area and be ecologically meaningful. | The alternative has a major effect in moving water resources toward or away from natural conditions and processes. The change would occur over most of the Preserve and be ecologically profound. | Temporary – Water returns to the original condition within a year of implementing the action.<br><br>Long-term – Water stays at the new state as long as the action is implemented. |
| Preserve Operations | Preserve operations would not be affected, or the effect would be at or below levels of detection and not appreciable. | The effect would be detectable, but not of a magnitude that would appreciably change Preserve operations. | The effects would be readily apparent and would result in a substantial change in Preserve operations in a manner noticeable to staff and the public. | The effects would be readily apparent resulting in substantial changes in Preserve operations noticeable to staff and the public and markedly different from existing operations. | Short-term – Only during initiation of the alternative.<br><br>Long-term – Continues as long as the alternative is implemented. |

| Impact Topic | Negligible | Minor | Moderate | Major | Duration |
|---|---|---|---|---|---|
| Cultural Resources | Impact at the lowest levels of detection with neither adverse nor beneficial consequences. The determination of effect for Section 106 would be no adverse effect. | Negative Impact – effects to cultural resources would diminish the overall integrity of the resource but those characteristics that convey significance would remain intact. The determination of effect for section 106 would be "historic property affected, no adverse effect".<br><br>Beneficial Impact – stabilization of cultural resources in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties. The determination of effect for section 106 would be no adverse effect. | Negative Impact – effects to cultural resources would diminish the overall integrity of the resource. The determination of effect for section 106 would be adverse effect. A memorandum of agreement is executed among the NPS and applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation, in accordance with 36 CFR 800.6(b). Measures identified in the memorandum of agreement to minimize or mitigate adverse impacts reduce the intensity of impact under NEPA from major to moderate.<br><br>Beneficial Impact – rehabilitation of a structure, landscape, or its patterns and features in accordance with the Secretary of the Interior's Standards for the | Negative Impact – effects of cultural resources would greatly diminish the overall integrity of the resource. The determination of effect for section 106 would be adverse effect. Measures to minimize or mitigate adverse impacts cannot be agreed upon and the NPS and applicable state or tribal historic preservation officer and/or Advisory Council are unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b).<br><br>Beneficial Impact – preservation or restoration of a cultural resource in accordance with the Secretary of the Interior's Treatment of Historic Properties. The determination of effect for section 106 would be no adverse effect. | Not applicable |

| Impact Topic | Negligible | Minor | Moderate | Major | Duration |
|---|---|---|---|---|---|
| | | | Treatment of Historic Properties. The determination of effect for section 106 would be no adverse effect. | | |
| Visitor use and experience | Visitors would not be affected, or changes in visitor use and/or experience would be below the level of detection. Visitors would not be aware of the effects associated with the alternative. | Changes in visitor use and/or experience would be detectable. Visitors would be aware of the effects associated with the alternative, but the effects would be slight. | Changes in visitor use and/or experience would be apparent. Visitors would be aware of the effects associated with the alternative and would likely be able to express an opinion about the changes. | Changes in visitor use and/or experience would be apparent and have important consequences. Visitors would be aware of the effects associated with the alternative and would likely express a strong opinion about them. | Short-term – Occurs only during the initiation of the project.<br><br>Long-term – Persists as long as the Alternative is implemented. |
| Neighboring lands and operations | Neighbor operations and resources would not be affected | Neighbor operations and resources would be temporarily or slightly affected | Neighbor operations and resources would be adversely affected temporarily, and may result in some moderate loss of operational time. | Neighbor operations and resources would be adversely affected long-term. | Short-term – Occurs only during the initiation of the project.<br><br>Long-term – Persists as long as the Alternative is implemented. |

# VEGETATION

## Affected Environment

Survey notes from the 1850s describe areas of "nearly all prairie" and a "small quantity of timber on the creeks" in the region of the Preserve (Barnard 1997). Recent attempts by Lauver and Blodgett (1998) to classify vegetation alliances and plant communities in the Preserve found eight community types. The Preserve is dominated by big bluestem–Indian grass–little bluestem Flint Hills vegetation community. This community type is commonly viewed as tallgrass prairie. Other community types such as the bulrush-spikerush marsh and limestone outcrops are very narrow and found in small patches (Lauver and Blodgett 1998). The floodplain forests along Palmer Creek (which runs 1.6 miles across the northern end of Big Pasture) is comprised of the ash-elm-hackberry-burr oak-black walnut floodplain forest community. This floodplain community has been called the rarest in the state because of the history of plowing these deeper soils for cultivation. Palmer Creek has been accessible to cattle since the early 1900s and cattle have influenced the plant community to varying degrees. The Palmer Creek floodplain vegetation community rates from very poor to excellent in Big Pasture (Barnard 2007).

Approximately 97% of the Preserve is tallgrass prairie. The prairie occurs on gently rolling slopes, terraces, and along some stream drainages. The primary plant species include big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), sideoats grama (*Bouteloua curtipendula*), lead plant (*Amorpha canescens*), Indian grass (*Sorghastrum nutans*), buffalo grass (*Buchloe dactyloides*), ironweed (*Vernonia baldwinii*), wild alfalfa (*Psoralea tenuiflora*) and hairy grama (*Bouteloua hirsuta*) (Lauver 1998).

The project area averages about 210 frost-free days and has the potential to produce about 18.8 million pounds (air dry) of vegetation annually under normal weather conditions, or about 3,860 pounds per acre (includes all vegetation whether palatable or not: from the Natural Resources Conservation Service site; www.websoilsurvey.nrcs.usda.gov). In dry years, the productivity of the project area can drop to 13.4 million pounds, or 71% of normal. In wet years, the productivity of the project area can increase to 24.5 million pounds, or 130% of normal. In tallgrass ecosystems, grasses make up most of the plant biomass although forbs can comprise about a third of the biomass in the late-spring/summer growing season (Coppedge et al. 1998).

More than 500 species of vascular plants have been identified within the Preserve (NPSpecies, 2008; Barnard per. comm. 2008). None of the plants documented from the Preserve are included on the state threatened, endangered, or Species in Need of Conservation (SINC) list. Over 30 plant species classified as "non-native" within Kansas have been found in the Preserve. Some are more serious than others. Caucasian bluestem (*Bothriochloa bladhii*) and sericea lespedeza (*Lespedeza cuneata*) represent a more serious threat and have been found within the Preserve. Japanese brome (*Bromus japonicus*), downy brome (*Bromus tectorum*), and Johnsongrass (*Sorghum halepsense*) also pose threats. Noxious weeds, including state listed, are surveyed and treated annually with appropriate control methods.

During the recent past, the entire preserve was burned each spring, usually between March 20 and April 1. Annual spring burning and intensive-early-stocking of stocker cattle is a common management combination in this portion of the Flint Hills, although a number of ranches near the

Preserve have year-round cow-calf operations. The preserve is still burning annually in the spring, but as of 2006, has instituted patch burning where some areas are eliminated from annual burning and remain unburned for two years before burning again. All alternatives are being patch burned to some extent. Big Pasture patching burning is divided into thirds, whereas, Windmill Pasture, smaller in size, has been divided in half.

Presently, plant data is collected annually in the project area by the Heartland Network Inventory and Monitoring Program (http://science.nature.nps.gov/im/units/htln/index.htm). Data is also collected as part of a photo-point monitoring program.

Tallgrass prairie is the most altered major habitat type in North America, in terms of acres lost (Noss et al. 1995). Less than four percent remains of the 142 million acres that once stretched from east Texas into Canada (Samson and Knopf 1994); nearly two-thirds of what remains is found in the Greater Flint Hills of Kansas and Oklahoma. This habitat is considered rare in Kansas and is listed by the state as prime habitat (Kansas Department of Wildlife and Parks. Strategic Plan 1991-1996).

**Effects Common to all Alternatives**

Few studies have documented quantitatively the effects of bison on tallgrass prairie and woody vegetation. One study suggests that bison tend to graze in patches, revisiting areas throughout the season and therefore leaving a mosaic of grazed and ungrazed areas. Because bison selectively graze on dominant grasses while avoiding most forbs and woody species, the resulting patchy distribution of vegetation favors increased plant species diversity by allowing forbs to flourish (Collins et al. 1998). The dynamic spatial and temporal nature of bison grazing allows the productivity of grasses to recover while the presence of diverse forbs enhances gas exchange, aboveground biomass, density and plant cover (Fahnestock and Knapp 1993, Hartnett et al. 1996, Damhoureyeh and Hartnett 1997). Research at the Oklahoma Tallgrass Preserve has found that not less than 99% of a bison's diet is grasses and sedges.

Bison wallowing also support a different vegetation structure and composition that is more drought and fire resistant (Collins and Barber 1985). The combined effect of bison wallows is an increase in spatial environmental heterogeneity and local and regional biodiversity (Hartnett et al. 1997).

Suggested by several studies and observations, bison, like many large mammals, are capable of severely affecting woody vegetation. One study focusing on the effects of bison on woody vegetation was conducted in the Nature Conservancy's 15,342-ha Tallgrass Prairie Preserve (TPP) in Oklahoma. The bison's rubbing on young trees helped prevent trees from invading the prairie. Although bison can retard woody plant recruitment by horning and rubbing, this is a natural process and moderate amounts would be viewed favorably in terms of preserving park plant communities.

Comparisons between how bison and cattle grazing affect the plant community are understood poorly because of confounding differences in how the herbivores are typically managed. A 10-year study comparing vegetation changes in Kansas tallgrass prairie that was burned and grazed season-long at a moderate stocking rate by either bison or cattle suggest that little bluestem

(*Schizachyrium scoparium*) cover decreased over time in bison pastures, and big bluestem (*Andropogon gerardii*) cover increased over time in cattle pastures. Grazing by either herbivore increased the canopy cover of annual forbs, perennial forbs, and cool-season graminoids, but both annual and perennial forb cover increased at a greater rate in bison pastures than in cattle pastures. Missouri goldenrod (*Solidago missouriensis*) and heath aster (*Symphyotrichum ericoides*) were primarily responsible for the increased forb cover in grazed pastures. Species richness at both small (10 $m^2$) and large (200 $m^2$) spatial scales increased at a greater rate in bison pastures than in cattle pastures, but richness did not change through time in ungrazed prairie. The number of annual forb species was significantly higher in bison pastures than in pastures grazed by cattle. Residual graminoid biomass at the end of the grazing season was lower in bison pastures than in cattle pastures, whereas forb residuum increased over time at a greater rate in pastures grazed by bison than in pastures grazed by cattle. Although bison and cattle differentially altered some vegetation components, the plant communities in bison and cattle pastures were 85% similar after 10 years of grazing. The study concluded that most measurable differences between bison-grazed and cattle-grazed pastures in tallgrass prairie are relatively minor, and differences in how the herbivores are typically managed may play a larger role in their impact on prairie vegetation than differences between the species.

In summary, overall direct and indirect effects common to all alternatives on vegetation by bison grazing and wallowing would be long-term and beneficial due to increased plant species diversity, forbs, structural diversity, and local heterogeneity.

For all alternatives, there would also be temporary, localized, minor adverse effects to vegetation associated with fencing upgrades and long-term, minor adverse effects to plant composition associated to the construction and temporary use of a bison handling facility every three years. The bison facility would be located on previously disturbed ground where vegetation is currently determined poor composition and low quality.

**Effects of Alternative A - The No Action Alternative / Bison in the Windmill Pasture Year-round**

Under this alternative, Bison would be reintroduced to the 1,074-acre Windmill Pasture. Bison would remain in this pasture year-round and cattle would no longer graze this area. Maximum carrying capacity for this alternative would be approximately 100 animals, with 73 animal unit equivalents (AUE)[2] as the average herd size.

Bison grazing effects are the same for all alternatives and differ only in number of acres to be removed from annual stocking of cattle to year-round grazing by bison. Alternative A- No Action would be the smallest acreage (1,074 acres) allotted to bison. Woody vegetation in Windmill Pasture is scarse and non-significant to preserve resources; therefore impacts would be negligible. However, with bison horning and rubbing behavior, particularly on saplings and shrubs, may contribute to the prevention of woody encroachment to this pasture.

[2] A 1,000 lb. cow is the standard measurement of an animal unit.

Year-round grazing by bison in the Windmill Pasture at the stocking rate proposed is determined to have direct and indirect beneficial, minor, and long-term effects.

**Cumulative Effects.** Past and present actions that have affected vegetation resources on the Preserve include cattle grazing, annual spring burning, conversion of the tallgrass prairie to agriculture, establishment of non-native hayfields, development of farmsteads, corrals, and other infrastructure. Most recently, tallgrass prairie within the Preserve was disturbed by installation of a new waterline and will be disturbed by the construction of a new visitor center and administrative and maintenance facilities. Future actions on and near the Preserve could include highway construction and maintenance, trail construction and maintenance, removal of some stock ponds, changes in land management, restoration of native bottomland prairie, and unintentional introduction of non-native species.

The implementation of a patch-burn grazing regime with bison can yield positive effects in terms of floristic diversity, structural heterogeneity, and productivity (Briggs et al. 1998, Biondini et al. 1999, Hamilton 2007). Such a pattern better mimics natural conditions and processes and better meets the Preserve's prairie management objectives (National Park Service 2000*b*, 2000*a*). Therefore, cumulative effects of bison grazing with a patch-burning fire regime would be beneficial, moderate, and long-term.

**Conclusion.** Alternative A would promote plant diversity, productivity, and landscape heterogeneity. Direct and indirect effects to vegetation would be beneficial, minor, and long-term. There would be no impairment of vegetation resources or values resulting from the implementation of Alternative A.

## Effects of Alternative B - Bison in Big Pasture Year-round

Alternative B differs from the No Action Alternative in that bison would be allowed year-round access to graze 3,711 acres, instead of 1,074 acres. Maximum carry capacity for this alternative would be approximately 300 animals, with 247 AUE's as the average herd size. Although the herd population would increase with the increase in acreage, the stocking rate would remain the same; therefore, grazing effects on the prairie plant community remain the same.

A 1.6 mile woody vegetation corridor exists along Palmer Creek (north part of Big Pasture) where horning and rubbing of woody vegetation by bison could occur. Affects analysis has determined that bison rubbing on young trees helped prevent trees from invading the prairie, but can also retard woody plant recruitment in a wooded plant community. However, this is a natural process and moderate amounts would be viewed favorably in terms of preserving park plant communities. Also, it has been determined that bison would have less adverse impact to this woodland plant community than cattle, which tend to mill around in shaded areas more so than bison. Therefore, based on current conditions of the woodland corridor along Palmer Creek, year-round bison grazing as opposed to annual cattle grazing would have beneficial and long-term effects to this plant community.

Year-round grazing by bison in Big Pasture at the stocking rate proposed is determined to have direct and indirect beneficial, minor, and long-term effects.

**Cumulative Effects.** Same as Alternative A – The No Action Alternative**.**

**Conclusion.** Alternative B would promote plant diversity, productivity, and landscape heterogeneity. Direct and indirect effects to vegetation would be beneficial, minor, and long-term. There would be no impairment of vegetation resources or values resulting from the implementation of Alternative B.

## Effects of Alternative C - Bison in Windmill and Big Pastures Year-round

Alternative C differs from the No Action Alternative in that bison would be allowed year-round access to graze 4,785 acres, instead of 1,074 acres. Maximum carrying capacity for this alternative would be approximately 500 animals, with 398 AUE's as the average herd size. Although the herd population would increase with the increase in acreage, the stocking rate would remain the same; therefore, grazing effects on the prairie plant community remain the same.

Alternative C includes the 1.6 mile woodland corridor along Palmer Creek. Impacts will be similar to those in Alternative B. It has been determined based on current conditions, that year-round bison grazing as opposed to annual cattle grazing would have beneficial and long-term effects to this plant community.

Year-round grazing by bison in Windmill and Big Pasture at the stocking rate proposed is determined to have direct and indirect beneficial, minor, and long-term effects.

**Cumulative Effects.** Same as Alternative A – The No Action Alternative**.**

**Conclusion.** Alternative C would promote plant diversity, productivity, and landscape heterogeneity. Direct and indirect effects to vegetation would be beneficial, minor to moderate, and long-term. There would be no impairment of vegetation resources or values resulting from the implementation of Alternative C.

## Effects of Alternative D - Bison in Windmill Pasture / Off-season grazing in Big Pasture

Alternative D and the No Action Alternative are similar in allowing year-round grazing by bison in the 1,074-acre Windmill Pasture. The difference between the alternatives is Alternative D would allow managers to have the option of opening the 3,711-acre Big Pasture to bison during the dormant season once cattle have been removed. As with Alternative A, the maximum carrying capacity would only be approximately 100 animals, with 73 AUE's as the average herd size. Since, herd population would remain the same, grazing effects on vegetation resources under normal conditions would be the same; therefore, direct and indirect effects to vegetation in Windmill Pasture would be beneficial, minor, and long-term effects.

However, during the years that Big Pasture would be opened to bison in the dormant season (winter months), Windmill Pasture would receive less grazing pressure for those months, since

the bison would have 4,785 acres to utilize and move around in, which equates to approximately 65 acres per animal unit. Allowing bison access into Big Pasture during the dormant season would reduce the vegetative biomass on a larger and patchier scale, thus increasing vegetative heterogeneity. In addition, bison take a relatively higher percentage of sedges in the winter/early spring than they do in the summer and early fall (although grasses continue to make up most of the diet) (Coppedge et al. 1998). Vegetative structure would be comparatively better (in regards to natural conditions) in both Windmill and Big Pastures. Compared to Alternative A, there would also be fewer impacts from trampling as supplemental feeding should not be necessary.

Bison in Windmill Pasture with the option of access to Big Pasture for winter grazing would have direct and indirect beneficial, minor to moderate, and long-term effects.

**Cumulative Effects.** Same as Alternative A – The No Action Alternative**.**

**Conclusion.** Alternative D would promote plant diversity, productivity, and landscape heterogeneity. Direct and indirect effects to vegetation would be beneficial, minor to moderate, and long-term. There would be no impairment of vegetation resources or values resulting from the implementation of Alternative D.

## WILDLIFE

### Affected Environment

About 40 mammal species occur in the Preserve (Robbins, 2005). Larger species include white-tailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), bobcat (*Felix rufus*), red fox (*Vulpes vulpes*), beaver (*Castor canadensis*), and badger (*Taxidea taxus*). Smaller mammals include the opossum (*Didelphis virginiana*) and eastern cottontail (*Sylvilagus floridanus*) as well as various squirrels, gophers, bats, moles, voles, shrews, and mice.

As many as 145 bird species frequent the area in and around the Preserve (Lichtenberg and Powell 2000). Many of these species are transient or seasonal breeders only. Some of the more notable species include the greater prairie chicken (*Tympanchus cupido*), upland sandpiper (*Bartramia longicauda*), eastern meadowlark (*Sturnella magna*), Henslow's sparrow (*Ammodramus henslowii*), and short-eared owl (*Asio flammeus*). Both the greater prairie chicken and Henslow's sparrow are species of concern in Kansas and most of the tallgrass prairie region. There are also numerous waterfowl, songbirds, raptors, and other bird species. Presently, breeding bird data is collected every three years in the project area by the Heartland Network Inventory and Monitoring Program (http://science.nature.nps.gov/im/units/htln/index.htm). Data is also collected annually by researchers and Preserve and The Nature Conservancy staff, including but not limited to Foote (2007) and Rehme (2008).

A 2004 herpetofaunal inventory noted 31 species of amphibians, reptiles, and turtles occur on the Preserve (Fogell 2004). Common amphibians include the bull frog (*Lithobates catesbeianus*), northern cricket frog (*Acris crepitans*), and plains leopard frog (*Rana blairi*). Common reptiles include the collared lizard (*Crotaphytus collaris*), great plains skink (*Eumeces obsoletus*), flathead snake (*Tantilla gracillus*), ringneck snake (*Diadophis punctatus*), and racer (*Coluber*

*constrictor*). Common turtles include the painted turtle (*Chrysemys picta*), common snapping turtle (*Chelydra serpentina*), and ornate box turtle (*Terrapene ornata*).

There is no information regarding terrestrial invertebrate species and populations on the Preserve. However, studies from the Konza Prairie in northern Kansas suggest that about 3,000 species may inhabit tallgrass ecosystems (Risser et al. 1981). Invertebrates such as grasshoppers, butterflies, and bees can play a significant, but poorly understood role in grassland ecosystems (Scott et al. 1979). Some invertebrate groups are undergoing severe and unexplained declines (U.S.D.A. 2007). Vegetation diversity and floral richness has been correlated with higher insect diversity in tallgrass prairies (Panzer and Schwartz 1998).

Thirty-eight species of fish have been collected in Fox Creek and 14 species have been collected in Palmer Creek and other unnamed creeks, including the Topeka shiner and the cardinal shiner (*Luxilis cardinalis*). The Topeka shiner is listed as an endangered species under the Endangered Species Act of 1973 and the cardinal shiner is a species of concern within Kansas. Monitoring of Fox Creek by the Kansas Department of Health and Environment found five species of unionid mussel, including the exotic Asiatic clam (*Corbicula fluminea*: Medland 1997, personal communication).

Bison were present in all counties in Kansas when the first European settlers arrived. They were gone from the Flint Hills area by the early 1870s; the last reported sightings in the state were in 1898 (Choate 1987). Other species extirpated in the vicinity of the Preserve include black bear (*Ursus americanus*), grizzly bear (*Ursus horribilis*), mountain lion (*Felis concolor*), elk (*Cervus canadensis*), gray wolf (*Canis lupus*), and pronghorn antelope (*Antilocapra americana*) among others.

Grazing, fire, and weather have many direct, indirect, and interactive effects on wildlife in tallgrass prairies (Kaufman et al. 1998, Joern 2005, Fuhlendorf et al. 2006, Hamilton 2007). These effects are incredibly complex and difficult to quantify or encapsulate. Furthermore, impacts and changes that may benefit one suite of species may have the opposite effect on another suite of species (e.g., heavy grazing). For example, Clark et al. (1989) found that grazing increased the abundance of deer mice and decreased the abundance of prairie voles (*Microtus ochrogaster*). Likewise, a few bird species reach high abundance under heavy grazing; however, a larger number of species do better under moderate or light grazing (Kaufman et al. 1998). Even individual species sometimes need a variety of impacts to meet their life history needs. For example, prairie chickens prefer tall vegetative structure for nesting, but want very short vegetative structure for courtship.

Although the effects on individual wildlife species will vary depending on the action, it is reasonable to conclude that most of the Preserve's indigenous wildlife evolved with fire and grazing and are influenced by these disturbances. If the interaction of fire and grazing creates a mosaic of habitat conditions on the landscape (e.g., patches of short early seral-stage grasses in proximity to patches of tall late-seral stage grasses) then most wildlife species should prosper (Fuhlendorf and Engle 2001, 2004, Fuhlendorf et al. 2006, Hamilton 2007). Therefore, the impact analysis for wildlife uses natural conditions and processes as a baseline for describing the direction, magnitude, and duration of impacts.

## Effects Common to All Alternatives

The reintroduction of bison to the preserve under a year-round grazing regime would affect wildlife resources in contrast to past management and in contrast to management on surrounding lands (i.e., intensive-early 'double' stocking of steers in the spring for 90 days). Year-round grazing by bison is generally better for wildlife than uniform short-duration high-intensity grazing in the spring, especially when such grazing follows a burn that removes litter and structure. Year-round grazing can be detrimental to many wildlife species if it occurs at high levels and creates a uniform habitat, but that is not anticipated with the conservative bison stocking rates proposed here. In addition to grazing impacts, bison can influence wildlife in other ways. For example, bison wallowing can provide critical habitat for some wildlife species such as frogs and toads (Gerlanc and Kaufman 2003).

Potential indirect negative impacts to wildlife under all Alternatives include disturbances associated with upgrades and maintenance of fences and gates, construction and use of the bison handling facility, and increased visitor disturbance. Most of these impacts are at the micro scale and can be mitigated by limiting the footprint, protecting erosion prone areas, and reseeding with native vegetation.

Implementation of all Alternatives in combination with a long-term prescribed fire program could have beneficial affects on wildlife resources (Howe 1994). The nature of those impacts will depend in large part on the location, extent, timing, and intensity of the fire as well as soils, weather, and the history of the site. The use of patchy fires in combination with bison grazing should have significant positive effects in terms of increasing habitat heterogeneity, which should increase wildlife diversity, distribution, and abundance (Fuhlendorf et al. 2006, Hamilton 2007). Implementation of a prescribed burn program could also increase bison recruitment and/or allow for higher stocking rates (while maintaining the same forage allocation rate).

## Effects of Alternative A - The No Action Alternative / Bison in the Windmill Pasture Year-round

Under this alternative, bison would be reintroduced to the approximate 1,074-acre Windmill Pasture. Cattle would no longer graze Windmill Pasture. Maximum carrying capacity for this alternative would be approximately 100 animals, with 73 animal unit equivalents (AUE)[3] as the average herd size.

Alternative A calls for the smallest bison population on the smallest number of acres. The relatively small area and population size may limit some of the natural movement and behavior dynamics of the bison herd.

Overall, the direct and indirect impacts on the wildlife community under this alternative would be beneficial, minor, and long-term.

[3] A 1,000 lb. cow is the standard measurement of an animal unit.

**Cumulative Effects.** Past and present actions that affected wildlife include the conversion of native tallgrass prairie to agricultural lands, construction of infrastructure, landscape fragmentation, species extirpations and extinctions, and the introduction of non-native species. Future actions that could affect wildlife on or near the Preserve include construction of a new visitor center and administrative and maintenance facilities, highway and trail construction and maintenance, watershed and stock pond development, stock pond removal, changes in land management, restoration of native bottomland prairie, and unintentional colonization by non-native species. Impacts associated with construction and maintenance of fences, gates, and the bison handling facility can be mitigated by revegetating disturbed areas, limiting the construction footprint, and timing the construction during non-reproductive periods. Also, the recent implementation of patch-burn grazing with conservative cattle stocking rates has demonstrated increased breeding bird diversity. Therefore, cumulative effects of bison grazing would be beneficial, moderate, and long-term.

**Conclusion.** Alternative A would promote wildlife diversity and population. Direct and indirect effects to wildlife would be beneficial, minor, and long-term. There would be no impairment of wildlife resources, habitat or values resulting from implementation of Alternative A.

**Effects of Alternative B - Bison in Big Pasture Year-round**

In Alternative B, bison would be reintroduced to the 3,711-acre Big Pasture. Bison would remain in this pasture year-round. Cattle would no longer graze Big Pasture. Maximum carry capacity for this alternative would be approximately 300 animals, with 247 AUE's as the average herd size.

Alternative B calls for a larger bison population in a larger pasture. The larger area and population size may improve some of the natural movement and behavior dynamics of the bison herd, however these improvements would likely not be significant.

However, the reintroduction of bison to the Big Pasture under a year-round grazing regime would affect wildlife resources in contrast to past management and in contrast to management on surrounding lands (i.e. annual double stocking of steers for 90 days). It is anticipated that there would be a slight increase in local wildlife diversity due to the presence of a year-round grazing regime and the unique impacts of bison on habitat, such as wallowing.

Overall, the direct and indirect impacts on the wildlife community under this alternative would be beneficial, minor, and long-term.

**Cumulative Effects.** Same as Alternative A – The No Action Alternative**.**

**Conclusion.** Alternative B would promote wildlife diversity and populations. Direct and indirect effects to wildlife would be beneficial, minor, and long-term. There would be no impairment of wildlife resources, habitat or values resulting from implementation of Alternative B.

**Effects of Alternative C - Bison in Windmill and Big Pastures Year-round**

In Alternative C, bison would be reintroduced to Windmill and Big Pastures year-round. Total acres available to bison would be approximately 4,785 acres. Cattle would no longer graze Windmill or Big Pasture. Maximum carrying capacity for this alternative would be approximately 500 animals, with 398 AUE's as the average herd size.

Alternative C calls for the largest bison population on the most acres proposed. The larger area and population size would improve some of the natural movement and behavior dynamics of the bison herd.

However, the reintroduction of bison to the Windmill and Big pastures under a year-round grazing regime will affect wildlife resources in contrast to past management and in contrast to management on surrounding lands. It is anticipated that there would be a slight increase in local wildlife diversity due to the presence of a year-round grazing regime and the unique impacts of bison on habitat, such as wallowing.

Overall, the direct and indirect impacts on the wildlife community under this alternative would be beneficial, minor, and long-term.

**Cumulative Effects.** Same as Alternative A – The No Action Alternative**.**

**Conclusion.** Alternative C would promote wildlife diversity and populations. Direct and indirect effects to wildlife would be beneficial, minor, and long-term. There would be no impairment of wildlife resources, habitat or values resulting from implementation of Alternative C.

**Effects of Alternative D - Bison in Windmill Pasture / Off-season grazing in Big Pasture**

Under Alternative D, bison would be reintroduced to the approximate 1,074-acre Windmill Pasture. Cattle would no longer graze Windmill Pasture. Alternative D differs from the No Action Alternative in that bison would be allowed to use Big Pasture during part of the dormant season (they will still have access to Windmill Pasture year-round). Under this alternative Big Pasture will essentially experience year-round grazing as cattle will continue to be stocked lightly during the growing season. Maximum carrying capacity for this alternative is the same for Alternative A (based on 1,074 acres) and would be approximately 100 animals, with 73 AUE's as the average herd size. The light amount of grazing in the Big Pasture should have negligible impacts on wildlife.

Overall, the impacts on the wildlife community under this alternative would be beneficial, minor, and long-term.

**Cumulative Effects.** Same as Alternative A – The No Action Alternative**.**

**Conclusion.** Alternative D would promote wildlife diversity and populations. Direct and indirect effects to wildlife would be beneficial, minor, and long-term. There would be no impairment of wildlife resources, habitat or values resulting from implementation of Alternative D.

# ENDANGERED AND THREATENED SPECIES

## Affected Environment

The Topeka shiner is the only federally- listed endangered or threatened species found at the Preserve. The bald eagle (*Haliaeetus leucocephalus*) was formerly identified in park planning documents as a listed species found at the site, but in July of 2007, the bald eagle was removed from the federal list of endangered and threatened species. The Neosho madtom (*Noturus placidus*) is a federally- listed threatened species with designated critical habitat in the Cottonwood River, of which Fox Creek is a tributary; however, it has not been found at the Preserve (National Park Service "Enhancement Report" 1998). The Preserve has habitat suitable for the American burying beetle (*Nicrophorus americanus*), an endangered insect; however, the species has not been documented at the site.

There are 15 species listed by the State of Kansas (KDWP, 3/2009) as threatened and endangered and occurring or potentially occurring in Chase County, including:

- American burying beetle *(Nicrophorus americanus)*
- bald eagle *(Haliaeetus leucocephalus)*
- Eastern spotted skunk *(Spilogale putorius*)
- eskimo curlew (*Numenius borealis*)
- flutedshell (*Lasmigona costata*)
- least tern (*Sterna antillarum*)
- Neosho madtom *(Noturus placidus)*
- Neosho mucket (*Lampsilis rafinesqueana*)
- Ouachita kidneyshell (*Ptychobranchus occidentalis*)
- peregrine falcon (*Falco peregrinus*)
- piping plover (*Charadrius melodus*)
- redspot chub (*Nocomis asper*)
- snowy plover (*Charadrius alexandrinus*)
- Topeka shiner *(Notropis topeka)*
- whooping crane (*Grus americana*).

In addition, there are 12 state-listed Species in Need of Conservation (KDWP, 3/2009) for Chase County including:

- black tern (*Chlidonias niger*)
- bobolink (*Dolichonyx oryzivorus*)
- brindled madtom (*Noturus miurus*)
- delta hydrobe (*Probythinella emarginata*)
- ferruginous hawk (*Buteo regalis*)
- golden eagle (*Aquila chrysaetos*)
- gravel chub (*Erimystax x-punctatus*)
- long-billed curlew (*Numenius americanus*)
- short-eared owl *(Asio flamneus)*
- spotted sucker (*Minytrema melanops*)
- wartyback (*Quadrula nodulata*)

- whip-poor-will (*Camprimulgus vociferous*).

The bald eagle, short-eared owl, and spotted sucker are known to occur on the Preserve.

Topeka Shiner

The Topeka shiner was listed as an endangered species under the authority of the Endangered Species Act of 1973 (ESA) on December 15, 1998 (63 FR 69008-21). The small fish has been documented in four watersheds in the Preserve. Apparently stable populations are found in two watersheds in the Windmill Pasture and individuals have been collected from other watersheds on the preserve (Peitz 2004, Mammoliti 2007). Critical habitat designation was originally proposed for the species in Kansas, but the entire state was subsequently excluded in the final rule "due to ongoing management actions, the development and implementation of State management plans for the species, State protections, and other conservation activities related to the species" (69 FR 44736-70). However, all streams in the Preserve are state-designated critical habitat for the Topeka shiner (Mammoliti 2004).

The Topeka shiner is a stout minnow, less than 3 inches in length. It prefers small to mid-size prairie streams with relatively high water quality and cool to moderate temperatures. The shiner is commonly found in intermittent streams with groundwater-maintained pools, as is the case on the Preserve. The substrate where the fish is found is usually clean gravel, cobble, or sand; however, it can be found where the bedrock or clay hardpan is overlain by a thin layer of silt. The fish usually travels in schools in the open water, preferring pools or runs. On the Preserve, there are typically few other fish species in the habitats utilized by the shiner (Peitz 2005).

The U.S. Fish and Wildlife Service stated that the action most likely "impacting the species to the greatest degree in the past is sedimentation and eutrophication (increase of minerals and organic nutrients within a body of water resulting in a decrease of dissolved oxygen) resulting from intensive agricultural development" (63 FR 69016). The Topeka shiner is sensitive to permanent changes in habitat such as reduced water quality and increased water temperature. Some researchers have found that livestock grazing, which tends to reduce and trample streamside vegetation and increase the amount of silt and sediment in streams, may affect Topeka shiner populations (Manci 1989, Zale et al. 1989, Blausey 2001).

The Flint Hills of Kansas provide some of the best remaining habitat for the Topeka shiner because there is little cultivation; however, stream impoundments and the corresponding stocking and spread of predatory fish such as largemouth bass continues to be a concern in the region (Schrank et al. 2000, Mammoliti 2002).

Other listed species

Currently, only the bald eagle, short-eared owl, and spotted sucker at documented from the preserve. Some of the species on the state list are migratory or transient (piping plover, whooping crane), and little information is known about their occurrence on the preserve. Other species occur in habitats not known to occur on the preserve, such as large river fish like the Neosho madtom, or freshwater mussels like the flutedshell.

The preserve is composed primarily of high quality upland tallgrass prairie that is likely home to some of the species listed above. The aquatic species will be subject to the same perturbations as the Topeka shiner. The terrestrial species will be subject to changes in vegetation composition and structure. Both aquatic and terrestrial habitats will be impacted by changes in grazing regimes (cattle to bison, season-long to year-round).

Presently, fish and bird data are collected annually in the project area by the Heartland Network Inventory and Monitoring Program (http://science.nature.nps.gov/im/units/htln/index.htm). Data is also collected by researchers, and Preserve staff, including but not limited to Mammoliti 2007 and Kansas State University Long-term Ecological Research (LTER) (Gido, pers. comm.).

**Effects Common to All Alternatives**

The Topeka shiner has been found in streams in Windmill and Big pastures. Bison and cattle could disturb soil along the banks of the stream and/or the stream substrates while entering or crossing the streams, resulting in increase turbidity and sediment loads. They could also urinate or defecate in the streams. However, these events are expected to localized, temporary, and inconsequential. Bison do not spend much time in riparian areas and the Topeka shiner evolved in the presence of bison (including herds that may have numbered in the tens of thousands) and are therefore able to withstand short-term disturbances to their habitat. Studies have shown that bison typically have negligible impact to aquatic biota in the tallgrass biome (Gray and Dodds 1998, Fritz et al. 1999).

The GMP—and associated biological assessment and Section 7 consultation—determined that reintroduction of bison to the Windmill Pasture, and the short-term presence of cattle in other pastures, would not likely adversely affect the Topeka shiner (and would have no effect on other listed species). This document also concludes that the alternative may affect, but is not likely to adversely affect the Topeka shiner and would have no effect on other listed species, as the terms are defined by the ESA. Although the shiner would not likely be adversely affected, as defined by the ESA, there could be short-term disturbances to individuals as a result of the alternative.

Potential negative indirect impacts to threatened and endangered species under all Alternatives include disturbances associated with upgrades and maintenance of fences and gates, construction and use of the bison handling facility, and increased visitor use. Most of these impacts are at the micro scale and can be mitigated by limiting the footprint, protecting erosion prone areas, and reseeding with native vegetation.

Implementation of the Alternatives in combination with institution of a prescribed fire program will affect vegetation, which could affect soil erosion and sediment loads in streams. However, these events are expected to be infrequent and would be most severe if a hard rain followed shortly after a fire. The Topeka shiner has evolved with both fire and grazing and is adapted to withstand such disturbances to its environment.

**Effects of Alternative A - The No Action Alternative / Bison in the Windmill Pasture Year-round**

Under this alternative, bison would be reintroduced to the approximate 1,074-acre Windmill Pasture. Cattle would no longer graze Windmill Pasture. Maximum carrying capacity for this alternative would be approximately 100 animals, with 73 animal unit equivalents (AUE)[4] as the average herd size. Bison would utilize streams and may alter terrestrial habitat (wallowing), however, these effects are likely to be at a small scale or temporary.

Overall, the impacts of bison grazing in Windmill Pasture may affect, but are not likely to adversely affect the Topeka shiner and other listed species.

**Cumulative Effects.** Past and present actions that have affected the Topeka shiner and other listed species include the conversion of tallgrass prairie to agriculture, the development of farmsteads, corrals, and other infrastructure, stock pond and watershed development, and the introduction of non-native species. Introductions of non-indigenous fish to the Preserve and surrounding localities may have especially harmful impacts. Future actions that could affect the Topeka shiner and other listed species on or near the Preserve include construction of the new visitor center and administrative and maintenance facilities, highway and trail construction and maintenance, stock pond development, changes in land management, and unintentional introduction of non-native species. Impacts associated with construction and maintenance of infrastructure can often be mitigated by altering the timing of construction, minimizing erosion during construction, limiting the construction footprint, and revegetating disturbed areas. Impacts associated with cattle and bison use of streams and riparian areas could be mitigated by revegetating disturbed areas.

**Conclusion.** Alternative A is not likely to adversely affect the Topeka shiner. Alternative A would have no effect on other listed species.

**Effects of Alternative B - Bison in Big Pasture Year-round**

In Alternative B, bison would be reintroduced to the 3,711-acre Big Pasture. Bison would remain in this pasture year-round. Cattle would no longer graze Big Pasture. Maximum carry capacity for this alternative would be approximately 300 animals, with 247 AUE's as the average herd size. Bison will utilize streams and may alter terrestrial habitat (wallowing), however these effects are likely to be at a small scale or temporary.

Overall, the impacts of bison grazing in Big Pasture may affect, but are not likely to adversely affect the Topeka shiner and other listed species.

**Cumulative Effects.** Same as Alternative A – The No Action Alternative

**Conclusion.** Alternative B is not likely to adversely affect the Topeka shiner. Alternative B would have no effect on other listed species.

[4] A 1,000 lb. cow is the standard measurement of an animal unit.

**Effects of Alternative C - Bison in Windmill and Big Pastures Year-round**

In Alternative C, bison would be reintroduced to Windmill and Big Pastures year-round. Total acres available to bison would be approximately 4,785 acres. Cattle would no longer graze Windmill or Big Pasture. Maximum carrying capacity for this alternative would be approximately 500 animals, with 398 AUE's as the average herd size. Bison will utilize streams and may alter terrestrial habitat (wallowing), however these effects are likely to be at a small scale or temporary.

Overall, the impacts of bison grazing in Windmill and Big pastures may affect, but are not likely to adversely affect the Topeka shiner and other listed species.

**Cumulative Effects.** Same as Alternative A – The No Action Alternative

**Conclusion.** Alternative C is not likely to adversely affect the Topeka shiner as defined by the Endangered Species Act. This conclusion is consistent with the park's GMP and associated biological assessment and section 7 consultation (National Park Service 2000*b*). Alternative C would have no effect on other listed species. There would be no impairment of threatened or endangered species resources or values resulting from implementation of the alternative.

**Effects of Alternative D - Bison in Windmill Pasture / Off-season grazing in Big Pasture**

Under Alternative D, bison would be reintroduced to the approximate 1,074-acre Windmill Pasture. Cattle would no longer graze Windmill Pasture. Alternative D differs from the No Action Alternative in that bison would be allowed to use Big Pasture during part of the dormant season (they will still have access to Windmill Pasture year-round). Under this alternative Big Pasture will essentially experience year-round grazing as cattle will continue to be stocked lightly during the growing season. Maximum carrying capacity for this alternative is the same for Alternative A (based on 1,074 acres) and would be approximately 100 animals, with 73 AUE's as the average herd size. Bison will utilize streams and may alter terrestrial habitat (wallowing), however these effects are likely to be at a small scale or temporary. Bison impacts would be negligible in Big Pasture.

**Cumulative Effects.** Same as Alternative A – The No Action Alternative

**Conclusion.** Alternative D would not likely adversely affect the Topeka shiner. Alternative D would have no effect on other listed species.

## SOIL

**Affected Environment**

Soils are an integral part of tallgrass ecosystems. Climate, organisms (e.g., bison, vegetation), topography, and parent material contribute to the development, condition, and function of soil (Ransom et al. 1998). The presence of large animals such as bison at moderate levels can increase soil nutrient levels and organic matter content; however, soil moisture content may decrease under grazing (Walters and Martin 2003). The affect of grazing on soil pH levels remains unclear with studies producing contradictory results (Walters and Martin 2003). At the

micro-site scale, bison dung and urine affect the distribution and composition of soil invertebrate communities (Rice et al. 1998). Conversely, soil type influences vegetation, which affects bison movements and condition, although other factors such as precipitation and fire history may affect bison more than soil type (Nellis and Briggs 1997). The lack of soil nitrogen can sometimes be a limiting factor for plants and soil microbes in tallgrass prairies (Rice et al. 1998). Likewise, the presence of soil mycorrhizal fungi can have significant impacts on composition of prairie vegetation by favoring certain species such as big bluestem (Hartnett and Wilson 1999).

A soil survey has not been conducted specifically for the Preserve. The following information comes from the Natural Resources Conservation Service (www.websoilsurvey.nrcs.usda.gov). Almost 75% of the project area is comprised of the Labette-Sogn, Clime-Sogn, and Tully soil types. These soils generally consist of silty clay loams with slopes ranging from 0-20%. Soil depths range from 4-40 inches above bedrock. None of the soil types in the project area are "hydric" although over half of the project area is "partially hydric. Soil pH averages 6.6 across the project area (range 5.8 to 7.9). The depth of the water table is greater than 78 inches for essentially 100% of the project area. About 80% of the project area is in soil wind erodibility group 7 or 8 (1 = most susceptible to wind erosion, 8 = least susceptible); the Clime-Sogn complex, which comprises about 27% of the project area, is in wind erodibility group 4. Most of the project area soils are part of the "loamy upland" ecological site. In normal years, the soils within the project site (Windmill and Big Pastures) produce about 3,860 pounds of air-dry vegetation per acre.

**Effects Common to All Alternatives**

The Preserve GMP determined that there would be no significant impacts to soil resources as a result of reintroducing bison to the preserve. Studies conducted at the Preserve suggest that grazing will increase or maintain soil nutrient levels and organic matter content, although soil moisture may be less than under ungrazed conditions (Walters and Martin 2003).

Implementation any of the Alternatives in combination with institution of a prescribed fire program could affect soil resources. However, both grazing and fire are natural processes that help develop and maintain prairie soils. For example, both processes return nutrients to the soil. Therefore, any impacts associated with fire would likely be within the range of natural variation and consistent with the NPS policy of conserving natural conditions and processes.

Potential indirect negative impacts to soils under all Alternatives include those associated with fencing and cattle crossing upgrades, construction and use of the bison handling facility, and increased visitor use. Most of these impacts are at the micro scale and can be mitigated by limiting the footprint, protecting erosion prone areas, and reseeding with native vegetation.

**Effects of Alternative A - The No Action Alternative / Bison in the Windmill Pasture Year-round**

Under this alternative, bison would be reintroduced to the approximate 1,074-acre Windmill Pasture. Cattle would no longer graze Windmill Pasture. Maximum carrying capacity for this

alternative would be approximately 100 animals, with 73 animal unit equivalents (AUE)[5] as the average herd size. Bison will affect soils by using streams and wallowing, however these effects are likely to be at a small scale or temporary.

Overall, the impacts to soils under Alternative A are expected to be beneficial, minor, and long-term. However, localized negative impacts may occur due to infrastructure development and animal husbandry practices.

**Cumulative Effects:** Past and present actions that have affected soils include the conversion of tallgrass prairie to agriculture, development of farmsteads, corrals, and other infrastructure, watershed and stock pond development, and historic and contemporary livestock grazing. Future actions that could affect soils on or near the preserve include construction of the new visitor center and administrative and maintenance facilities, highway and trail construction and maintenance, watershed and stock pond development, changes in land management, and restoration of native bottomland prairie. Impacts associated with construction and maintenance of fences, gates, and the bison handling facility can be mitigated by revegetating disturbed areas, protecting erosion prone areas, and limiting the construction footprint. The cumulative affects of Alternative A on soils would be beneficial, negligible, and long-term.

**Conclusion.** Alternative A would have beneficial, minor, and long-term affects on soils, although localized impacts could occur due to infrastructure development and other related actions. There would be no impairment of soil resources or values resulting from implementation of the alternative.

**Effects of Alternative B - Bison in Big Pasture Year-round**

In Alternative B, bison would be reintroduced to the 3,711-acre Big Pasture. Bison would remain in this pasture year-round. Cattle would no longer graze Big Pasture. Maximum carry capacity for this alternative would be approximately 300 animals, with 247 AUE's as the average herd size. Bison will affect soils by using streams wallowing, however these effects are likely to be at a small scale or temporary.

Overall, the impacts to soils under Alternative B are expected to be beneficial, minor, and long-term. However, localized negative impacts may occur due to infrastructure development and animal husbandry practices.

**Cumulative Effects:** Same as Alternative A – The No Action Alternative

**Conclusion.** Alternative B would have beneficial, minor and long-term affects on soils, although localized impacts could occur due to infrastructure development and other related actions. There would be no impairment of soil resources or values resulting from implementation of the alternative.

[5] A 1,000 lb. cow is the standard measurement of an animal unit.

**Effects of Alternative C - Bison in Windmill and Big Pastures Year-round**

In Alternative C, bison would be reintroduced to Windmill and Big Pastures year-round. Total acres available to bison would be approximately 4,785 acres. Cattle would no longer graze Windmill or Big Pasture. Maximum carrying capacity for this alternative would be approximately 500 animals, with 398 AUE's as the average herd size. Bison will affect soils by using streams and wallowing, however these effects are likely to be at a small scale or temporary.

Overall, the impacts to soils under Alternative C are expected to be beneficial, minor, and long-term. However, localized negative impacts may occur due to infrastructure development and animal husbandry practices.

**Cumulative Effects:** Same as Alternative A – The No Action Alternative

**Conclusion.** Alternative C would have beneficial, minor and long-term affects on soils, although localized impacts could occur due to infrastructure development and other related actions. There would be no impairment of soil resources or values resulting from implementation of the alternative.

**Effects of Alternative D - Bison in Windmill Pasture / Off-season grazing in Big Pasture**

Under Alternative D, bison would be reintroduced to the approximate 1,074-acre Windmill Pasture. Cattle would no longer graze Windmill Pasture. Alternative D differs from the No Action Alternative in that bison would be allowed to use Big Pasture during part of the dormant season (they will still have access to Windmill Pasture year-round). Under this alternative Big Pasture will essentially experience year-round grazing as cattle will continue to be stocked lightly during the growing season. Maximum carrying capacity for this alternative is the same for Alternative A (based on 1, 074 acres) and would be approximately 100 animals, with 73 AUE's as the average herd size. Bison will affect soils by using streams and wallowing, however these effects are likely to be at a small scale or temporary. Bison impacts would be negligible in Big Pasture.

Overall, the impacts to soils under Alternative D are expected to be beneficial, minor, and long-term. However, localized negative impacts may occur due to infrastructure development and animal husbandry practices.

**Cumulative Effects:** Same as Alternative A – The No Action Alternative

**Conclusion.** Alternative D would have beneficial, minor, and long-term affects on soils, although localized impacts could occur due to infrastructure development and other related actions. There would be no impairment of soil resources or values resulting from implementation of the alternative.

# WATER

## Affected Environment

Prairie streams and aquatic systems are extremely complex and dynamic (Gray and Dodds 1998). Stream flows can range from stable in spring and early summer to intermittent or dry in fall and winter; however, scouring floods can occur at any time of the year. Furthermore, changes in riparian and upland vegetation such as those associated with fire can also have significant affects on water resources. Yet most prairie-stream biota have evolved and adapted to the dynamic environment.

Aquatic resources within the Preserve include Fox and Palmer Creeks, 26 stock ponds, over 200 springs and seeps, and numerous unnamed intermittent creeks. Palmer Creek runs west to east through the northern end of Big Pasture and a small portion of Fox Creek runs north to south through the northeast corner of Big Pasture. Windmill pasture contains 26 documented springs and one stock pond. Big pasture contains 64 documented springs and six stock ponds.

Since 1988, Kansas Department of Health and Environment (KDHE) has been monitoring Fox and Palmer creeks bi-monthly. Initial sampling in July 1998 showed high fecal coliform and streptococcus counts in both creeks. Recent KDHE samples suggest that water quality has improved.

Kansas Department of Wildlife and Parks (KDWP) sampled both Fox and Palmer creeks (Kansas Department of Wildlife and Parks 2006). Thirty-eight species of fish were collected in Fox Creek and fourteen species were collected in Palmer Creek. Twenty-one aquatic insect families have been collected in Fox Creek and thirteen insect families have been collected in Palmer Creek. KDWP Fish Index of Biotic Integrity suggests healthy fish communities while the invertebrate data suggests impacts from nutrients and oxygen-demanding pollutants for both creeks.

Fluvial geomorphological assessments have been completed on Palmer Creek and on six unnamed intermittent tributaries (Kansas State Conservation Commission 2005; Watershed Institute, Inc. 2006; Watershed Institute, Inc. 2007*a*; Watershed Institute, Inc. 2007*b*). Three assessments, including Palmer Creek, were completed in Big Pasture and one in Windmill Pasture. All stream reaches within these pastures classified as C channel types, indicating they are slightly entrenched, with a moderate to high width/depth ratio and sinuosity. Channel material for the Big Pasture stream reaches, including Palmer Creek, was predominantly gravel with some bedrock present. Channel material for the Windmill Pasture creek was predominantly silt/clay with bedrock present.

The Preserve has 26 stock ponds (Rizzo 1998). KDWP surveys suggest some of the ponds have been stocked with largemouth bass (*Mictopterus salmoides*) (Marteney 1997, Johnson 2004). Other fish collected include green sunfish (*Lepomis cyanellus*) and bluegill (*Lepomis macrochirus*). Most of the ponds are relatively small and in good shape (Rizzo 1998). Except for two ponds, all ponds have a maximum capacity less than 100 acre-feet. Maximum capacities for ponds in Big and Windmill Pastures range from 29-75 acre-feet. None of the ponds in Big or Windmill Pastures are considered good for angling (Marteney 1997, Johnson 2004).

The Preserve has 237 documented springs (Sawin and Buchanan 2001). Kansas Geological Survey collected information on location and flow rate of these springs. Basic water chemistry analysis was conducted at seven of these springs and KDHE analyzed organic and inorganic components of the spring water at three springs. Water quality at these springs was generally extremely high (Buchanan and Sawin 2000). Most of the springs are considered intermittent. Fifty-seven percent of the springs had April flow rates estimated at one gallon per minute and sixteen percent had April flow rates estimated at five gallons per minute or more. No information has been collected on the biota associated with these springs.

The Preserve currently lacks historic long-term data on aquatic biota, water quality, hydrology, and geomorphology. However, such data is now being collected by Preserve staff and the Heartland Inventory and Monitoring Network, including but not limited to Emmert 2006 and Emmert 2007. In addition, KDHE is collecting water quality data every other month on Palmer and Fox creeks.

**Effects Common to All Alternatives**

Both bison and cattle could disturb the soil along the banks of the stream and/or the stream substrate, resulting in increase sediment loads. However, the impact from bison is expected to be negligible and localized based on studies of bison impacts of prairie streams (Fritz et al. 1999). Furthermore, prairie streams recover rapidly from short-term disturbance events (Gray and Dodds 1998). The GMP concluded that the reintroduction of bison would result in "reduced animal waste runoff during storm events, lower coliform levels, and lower nutrient concentrations in Preserve waterways" (compared to cattle: National Park Service 2000*b*). Furthermore, the presence of bison and the reduced stocking rates would allow for an increase in herbaceous vegetation in the riparian zones (in contrast to high stocking rates of cattle), which would improve water filtering and buffering during storm events.

Cattle impacts to water quality could be comparatively more severe. Cattle congregate more in riparian areas and typically spend more time in water. Impacts from cattle include high nutrient loads, increased sedimentation, bank erosion, and substrate disturbance.

Potential indirect negative impacts to water resources in both pastures under all Alternatives include impacts associated with upgrades and maintenance of fences and gates, construction and use of the bison handling facility, and impacts associated with expected higher visitor use. Some of these impacts can be mitigated by taken erosion control measures, minimizing the disturbance footprint, and altering the timing of disturbance.

Implementation of any of the Alternatives in combination with prescribed fire program could affect water resources. The nature of those impacts will depend in large part on the location, timing, and intensity of the fire. However, as a general statement it is expected that the presence of fire under this alternative will occur within the natural range of variation and should have no noticeable lasting effects on water quality.

**Effects of Alternative A - The No Action Alternative / Bison in the Windmill Pasture Year-round**

Under this alternative, bison would be reintroduced to the approximate 1,074-acre Windmill Pasture. Cattle would no longer graze Windmill Pasture. Maximum carrying capacity for this alternative would be approximately 100 animals, with 73 animal unit equivalents (AUE)[6] as the average herd size. Bison will affect water resources by using streams, springs, and ponds, however these effects are likely to be at a small scale or temporary. Bison use of these resources will include wading and disturbing sediment and urinating/defecating in streams. Despite the short-term use by bison, they do not loaf in streams to the extent cattle do, so the overall impact will be beneficial.

Overall, the impacts to water are expected to be beneficial, minor, and long-term. Many impacts would be temporary, but would sporadically occur for the life of the project.

**Cumulative Effects.** Past and present actions that have affected aquatic resources include the conversion of tallgrass prairie to agriculture, development of farmsteads, corrals, and other infrastructure, watershed and stock pond development, and historic and contemporary livestock grazing. Future actions that could affect aquatic resources on or near the preserve include construction of the new visitor center and administrative and maintenance facilities, highway and trail construction and maintenance, watershed and stock pond development, changes in land management, and restoration of native bottomland prairie. Impacts associated with construction and maintenance of fences, gates, and the bison handling facility can be mitigated by revegetating disturbed areas, protecting erosion prone areas, and limiting the construction footprint. Impacts associated with cattle and bison use of the streams and riparian areas may be mitigated through revegetating disturbed areas. The cumulative impacts are beneficial, minor, and long-term.

**Conclusion.** Overall, the impacts of Alternative A would be beneficial, minor, and long-term. There would be no impairment of water resources or values resulting from implementation of the alternative.

**Effects of Alternative B - Bison in Big Pasture Year-round**

In Alternative B, bison would be reintroduced to the 3,711-acre Big Pasture. Bison would remain in this pasture year-round. Cattle would no longer graze Big Pasture. Maximum carry capacity for this alternative would be approximately 300 animals, with 247 AUE's as the average herd size. Bison will affect water resources by using streams, springs, and ponds, however these effects are likely to be at a small scale or temporary. Bison use of these resources will include wading and disturbing sediment and urinating/defecating in streams. Despite the short-term use by bison, they do not loaf in streams to the extent cattle do, so the overall impact will be beneficial.

[6] A 1,000 lb. cow is the standard measurement of an animal unit.

Overall, the impacts to water are expected to be beneficial, minor, and long-term. Many impacts would be temporary, but would sporadically occur for the life of the project.

**Cumulative Effects:** Same as Alternative A – The No Action Alternative

**Conclusion.** Overall, the impacts from Alternative B would be beneficial, minor, and long-term. There would be no impairment of water resources or values resulting from implementation of the alternative.

**Effects of Alternative C - Bison in Windmill and Big Pastures Year-round**

In Alternative C, bison would be reintroduced to Windmill and Big Pastures year-round. Total acres available to bison would be approximately 4,785 acres. Cattle would no longer graze Windmill or Big Pasture. Maximum carrying capacity for this alternative would be approximately 500 animals, with 398 AUE's as the average herd size. Bison will affect water resources by using streams, springs, and ponds, however these effects are likely to be at a small scale or temporary. Bison use of these resources will include wading and disturbing sediment and urinating/defecating in streams. Despite the short-term use by bison, they do not loaf in streams to the extent cattle do, so the overall impact will be beneficial.

Overall, the impacts to water are expected to be beneficial, minor, and long-term. Many impacts would be temporary, but would sporadically occur for the life of the project.

**Cumulative Effects:** Same as Alternative A – The No Action Alternative

**Conclusion.** Overall, the impacts from Alternative C would be beneficial, minor, and long-term. There would be no impairment of water resources or values resulting from implementation of the alternative.

**Effects of Alternative D - Bison in Windmill Pasture / Off-season grazing in Big Pasture**

Under Alternative D, bison would be reintroduced to the approximate 1,074-acre Windmill Pasture. Cattle would no longer graze Windmill Pasture. Alternative D differs from the No Action Alternative in that bison would be allowed to use Big Pasture during part of the dormant season (they will still have access to Windmill Pasture year-round). Under this alternative Big Pasture will essentially experience year-round grazing as cattle will continue to be stocked lightly during the growing season. Maximum carrying capacity for this alternative is the same for Alternative A (based on 1, 074 acres) and would be approximately 100 animals, with 73 AUE's as the average herd size. Bison will affect water resources by using streams, springs, and ponds, however these effects are likely to be at a small scale or temporary. Bison use of these resources will include wading and disturbing sediment and urinating/defecating in streams. Despite the short-term use by bison, they do not loaf in streams to the extent cattle do, so the overall impact will be beneficial. Bison impacts would be negligible in Big Pasture.

Overall, the impacts to water are expected to be beneficial, minor, and long-term. The presence of bison in the pastures would have positive effects. Many impacts would be temporary, but would sporadically occur for the life of the project.

**Cumulative Effects:** Same as Alternative A – The No Action Alternative

**Conclusion.** Alternative D would have impacts on water quality that are likely to be beneficial, minor, and long-term. There would be no impairment of water resources or values resulting from implementation of the alternative.

# PRESERVE OPERATIONS

## Affected Environment

Preserve operations, for the purpose of this analysis, refers to the staffing and budget in terms of quality and effectiveness of maintaining the Preserve's infrastructure and implementing management plans to ensure adequate protection of resources and to provide for an effective visitor experience. Preserve operations are not considered a resource protected by the Organic Act and therefore, do not warrant consideration for impairment.

Tallgrass Prairie National Preserve has staff onsite who provide the functions and activities necessary to accomplish current management objectives including resource protection and management, visitor services, interpretation and education, and maintenance. The Natural Resource staff is responsible for managing and protecting natural resources including future bison management. Current Natural Resource staff includes one full-time program manager and two temporary GS-05 biological technicians.

Current preserve staffing is depicted in the organization chart below:

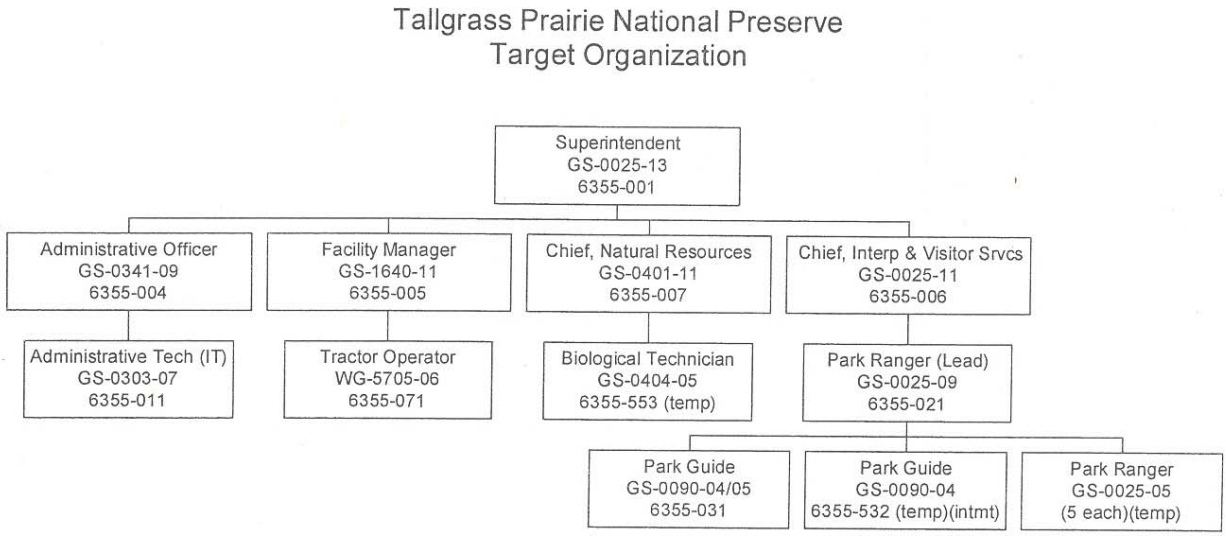


**Figure 6. NPS Personnel Chart**

The Nature Conservancy owns in fee approximately 95% of the land within the Preserve boundary. Most of the preserve is leased for cattle ranching with the lessee responsible for caring for the cattle and minor infrastructure maintenance associated with the cattle operation. TNC has two onsite employees with approximately 10 - 15% of their time allocated to preserve operations under a Cooperative Agreement outlining the NPS-TNC partnership. TNC has other

properties, conservation easements, and projects throughout Kansas that also require personnel time.

**Effects Common to All Alternatives**

No matter the alternative, operational activities associated with bison reintroduction and management are numerous ranging from developing a Bison Management Plan to constructing appropriate fence and a handling facility. Routine or periodically scheduled activities include fence and handling facility maintenance, forage and mineral supplementation, monitoring and observational checks, doctoring and removal, round-ups, and dealing with escapes or hazard animals. A roundup would be scheduled every third year to reduce herd size and process animals. Current staffing, between TNC and NPS, is adequate for all immediate program oversight, but the immediate on-the-ground care for the bison and infrastructure would require adding a caretaker position. Other parks and preserves with bison, typically have a wildlife biologist or range management specialist for technical program support. In addition, they have ranger or back country staff to help with visitor safety. The amount of staff time and budget required are further discussed under each alternative.

In summary, overall direct and indirect effects common to all alternatives on preserve operations (staff and budget) would be adverse, minor to moderate and long-term due to an increased need of personnel time and cost required managing and overseeing the bison program.

**Effects of Alternative A - The No Action Alternative / Bison in the Windmill Pasture Year-round**

Bison would be reintroduced to the 1,074-acre Windmill Pasture. Maximum carrying capacity for this alternative would be approximately 100 animals, with 73 animal unit equivalents (AUE)[7] as the average herd size.

Fencing around Windmill Pasture is adequate for containing cattle, but would require an electric wire offset between the second and third wire. Approximately six miles of fence would require this additional wire and routine maintenance. A handling facility would be constructed. A bison caretaker would be hired.

Of all the alternatives, Alternative A would have the least adverse impact to preserve operations (staff and budget) because it is the smallest herd located on the smallest acreage, therefore requiring less time handling and culling fewer animals, fewer miles of fence to check and repair, and smallest handling facility. A part-time caretaker would be hired. Alternative A is determined to have direct and indirect adverse, minor long-term effects.

**Cumulative Effects.** Past and present actions that have affected preserve operations (staff and budget) include the development of hiking trails and fishing opportunities. Last year three ponds were opened for public fishing. This summer fishing opportunities were expanded on Fox Creek, 5 miles of new hiking trails were developed, visitation hours were extended, and bus tour fees

[7] A 1,000 lb. cow is the standard measurement of an animal unit.

discontinued. All of these actions have affected visitation and preserve operations in terms of staffing demands and budget allocation. In addition to the reintroduction of bison, future actions may include providing more back-country experiences with additional hiking trails, fishing and possibly camping. Also, a visitor center is to be constructed in the near future.

In summary, bison reintroduction under Alternative A in combination with increased visitor use and experience opportunities would demand more staffing and budget. Therefore, cumulative effects of Alternative A on preserve operations would likely be long-term, adverse, and minor.

**Conclusion.** Direct, indirect, and cumulative effects to preserve operations would be long-term, adverse, and minor. Impairment of resources and resource values is not analyzed for this impact topic.

**Effects of Alternative B - Bison in Big Pasture Year-round**

Alternative B differs from Alternative A in that bison would be allowed year-round access to graze 3,711 acres instead of 1,074 acres. Maximum carry capacity for this alternative would be approximately 300 animals, with 247 AUE's as the average herd size.

Fencing improvements would include replacing approximately 4.5 miles of fence as well as installing an electric wire offset between the second and third wire along the pasture's periphery, which is approximately 11 miles of fence line. A handling facility would be constructed. A bison caretaker would be hired.

Alternative B is approximately three times the herd size and acreage of Alternative A requiring more animal care and oversight. Roundups and processing of more animals mean more time and expense. Eleven miles of fence with more water gaps would need routine checking and maintenance compared to six miles. The handling facility would be larger to accommodate approximately 300 animals instead of 100. A part-time caretaker would be hired and would require some assistance from current staff. Alternative B is determined to have direct and indirect adverse, moderate long-term effects.

**Cumulative Effects.** Past and present actions that have affected preserve operations (staff and budget) include the development of hiking trails and fishing opportunities. Last year three ponds were opened for public fishing. This summer fishing opportunities were expanded on Fox Creek, 5 miles of new hiking trails were developed, visitation hours were extended, and bus tour fees discontinued. All of these actions have affected visitation and preserve operations in terms of staffing demands and budget allocation. In addition to the reintroduction of bison, future actions may include providing more back-country experiences with additional hiking trails, fishing and possibly camping. Also, a visitor center is to be constructed in the near future.
In summary, bison reintroduction under Alternative B in combination with increased visitor use and experience opportunities would demand more staffing and budget. Therefore, cumulative effects of Alternative B on preserve operations would likely be long-term, adverse, and moderate.

**Conclusion.** Direct, indirect, and cumulative effects to preserve operations would be long-term, adverse, and moderate. Impairment of resources and resource values is not analyzed for this impact topic.

**Effects of Alternative C - Bison in Windmill and Big Pastures Year-round**

Alternative C differs from Alternative A in that bison would be allowed year-round access to graze 4,785 acres, instead of 1, 074 acres. Maximum carrying capacity for this alternative would be approximately 500 animals, with 398 AUE's as the average herd size.

Fencing requirements would be both Alternative A and B combined. Windmill Pasture, the smaller of the two, would require the upgrade of installing an electric wire offset between the second and third wire on the existing fence. Whereas, Big Pasture fence would need approximately 4.5 miles of fence replaced, in addition to installing the electric wire offset. There would be 13 total miles of fence line. A handling facility would be constructed. A bison caretaker would be hired.

Alternative C is approximately four times the herd size and acreage of Alternative A and 100 head and 1,000 acres bigger than Alternative B. This is the largest bison herd and management area proposed. A larger handling facility would be required and a full-time caretaker would need to be hired to sustain a successful bison program. Alternative C is determined to have direct and indirect adverse, moderate long-term effects.

**Cumulative Effects.** Past and present actions that have affected preserve operations (staff and budget) include the development of hiking trails and fishing opportunities. Last year three ponds were opened for public fishing. This summer fishing opportunities were expanded on Fox Creek, 5 miles of new hiking trails were developed, visitation hours were extended, and bus tour fees discontinued. All of these actions have affected visitation and preserve operations in terms of staffing demands and budget allocation. In addition to the reintroduction of bison, future actions may include providing more back-country experiences with additional hiking trails, fishing and possibly camping. Also, a visitor center is to be constructed in the near future.

In summary, bison reintroduction under Alternative C in combination with increased visitor use and experience opportunities would demand more staffing and budget. Therefore, cumulative effects of Alternative C on preserve operations would likely be long-term, adverse, and moderate.

**Conclusion.** Direct, indirect, and cumulative effects to preserve operations would be long-term, adverse, and moderate. Impairment of resources and resource values is not analyzed for this impact topic.

**Effects of Alternative D - Bison in Windmill Pasture / Off-season grazing in Big Pasture**

This alternative is similar to Alternative A in that the same number of bison would be located in the 1,074-acre Windmill Pasture; however, the bison herd would have access to the 3,711-acre Big Pasture during the winter months. Maximum carrying capacity would remain at approximately 100 animals, with 73 AUEs as the average herd size.

Fencing requirements would be the same as Alternative C. Windmill Pasture, the smaller of the two, would require the upgrade of installing an electric wire offset between the second and third wire on six miles of fence. Big Pasture fence would need approximately 4.5 miles of fence replaced, in addition to installing the electric wire offset on approximately 13 miles of fence. This Alternative would require additional handling or moving of bison between Windmill and Big Pasture. A part-time caretaker would be hired and would require some assistance from current staff. Alternative D is determined to have direct and indirect adverse, moderate long-term effects.

**Cumulative Effects.** Past and present actions that have affected preserve operations (staff and budget) include the development of hiking trails and fishing opportunities. Last year three ponds were opened for public fishing. This summer fishing opportunities were expanded on Fox Creek, 5 miles of new hiking trails were developed, visitation hours were extended, and bus tour fees discontinued. All of these actions have affected visitation and preserve operations in terms of staffing demands and budget allocation. In addition to the reintroduction of bison, future actions may include providing more back-country experiences with additional hiking trails, fishing and possibly camping. Also, a visitor center is to be constructed in the near future.

In summary, bison reintroduction under Alternative D in combination with increased visitor use and experience opportunities would demand more staffing and budget. Therefore, cumulative effects of Alternative D on preserve operations would likely be long-term, adverse, and moderate.

**Conclusion.** Direct, indirect, and cumulative effects to preserve operations would be long-term, adverse, and moderate. Impairment of resources and resource values is not analyzed for this impact topic.

## CULTURAL RESOURCES

### Affected Environment

Multiple overlapping cultural resources occur at Tallgrass Prairie National Preserve and are specifically called out for protection and preservation in the Preserve's enabling legislation. The entire preserve is a designated National Historic Landmark, which technically means that all cultural resources that contribute to the Landmark significance and theme are eligible for the National Register of Historic Places and thus subject to compliance with section 106 of the National Historic Preservation Act. Other historic properties on the Preserve may be eligible for the National Register of Historic Places, but have not been evaluated for significance. Within the affected environment there are cultural resources consisting of archeological sites, portions of a cultural landscape, and historic structures. It is important to note that cultural resources are often intrinsically intertwined, for example, historic structures are a contributing element of the cultural landscape and may have an archeological component.

An archeological overview and assessment was completed for the Preserve in 1999 (Jones 1999) which documented reconnaissance survey results for the site. Twelve archeological sites were documented. Two sites fall within the Alternative A project area, and an additional three sites fall within the Alternative B project area. Alternatives C and D would contain all of the

following sites for total of five sites. The following information regarding archeological sites was obtained from Jones (1999):

- 14CS00107 consists of the remains of an historic farmstead which dates to between 1870 and 1938;

- 14CS00108 is a large prehistoric quarry and lithic workshop that was not dated due to a lack of diagnostic artifacts;

- 14CS00110 consists of the remains a farmstead evidenced by depressions and dry-laid masonry rubble. No date has been determined for this site;

- 14CS00405 is a large prehistoric lithic quarry and workshop which has been dated to between AD 1-950 and which has the potential for intact subsurface deposits;

- 14CS406 consists of a small prehistoric lithic workshop, which did not yield diagnostic artifacts and thus was not dated.

A cultural landscape report was completed for Tallgrass Prairie National Preserve in 2004 and describes the contributing elements of the built environment, which convey the significance of the landscape (Bahr Vermeer Architects, et al. 2004). The report describes various aspects of the built environment and notes that the viewsheds are of particular importance given the wide-open spaces, which characterize much of the preserve. Within the bison reintroduction area, managed viewsheds, historic stone fencing, and patterns of spatial organization (pasture delineation, road patterning etc.) are called out as significant in the cultural landscape report.

The only known historic structures within the bison reintroduction area are those associated with the archeological sites described above and stone fencing which is described in the cultural landscape report.

**Effects Common to All Alternatives**

14CS00107 is near the proposed handling facility location and will be avoided. An archeological investigation in and around 14CS00107 failed to yield significant archeological materials but recommended that the site be retained as an element of the cultural landscape. That investigation determined a boundary for 14CS00107 and construction of the facility and an access road will outside the boundary (Roop 2009). It should be noted that for all cultural resources in all alternatives, the number of bison will be much less than the number of cattle currently grazing in the proposed pastures.

**Effects of Alternative A - The No Action Alternative / Bison in the Windmill Pasture Year-round**

Bison will be confined to the Windmill Pasture and cattle will be in the Big Pasture during the growing season.

Bison reintroduction would likely have long-term, minor negative impacts to a portion of one archeological site (14CS00108) via trampling and possible wallowing The cultural landscape at

the preserve would have long-term minor effects from fence fortification to accommodate bison. Fence fortification would run along existing barbed wire fence lines and would not be a significant change to the cultural landscape. No stone fencing would be affected by bison in this alternative. Bison, along with prescribed fire may have long-term, minor, beneficial effects due to enhancement of one of the defining characteristics of the landscape, notably the natural prairie. None of these effects would diminish the overall integrity of the cultural resources.

**Cumulative Effects.** Overall, the impacts would be negative, minor, and long-term. There would be no impairment of cultural resources or values resulting from implementation of the alternative.

**Conclusion.** Implementation of Alternative A would have long-term minor negative impacts to a portion of one archeological site, portions of the cultural landscape - including and specifically stone fences and viewsheds. This alternative is the baseline and the GMP also concluded that no significant impacts to cultural resources would occur under this alternative. If implemented, this Alternative would require fencing to take into account protection of stone fences and viewsheds to minimize impacts.

**Effects of Alternative B - Bison in Big Pasture Year-round**

Implementation of Alternative B would complete the action called for in the GMP for the Preserve (National Park Service 2000*b*) however, the alternative does differ from that baseline. Under Alternative B bison will be confined to Big Pasture and cattle will be in Windmill Pasture during the growing season.

Bison reintroduction would likely have long-term, moderate negative impacts to four archeological sites via trampling and possible wallowing. 2 miles of stone fence would be excluded from bison by barbed wire fencing. 1 mile of stone fence in the interior of the pasture would not excluded from bison and would have long-term moderate negative effects from bison trampling and possibly rubbing against the walls. None of these effects would diminish the overall integrity of the cultural resources. Bison, along with prescribed fire may have long-term, minor, beneficial effects due to enhancement of one of the defining characteristics of the landscape, notably the natural prairie.

**Cumulative Effects.** Overall, the impacts would be negative, moderate, and long-term. There would be no impairment of cultural resources or values resulting from implementation of the alternative.

**Conclusion.** Implementation of Alternative B would have long-term moderate negative impacts to four archeological sites, portions of the cultural landscape - including and specifically stone fences and viewsheds. If implemented, this Alternative would require fencing to take into account protection of exterior stone fences and viewsheds to minimize impacts.

**Effects of Alternative C - Bison in Windmill and Big Pastures Year-round**

Implementation of Alternative C would complete the action called for in the GMP for the Preserve (National Park Service 2000*b*) however, the alternative does differ from that baseline.

Under Alternative C bison will be confined to Windmill and Big Pastures and cattle will not be in either pasture.

Bison reintroduction would likely have long-term, moderate negative impacts to four archeological sites via trampling and possible wallowing. 3.5 miles of stone fence would be excluded from bison by barbed wire fencing. 1 mile of stone fence in the interior of the pasture would not excluded from bison and would have long-term moderate negative effects from bison trampling and possibly rubbing against the walls. None of these effects would diminish the overall integrity of the cultural resources. Bison, along with prescribed fire may have long-term, minor, beneficial effects due to enhancement of one of the defining characteristics of the landscape, notably the natural prairie.

**Cumulative Effects.** Overall, the impacts would be negative, moderate, and long-term. There would be no impairment of cultural resources or values resulting from implementation of the alternative.

**Conclusion.** Implementation of Alternative C would have long-term moderate negative impacts to four archeological sites, portions of the cultural landscape - including and specifically stone fences and viewsheds. If implemented, this Alternative would require fencing to take into account protection of stone fences and viewsheds to minimize impacts.

**Effects of Alternative D - Bison in Windmill Pasture / Off-season grazing in Big Pasture**

Implementation of Alternative D would complete the action called for in the GMP for the Preserve (National Park Service 2000*b*) however, the alternative does differ from that baseline. The bison will graze Windmill year around and have access to Big Pasture during the off-season. Cattle will continue to graze Big Pasture during the growing season.

Bison reintroduction would likely have long-term, moderate negative impacts to four archeological sites via trampling and possible wallowing. 3.5 miles of stone fence would be excluded from bison by barbed wire fencing. 1 mile of stone fence in the interior of the pasture would not excluded from bison and would have long-term moderate negative effects from bison trampling and possibly rubbing against the walls. None of these effects would diminish the overall integrity of the cultural resources. Bison, along with prescribed fire may have long-term, minor, beneficial effects due to enhancement of one of the defining characteristics of the landscape, notably the natural prairie.

**Cumulative Effects.** Overall, the impacts would be negative, moderate, and long-term. There would be no impairment of cultural resources or values resulting from implementation of the alternative.

**Conclusion.** Implementation of Alternative C would have long-term moderate negative impacts to four archeological sites, portions of the cultural landscape - including and specifically stone fences and viewsheds. If implemented, this Alternative would require fencing to take into account protection of stone fences and viewsheds to minimize impacts.

# VISITOR USE AND EXPERIENCE

## Affected Environment

A range of visitor experience goals has been developed for the Preserve in an effort to guide park development and programming. One goal is to provide a variety of opportunities for the visitor to experience the prairie and prairie landscape. These opportunities include for the visitor to experience quiet and solitude, scenic prairie views, the relationship of earth and sky, wildlife, the multitude of flowering and other native plants, and the effects of various regimes of fire and grazing animals. Bison would be an important element not only for their historic role within the tallgrass prairie ecosystem, but also in meeting the visitor's expectations and thoughts about the prairie. Today, visitors to the Preserve observe cattle as part of the tallgrass scenery.

Visitor access to the prairie is offered daily by ranger-guided bus tours and designated hiking trails (Figure 4). Both the bus tour route and three hiking trails directly pass through Windmill Pasture and extend into Big Pasture, which accommodate all alternatives. Since opening trails to hikers in August 2005, approximately 4,000 people have ventured onto the prairie landscape. Over 34,000 visitors since 1997 (12 years), have experienced the ranger guided bus tours of the grassland prairie.

## Effects Common to All Alternatives

Visitors would continue to have access to the entire preserve as they do now. The bus tour route and current hiking trails would remain the same with more trails added in the future. Hiking would be available through all proposed bison pastures. Additional trails are located outside the proposed bison areas. Current interpretive and educational programs would remain the same with additional programming added for the ecological, cultural, and historical aspects of bison. Backcountry camping is suggested in the GMP and is a future possibility. No matter the alternative, visitors would have opportunity to see bison in a tallgrass prairie setting on the preserve. Each alternative may provide somewhat slightly different viewing opportunities and are discussed below. Visitor safety would be ensured through adequate staffing, appropriate infrastructure, interpretation and educational literature and programming, and emergency response capabilities.

In summary, direct and indirect effects common to all alternatives on visitor use and experience as a result of bison reintroduction would be short- and long-term and beneficial.

## Effects of Alternative A - The No Action Alternative / Bison in the Windmill Pasture Year-round

Bison would be reintroduced to the 1,074-acre Windmill Pasture. Maximum carrying capacity for this alternative would be approximately 100 animals, with 73 animal unit equivalents (AUE)[8] as the average herd size.

[8] A 1,000 lb. cow is the standard measurement of an animal unit.

Visitors would be able to view almost daily a small herd of bison in a tallgrass prairie setting of 1, 074 acres. Both tour bus and hiking trails would allow viewing opportunities. Windmill pasture is the closest pasture to the historic ranch headquarters, which is the primary access to the preserve. Alternative A is determined to have short- and long-term beneficial direct and indirect effects on visitor use and experience.

**Cumulative Effects.** Past and present actions that have affected visitor use and experiences at the Preserve include quality ranger-led prairie bus tours and interpretive programs, the development of hiking trails, and providing fishing opportunities. In addition to the reintroduction of bison to the tallgrass prairie, future actions may include limited low-impact camping. Also, a visitor center is to be constructed.

Overall, as more visitor use and experience opportunities increase, visitation to the Preserve is likely to increase. Therefore, cumulative effects of Alternative A on visitor experience would likely be beneficial, moderate, and long-term.

**Conclusion.** Direct, indirect, and cumulative effects to visitor use and experience would be short- and long-term, minor, and beneficial.

### Effects of Alternative B - Bison in Big Pasture Year-round

Alternative B differs from Alternative A in that bison would be allowed year-round access to graze 3,711 acres, instead of 1, 074 acres. Maximum carry capacity for this alternative would be approximately 300 animals, with 247 AUE's as the average herd size.

Visitors would be able to view bison in a tallgrass prairie setting of 3, 711 acres. A small segment of the bus tour and three backcountry hiking trails run through Big Pasture so visitors would have opportunity to observe bison. Although, the opportunity to view bison on a daily basis decreases on the bus tour, hikers would have many opportunities to see the bison herd as they venture further north. Alternative B is determined to have short- and long-term beneficial direct and indirect effects on visitor use and experience.

**Cumulative Effects.** Same as Alternative A – The No Action Alternative. Therefore, cumulative effects of Alternative B on visitor experience would likely be beneficial, moderate, and long-term.

**Conclusion.** Direct, indirect, and cumulative effects to visitor use and experience operations would be short- and long-term, minor, and beneficial.

### Effects of Alternative C - Bison in Windmill and Big Pastures Year-round

Alternative C differs from Alternative A in that bison would be allowed year-round access to graze 4,785 acres, instead of 1, 074 acres. Maximum carrying capacity for this alternative would be approximately 500 animals, with 398 AUE's as the average herd size.

Visitors would be able to view bison in a tallgrass prairie of 4,785 acres. The bus tour and hiking trails cross Windmill Pasture and a small segment of the bus tour and three backcountry hiking

trails go through Big Pasture allowing visitors opportunity to observe bison. If the bison are located north of the bus tour route, the opportunity to see bison on a daily basis decreases. However, due to the increased size of the herd, hikers would have many opportunities to see bison. Alternative C is determined to have short- and long-term beneficial direct and indirect effects on visitor use and experience.

**Cumulative Effects.** Same as Alternative A – The No Action Alternative. Therefore, cumulative effects of Alternative C on visitor use and experience would likely be beneficial, moderate, and long-term.

**Conclusion.** Direct, indirect, and cumulative effects to visitor use and experience operations would be short- and long-term, moderate, and beneficial.

### Effects of Alternative D - Bison in Windmill Pasture / Off-season grazing in Big Pasture

Alternative D and Alternative A are similar in allowing year-round grazing by bison in the 1,074-acre Windmill Pasture. The difference between the alternatives is Alternative D would allow managers to have the option of opening the 3,711-acre Big Pasture to bison during the winter months. As with Alternative A, the maximum carrying capacity would only be approximately 100 animals, with 73 AUE's as the average herd size.

Visitors would be able to view a small herd of bison in 1, 074 acres most of the time year-round. However, if managers were to allow bison into Big Pasture during the winter months the herd would be less visible, making viewing opportunities to be less certain.
Both tour bus and hiking trails would allow viewing opportunities of the herd. Windmill pasture is the closest pasture to the historic ranch headquarters, which is the primary access to the preserve. Alternative B is determined to have short- and long-term beneficial direct and indirect effects on visitor use and experience.

**Cumulative Effects.** Same as Alternative A – The No Action Alternative. Therefore, cumulative effects of Alternative D on visitor use and experience would likely be beneficial, moderate, and long-term.

**Conclusion.** Direct, indirect, and cumulative effects to visitor use and experience operations would be short- and long-term, moderate, and beneficial.

## NEIGHBORING LANDS AND OPERATIONS

### Affected Environment

Land surrounding the preserve is privately owned and primarily used for cattle grazing purposes. A few properties graze cow-calf pairs year-round, but for the most part, short duration double stocking of yearling steers is predominant.

Neighboring lands and operations, for the purpose of this analysis, refers to the potential impacts to neighbors due to inadvertent bison trespassing on to their land. This impact topic is not considered a resource protected by the Organic Act and therefore, does not warrant consideration for impairment.

## Effects Common to All Alternatives

All alternatives require appropriate sound infrastructure to properly contain and manage bison. The difference between the alternatives is the size of each pasture and the differing landowners who border each proposed pasture. All fencing would be a five strand barbed-wire fence with an electric wire offset between the second and third wires.

Daily or routine operational activities include monitoring and observational checks of the bison herd as well as checking all fences. All bison would be tested and certified disease free. In addition, all bison would be considered genetically free from any cattle gene introgression. A qualified caretaker would be hired to do the operational activities and a veterinarian would be hired for any medical and genetic requirements.

In summary, overall direct and indirect effects common for all alternatives on neighboring operations would be negligible.

## Effects of Alternative A - The No Action Alternative / Bison in the Windmill Pasture Year-round

Bison would be reintroduced to the 1,074-acre Windmill Pasture. Maximum carrying capacity for this alternative would be approximately 100 animals, with 73 animal unit equivalents (AUE)[9] as the average herd size.

Bison would be directly adjacent to one neighboring landowner on the west side of Windmill Pasture. The other three sides would be bound by preserve property that is annually leased for cattle grazing. Past stocking history on all areas has been steers and is likely to continue to be steers, practically eliminating the risk of cattle gene introgression into the bison herd as well as brucellosis transmission from bison to cattle between the preserve and the west neighbor. All bison would be tested and certified disease free.

Of all the alternatives, Alternative A has the least potential to impact neighboring lands and operations since the area borders one neighbor, whereas the other three alternative pastures border three additional neighbors. Alternative A proposes the smallest herd on the smallest acreage, which lessens the potential for escapes. In the event of an escaped bison onto neighboring property, temporary access to property to retrieve bison would be requested and could possibly suspend daily operations temporarily. Based on past history with cattle escapes and retrieval with this neighbor and the current preserve lessee, direct and indirect effects to this neighbor would be adverse, negligible to minor, and short-term.

**Cumulative Effects.** Past and present actions that have affected neighboring lands and operations include fence repair and construction, annual prescribed burning, invasive tree and non-native plant management, and the expansion of visitor opportunities including backcountry

[9] A 1,000 lb. cow is the standard measurement of an animal unit.

trails and fishing. Implementation of Alternative A, in combination with the tasks identified above would likely have negligible to minor, adverse, short-term effects on neighboring lands and operations.

**Conclusion.** Direct, indirect, and cumulative effects to neighboring lands and operations would be short-term, adverse, and negligible to minor. Impairment of resources and resource values is not analyzed for this impact topic.

### Effects of Alternative B - Bison in Big Pasture Year-round

Alternative B differs from Alternative A in that bison would be allowed year-round access to graze 3,711 acres, instead of 1, 074 acres. Maximum carry capacity for this alternative would be approximately 300 animals, with 247 AUE's as the average herd size.

Bison would be directly adjacent to four neighboring lands to the west, north, and east. The south boundary is bound by preserve property, which is leased for grazing annually. Past stocking history has been steers to the west, east, and to the south by the lessee. To the north is a cow-calf/heifer cattle operation. There is a very small risk with cattle gene introgression into the bison herd and brucellosis transmission from bison to cattle with the neighbor to the north. All bison would be tested and certified disease free. Past history of preserve cattle mixing with the neighbor to the north has been minimal. In the event of an escaped bison onto neighboring property, temporary access to property to retrieve bison would be requested and could possibly suspend daily operations temporarily. Alternative B is determined to have minor, short-term, adverse direct and indirect effects to neighboring lands and operations.

**Cumulative Effects.** Past and present actions that have affected neighboring lands and operations include fence repair and construction, annual prescribed burning, invasive tree and non-native plant management, and the expansion of visitor opportunities including backcountry trails and fishing. Implementation of Alternative A, in combination with the tasks identified above would likely have negligible to minor, adverse, short-term effects on neighboring lands and operations.

**Conclusion.** Direct, indirect, and cumulative effects to neighboring lands and operations would be short-term, adverse, and negligible to minor. Impairment of resources and resource values is not analyzed for this impact topic.

### Effects of Alternative C - Bison in Windmill and Big Pastures Year-round

Alternative C differs from Alternative A in that bison would be allowed year-round access to graze 4,785 acres, instead of 1,074 acres. Maximum carrying capacity for this alternative would be approximately 500 animals, with 398 AUE's as the average herd size.

Bison would be directly adjacent to four neighboring lands to the west, north, and east. The south boundary is bound by preserve property. Past stocking history has been steers to the west, east, and to the south by the lessee. To the north is a cow-calf/heifer cattle operation. There is a very small risk with cattle gene introgression into the bison herd and brucellosis transmission

from bison to cattle with the neighbor to the north. All bison would be tested and certified disease free. Past history of preserve cattle mixing with the neighbor to the north has been minimal. In the event of an escaped bison onto neighboring property, temporary access to the property to retrieve bison would be requested and could possibly suspend daily operations temporarily. Alternative B is determined to have minor, short-term, adverse direct and indirect effects to neighboring lands and operations.

**Cumulative Effects.** Past and present actions that have affected neighboring lands and operations include fence repair and construction, annual prescribed burning, invasive tree and non-native plant management, and the expansion of visitor opportunities including backcountry trails and fishing. Implementation of Alternative A, in combination with the tasks identified above would likely have negligible to minor, adverse, short-term effects on neighboring lands and operations.

**Conclusion.** Direct, indirect, and cumulative effects to neighboring lands and operations would be short-term, adverse, and negligible to minor. Impairment of resources and resource values is not analyzed for this impact topic.

**Effects of Alternative D - Bison in Windmill Pasture / Off-season grazing in Big Pasture**

This alternative is similar to Alternative A in that the same number of bison would be located in the 1,074-acre Windmill Pasture during the growing season (mid-April through September); however, the bison would have access to the 3,711-acre Big Pasture during the dormant/off-season months. Maximum carrying capacity would be approximately 100 animals, with 73 AUEs as the average herd size.

For the most part, bison would remain in Windmill Pasture unless conditions warrant the use of Big Pasture for three or four months during the winter. As with Alternative A, Windmill Pasture is adjacent to one neighboring landowner on the west side. The other three sides are bound by preserve property that is annually leased for cattle grazing. On the rare occasion that bison would be allowed in Big Pasture, as with Alternatives B and C, three neighbors exist to the north and east. Although grazing time would be limited, there would still be a very small risk of potential cattle gene introgression into the bison herd and brucellosis transmission from bison to cattle to the neighbor to the north. All bison would be tested and certified disease free. Past history of preserve cattle mixing with the neighbor to the north has been minimal. In the event of an escaped bison onto any neighboring property, temporary access to the property to retrieve bison would be requested and could possibly suspend daily operations temporarily. Alternative D is determined to have minor, short-term, adverse direct and indirect effects to neighboring lands and operations.

**Cumulative Effects.** Past and present actions that have affected neighboring lands and operations include fence repair and construction, annual prescribed burning, invasive tree and non-native plant management, and the expansion of visitor opportunities including backcountry trails and fishing. Implementation of Alternative A, in combination with the tasks identified above would likely have negligible to minor, adverse, short-term effects on neighboring lands and operations.

**Conclusion.** Direct, indirect, and cumulative effects to neighboring lands and operations would be short-term, adverse, and negligible to minor. Impairment of resources and resource values is not analyzed for this impact topic.

# CONSULTATION AND COORDINATION

The proposal to reintroduce bison to Tallgrass Prairie National Preserve was initially considered in the late 1990s as part of the planning and development process for the Preserve's GMP. As part of that process, the Preserve issued scoping letters to the affected Tribes, the State Historic Preservation Officer, relevant state agencies, the U.S. Fish and Wildlife Service, and other parties. A ROD was signed December 5, 2000 that call for the reintroduction of bison to the Preserve. Funding constraints, staffing, other priorities, and a change in partners delayed action until late 2007 when this plan/environmental assessment was initiated. When the draft plan/environmental assessment is released to the public for review, the Preserve will host an open house to present information about the plan, answer questions, and take comments.

The legislation authorizing the Preserve provides explicit guidance in regards to consultation. The Nature Conservancy has assumed the role of primary partner, originally held by the National Park Trust. They have been a partner in all phases of Preserve management, including the development of this bison management plan/environmental assessment. The authorizing legislation for the Preserve established an Advisory Committee that was a significant player in development of the GMP. The legislation also explicitly stated that in preparing the GMP the National Park Service shall consult with *"adjacent landowners, appropriate officials of nearby communities, the Kansas Department of Wildlife and Parks, the Kansas Historical Society (sic), and other interested parties."* The Preserve will consult with these entities in development of this bison management plan/environmental assessment.

## Tribes

Various laws, executive orders, and policies direct the National Park Service to consult with recognized Indian Tribes in the development of Preserve management plans. Several Native American Tribes were contacted in development of the General Management Plan for the Tallgrass Prairie National Preserve (National Park Service 2000*b*). The Tribes were:

· Kaw Tribe
· Osage Tribe
· Pawnee Tribe
· Wichita Tribe

These Tribes will be consulted in regards to this bison management plan / environmental assessment. See Appendix III.

## U.S. Fish and Wildlife Service

The National Park Service consulted with the U.S. Fish and Wildlife Service in the development of the General Management Plan for the Preserve (National Park Service 2000*b*). As part of the GMP process, the NPS developed and submitted to the U.S. Fish and Wildlife Service a Biological Assessment regarding potential impacts of the GMP actions to the endangered Topeka shiner. That agency concurred with the NPS determination that the actions in the GMP would not likely adversely affect the species, and would have no effect on other listed species. The

preferred alternative included the reintroduction and management of bison in the Windmill Pasture (i.e., the No Action alternative in this environmental assessment).

A copy of this document will be provided to the U.S. Fish and Wildlife Service. The NPS has determined that the actions described in this environmental assessment may affect, but are not likely to adversely affect the Topeka shiner, and will have no effect on other listed species. The NPS will ask the U.S. Fish and Wildlife Service for their concurrence pursuant to Section 7 of the Endangered Species Act.

## State Historic Preservation Officer

The State Historic Preservation Office (KSSHPO) was consulted in the development of the GMP for the Preserve (National Park Service 2000*b*). The selected alternative in that document included the reintroduction and management of bison in the Windmill Pasture. A notice of scoping for this Bison Management Plan/Environmental Assessment was provided to the KSSHPO and no adverse effects to historic properties were identified, although KSSHPO requested that actions proposed in the plan be submitted for review per section 106 of the National Historic Preservation Act. No adverse effects to historic properties are expected based on the actions called for in this environmental assessment. A copy of this draft environmental assessment will be forwarded to the State Historic Preservation Office along with a request for concurrence for a determination of historic property affected; no adverse effect.

## Full List of Recipients for this Environmental Assessment

FEDERAL AGENCIES/ORGANIZATIONS
· U.S. Fish and Wildlife Service, Kansas Field Office

TRIBES
· Kaw Tribe
· Osage Tribe
· Pawnee Tribe
· Wichita Tribe

STATE AGENCIES/ORGANIZATIONS
· Kansas Biological Survey
· Kansas Department of Agriculture
· Kansas Department of Health and Environment
· Kansas Department of Wildlife and Parks
· Kansas Division of Commerce, Travel and Tourism
· Kansas State Historic Preservation Officer

OTHER AGENCIES AND ORGANIZATIONS
· The Nature Conservancy, Kansas Chapter
· Kansas Farm Bureau
· Kansas Livestock Association
· Chase County Board of County Commissioners

· Mayor, Cottonwood Falls
· Mayor, Strong City·
· Audubon of Kansas
· The Wildlife Society, Kansas Chapter
· Kansas Wildlife Federation
· Chase County Farm Bureau Association
· Sierra Club, Kansas Chapter

OTHER ENTITIES
· Adjacent Landowners
· Tallgrass Prairie National Preserve Advisory Committee
· Requesting Members of the Public

## Planning Team Participants and Document Preparers

The General Management Plan for the Preserve was completed in 2000 (National Park Service 2000*b*). That document selected an alternative that recommended reintroducing bison to the Windmill Pasture. This document analyzes that action in detail along with three alternative actions. Table 6 lists the key members in developing this bison management plan / environmental assessment.

Table 6. Planning Team Participants

| **Planning Team Participants** | | |
|---|---|---|
| Steve Miller | Superintendent (Former) | Tallgrass Prairie National Preserve |
| Kristen Hase | Chief of Natural Resources | Tallgrass Prairie National Preserve |
| Tobin Roop | Facility Operations Specialist | Tallgrass Prairie National Preserve |
| Heather Brown | Chief of Interpretation | Tallgrass Prairie National Preserve |
| Daniel Licht | Wildlife Biologist | Midwest Region - NPS |
| Brian Obermeyer | Flint Hills Project Director | The Nature Conservancy |
| Rob Manes | Kansas Director of Conservation | The Nature Conservancy |
| Paula Matile | Conservation Specialist | The Nature Conservancy |

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# APPENDIX I : DETERMINING STOCKING RATES

## Background

There are a myriad of ways to establish a target or desired population level for large ungulates such as bison. From a conservation perspective the ideal way is to simply let predators and natural processes and conditions dictate the level of the prey population. This is the case in Yellowstone National Park and in many large parks and preserves in Africa and other parts of the world. However, in most of the developed world such an approach is no longer viable or wise due to park size and the absence of natural predators, as with Tallgrass Prairie National Preserve.

Managers are expected to establish and manage for explicit desired population levels or herd objectives. These levels and objectives can be established using criteria such as visitor expectations (e.g., probability of visitors seeing the species), landowner tolerance (crop damage), hunting goals (number of animals available for harvest), revenue generation, genetic levels (animals necessary to maintain adequate heterozygosity), and natural or pre-Columbian densities. The most common way to establish a desired population level for large ungulates—and especially for bison—is to determine a stocking rate based primarily on forage availability and forage goals. The factors mentioned above may be secondary considerations in establishing such goals. All of the NPS units in the Northern Great Plains and all TNC properties use some form of a forage allocation model as a basis in establishing bison population goals.

Annual forage production can be used to establish bison population levels, both proactively and reactively. In the former, an assessment is made of forage production at a site and mathematical formulas, assumptions, and goals are used to determine a desired stocking rate. In a reactive approach, bison are put on the land and post-grazing vegetation monitoring is conducted. Depending on the results of the monitoring, the bison population may be adjusted accordingly. The more common approach is to use a proactive forage allocation model; however, the desired and most precise approach is to use a combination of a forage allocation model along with periodic monitoring of range conditions.

To use a forage allocation model there must be an understanding of the amount of dry matter forage the range typically produces. These figures are readily available from the Natural Resources Service Technical Field Guides. In 2006, staff from the Natural Resources Conservation Service (NRCS) conducted a range site assessment at the Preserve to estimate annual forage production. NRCS considered grazeable acres, soil type and range condition in making the determinations. For example, Windmill Pasture is estimated having an annual forage production of 690,223 pounds, or 873.7 animal unit months (AUMs) (Table 1).

## Soil, Range Site, Condition, and AUM Inventory

MLRA: 76
County: Chase

Name: Tallgrass Prairie Preserve
Pasture: Windmill

Clear Condition

| Soil Map Unit | Acres | Soil Name | % | Range Site | Acres | Condition | AUM/Ac | Total AUM's |
|---|---|---|---|---|---|---|---|---|
| 4665 | 1.2 | Florence-Matfield cherty silt loams, 1 to 15 percent slopes | 75% | Loamy Upland | 0.9 | Good | 1.0 | 0.9 |
| | | | 25% | Flint Ridge | 0.3 | Good | 0.5 | 0.1 |
| 4671 | 4.1 | Irwin silty clay loam, 1 to 3 percent slopes | 100% | Clay Upland | 4.1 | Good | 0.9 | 3.7 |
| 4673 | 7.1 | Irwin silty clay loam, 3 to 7 percent slopes | 100% | Clay Upland | 7.1 | Good | 0.9 | 6.4 |
| 4744 | 41.1 | Labette-Dwight complex, 0 to 3 percent slopes | 60% | Loamy Upland | 24.7 | Good | 1.0 | 24.7 |
| | | | 40% | Clay Pan | 16.4 | Good/Fair | 0.5 | 8.2 |
| 4051 | 42.8 | Ivan silt loam, channeled | 100% | Loamy Lowland | 42.8 | Fair | 1.2 | 51.4 |
| 4783 | 62.4 | Tully silty clay loam, 3 to 7 percent slopes | 100% | Loamy Upland | 62.4 | Good | 1.0 | 62.4 |
| 4780 | 69.7 | Tully cherty silty clay loam, 5 to 15 percent slopes | 100% | Loamy Upland | 69.7 | Good | 1.0 | 69.7 |
| 4605 | 93.3 | Dwight silt loam, 1 to 3 percent slopes | 100% | Clay Pan | 93.3 | Good/Fair | 0.5 | 46.7 |
| 4590 | 214.7 | Clime-Sogn complex, 3 to 20 percent slopes | 75% | Limy Upland | 161 | Good | 0.8 | 128.8 |
| | | | 25% | Shallow Limy | 53.7 | Good/Fair | 0.5 | 26.9 |
| 4746 | 537.9 | Labette-Sogn silty clay loams, 0 to 8 percent slopes | 65% | Loamy Upland | 349.6 | Good | 1.0 | 349.6 |
| | | | 35% | Shallow Limy | 188.3 | Good/Fair | 0.5 | 94.2 |
| | | | | Total | 1074.3 | | | |

1074.3 TOTAL ACRES

Total AUM's 873.7

Average AUM's 0.81

Table 1: Annual Forage Production for Windmill Pasture

To determine the amount of forage required for grazers, range managers have developed the concept of an animal unit (AU) to standardize the amount for forage required by an animal for purposes of determining stocking rates. One animal unit is defined as a 1,000 lb. beef cow nursing a young calf. Such a cow-calf pair will have an approximate daily requirement of 26 pounds of dry matter forage. The amount of forage required by one AU for one month is called an Animal Unit Month (AUM). For a nursing beef cow, an AUM would require 790 pounds of forage (1 AU x 26lbs forage daily x 30.4 days in an average month). The AUM approach is

useful for managing on sites where the vegetation changes dramatically between a growing season and a dormant season, or where only short-term stocking is desired.

Because animal sizes and forage needs vary by species, location, age, breeding status, and other factors, AU values vary within and between species. For bison, TNC uses an AU equivalent estimate of 1.25 for a bison cow with a six month or younger calf, 1.0 for a dry cow, 1.5 for a mature bison bull, and smaller values for younger animals (Bragg et al. 2002; see Table 2). A more precise forage allocation model would also incorporate deer, antelope, and other large herbivores, but unfortunately this is difficult to quantify.

| Age Class | Animal Unit (AU) |
|---|---|
| Bull – mature | 1.5 |
| Cow – dry | 1.0 |
| Cow – with calf | 1.25 |
| Bull – 2 yr. | 1.0 |
| Heifer – bred | 1.0 |
| Yearling bull/heifer – 13-24 month. | .8 |
| Calf – weaned to 12 month | .5 |

Table 2: Animal Unit Equivalent by Age Class

The next step is to calculate how much of the forage produced should be allocated for ungulate consumption. The amount of leaf material the plant must retain to conduct photosynthesis and provide carbohydrates and other products ranges from 40 to 60 percent, depending on grassland type. This value implies that the plant retains half the herbage while the other half is available for utilization. As a result, many land managers, including many conservation managers, follow the *take half, leave half* rule, whereby half of the plant matter produced is left ungrazed. However, not all standing herbage available for utilization will be ingested by grazing animals. Livestock typically consume only about 50 percent of the forage available for utilization. The remainder is trampled, soiled by animal waste, consumed by insects and wildlife, and lost to other natural processes.

Ultimately, the stocking rate depends on management goals. Most private lands are managed for maximum sustained yield of livestock production, i.e., long-term revenue generation. Under such objectives, the *take half, leave half* rule is reasonable. However, conservation managers may wish to graze an area more heavily to create early seral stages or graze an area lightly to promote later seral stages. The choice may depend in part on regional conditions and how best the preserve or park unit can contribute to regional biological diversity.

**A Recommended Forage Allocation Model for Tallgrass Prairie National Preserve**

The proposed bison stocking rate at the Preserve will allocate approximately 25 percent of the annual herbage production intake at a rate of 26 pounds of air-dried herbage per animal per day

(3 percent of body weight per day). Over a twelve-month grazing period, each animal unit (AU) would require approximately 9,500 pounds of forage.

NRCS's estimated annual forage production in Windmill Pasture is 690,223 lbs, or approximately 874 AUMs (690,223 lbs / 12 mo.). Alternatives A and D, bison would be confined to the 1,074 grazeable-acre Windmill Pasture, although Alternative D, under special circumstances would allow for off-season access to 3,711 grazeable acres in Big Pasture. Since Windmill Pasture (1,074 acres) is the primary pasture for both alternatives, the stocking rate would be the same. According to forage production for Windmill Pasture, year-round stocking of bison on average could be as high as 73 animal units (874 AUMs / 12 mo.). This translates to 14.7 acres per animal unit. Taking into consideration the culling strategy, conservative modeling figures, and herd demographics the maximum number of bison for Alternatives A and D would be approximately 100 animals, which is approximately 30% of the animal unit target. Once a bison herd is established, vegetation monitoring of range conditions will also be considered when determining culling numbers and targeted annual herd size.

Alternative B would allow bison to graze on 3,711 acres (Big Pasture); forage production for Big Pasture allows for 247 animal units (2,964.7 AUMS/12 months); therefore, the potential maximum number of bison would be approximately 300 animals, which is less than 30% of the animal unit target.

Alternative C would allow bison to graze on 4,785 acres (Big Pasture + Windmill Pasture); forage production for both pastures allows for 398.7 animal units (4,785.4 AUMS/12 months); therefore, the potential maximum number of bison would be approximately 500 animals.

The maximum number of head for Alternative B and C (300 and 500 respectively) would likely not be reached except under rare circumstances. Although acreage and forage production would allow these numbers, Preserve and bison management objectives focus on sustaining natural conditions and processes in the tallgrass prairie grassland ecosystems, promoting biological diversity, and enhancing visitor understanding and satisfaction of the preserve and its resources.

# APPENDIX II: CULLING STRATEGIES

Numerous culling strategies are possible for removing surplus bison from the Tallgrass Prairie National Preserve. Ultimately, the selection of a culling strategy is dependent on herd objectives (e.g., revenue generation, mimic natural conditions, behavioral traits), logistical considerations (e.g., personnel and infrastructure), availability and expectations of the recipients of bison (how many they want, sex and age classes), and other factors. Weather and other stochastic variables also come into play and make it unrealistic to expect a consistent or predictable culling strategy over the long term.

The purpose of this section and discussion is to provide and discuss a variety of culling scenarios. The information is provided for resource managers, planners, and decision makers in non-technical terms. As is the case with all predictive models, the output should be viewed cautiously since real world conditions will almost certainly vary slightly from what is projected in the model. However, the model provides a useful tool and the best available information for predicting future conditions and for contrasting management choices.

Methods

The analyses performed in this section were conducted using a demographic model developed by Millspaugh et al. (2005). The Millspaugh model was created for National Park Service units under a cooperative agreement and is the property of the federal government. Although the model was designed for NPS units in the Northern Great Plains, it can be applied to all bison herds. The model allows the user to input known herd demographics, fecundity and survival rates, culling strategies, and other criteria such as stochasticity and density-dependent changes, if desired. Alternatively, the user may opt to use the default values supplied with the model. The model projects changes in herd demographics to year 25. Under most model runs herd demographics tend to become more repetitive and predictable after 25 years, regardless of the culling strategy or the initial population structure.

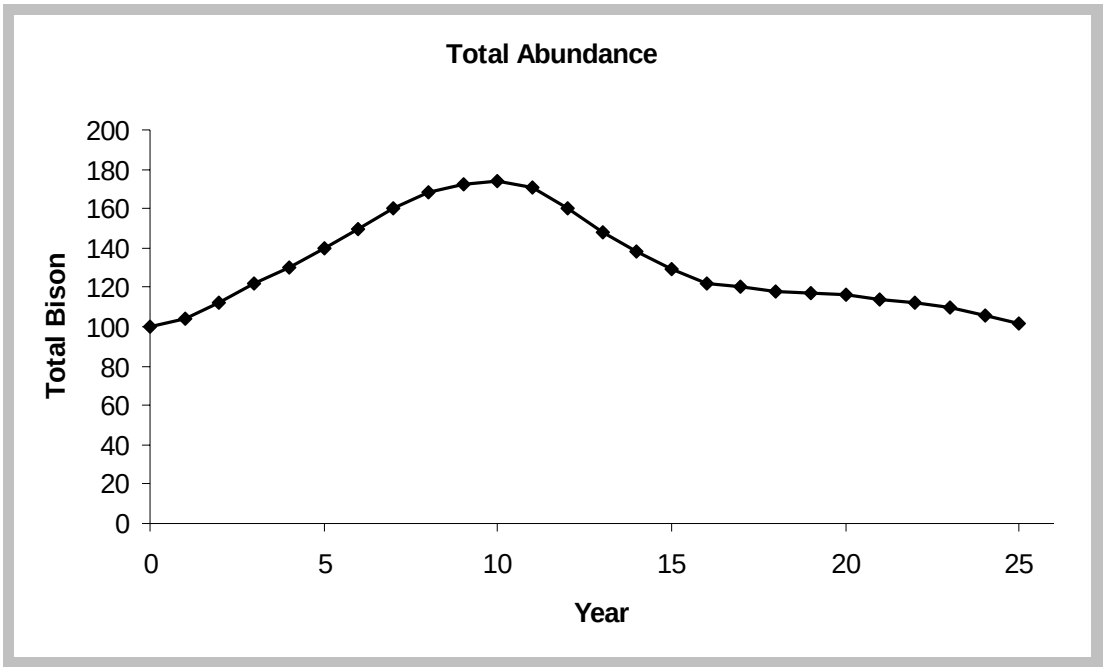
For purposes of analyzing culling strategies for Tallgrass Prairie National Preserve, the known fecundity and survival rates of the Wind Cave bison population were used. This herd is similar to what the Preserve herd will likely face in that there are no natural predators and density-dependent changes are not a factor due to regular culling of surplus animals. Model modules for stochastic, weather, and density-dependent changes were not used (in other words, a deterministic model was run). Each modeling scenario started with 100 animals and was designed to produce a lambda near 1 (i.e., a population in year 25 that was similar in size to the starting population). The Millspaugh et al. demographic model displays over a dozen different outputs (e.g., bull:cow ratios, age structure); however, due to space limitations the results and discussion presented here is focused on changes in total population size and a few other key values. The population estimates and other demographic values are reported from early fall, i.e., prior to culling activities. Copies of the model can be obtained by contacting the National Park Service - Midwest Region Wildlife Biologist.

**#1. Cull 80% of Yearlings Annually.** This model shows the effect of removing 80% of the female yearlings and 80% of the male yearlings every year from a bison population that starts with a young age structure and a 50:50 sex ratio (see the table below). Such a culling strategy is typical of many private and some public herds (e.g., Wind Cave National Park). The strength of such a strategy is that it removes the easily handled yearling animals while still maintaining a relatively natural and age structure. The initial population size in the model run is based on 100 animals.

| Age | Female | Male | Total |
|---|---|---|---|
| 0 (Calves) | 10 | 10 | 20 |
| 1 (Yearlings) | 10 | 10 | 20 |
| 2 | 10 | 10 | 20 |
| 3 | 10 | 10 | 20 |
| 4 | 10 | 10 | 20 |

As can be seen below, the total population continues to increase in the early years. This is due to the population being skewed in the early years toward young and prime age animals and their higher fecundity. However, as the adult population ages and becomes skewed toward the older age classes the recruitment drops with a corresponding drop in the total population. Under such a scenario the adult bull:cow ratio gradually changes to about 67:100 in year 25 due to the lower survival rate for male animals. The number of yearlings culled each year ranges from 28 animals in the peak years (9-10) to 16 animals in the early and late years.

Increasing the yearling removal by 10 percentage points to 90% for each sex class results in a total population of about 60 animals in year 25; conversely, decreasing it to 70% results in a population of 300 animals in year 25.

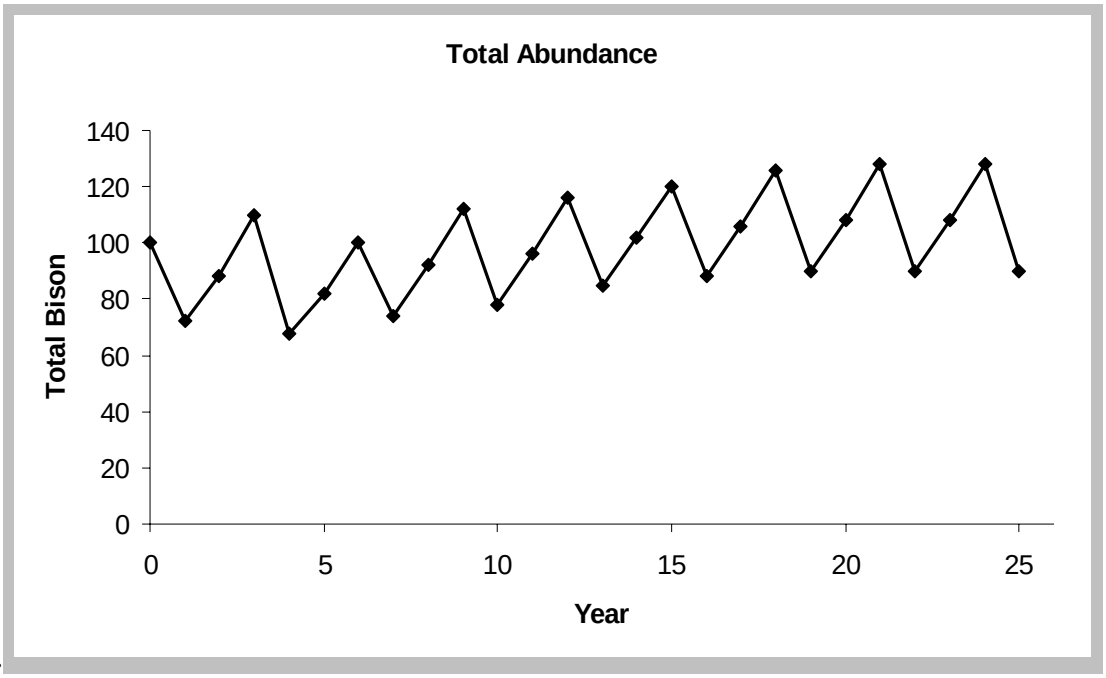


**#2. Minimize Roundups and Maintain Natural Demographics.** This model shows the effect of culling the herd every third year while maintaining relatively natural age and sex structures. To maintain a population comparable to the starting population, 45% of all age and sex classes (including calves) would have to be culled. The model starts with a young age structure and a 50:50 sex ratio, which is a reasonable demographic for a newly started herd (see table below). Culling every third year is not currently used in NPS units due in large part to the logistics of handling so many animals in the culls; however, it warrants consideration in small herds such as that at Tallgrass Prairie National Preserve; it was the recommended approach at a bison workshop conducted at the Preserve (National Park Service 2004). The initial population size in this model run is 100 animals.

| Age | Female | Male | Total |
|---|---|---|---|
| 0 (Calves) | 10 | 10 | 20 |
| 1 (Yearlings) | 10 | 10 | 20 |
| 2 | 10 | 10 | 20 |
| 3 | 10 | 10 | 20 |
| 4 | 10 | 10 | 20 |

As can be seen below, this scenario creates a high level of inter-year variability, which from an ecological perspective is not necessarily bad and may even better mimic natural conditions. Under such a scenario the adult bull:cow ratio gradually changes to about 53:100 in year 25 due to the lower survival rate for male animals. The number of animals removed in each cull (i.e., every third year) ranges from 40 to 54.

Increasing the removal rate even 10 percentage points to 55% for each age-sex cohort results in a population that zeros out in year 25; conversely, decreasing it to 35% results in a population of 250 animals in year 25.

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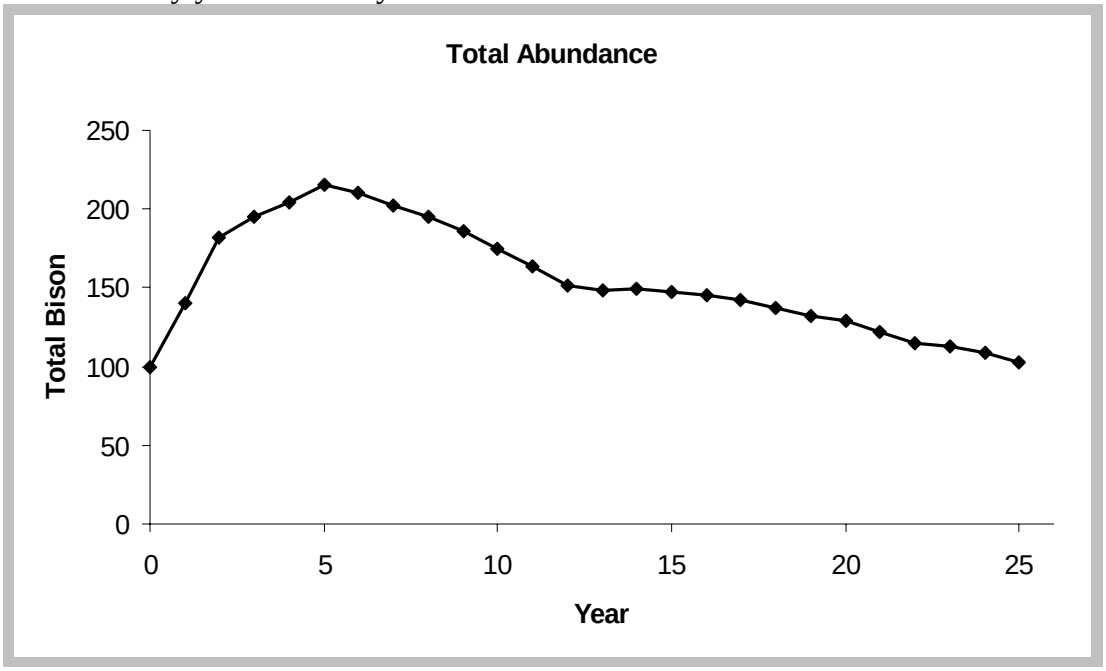
**#3. Maximize Production.** This model maximizes recruitment and revenue generation and is similar to culling strategies on many private herds. The model shows the effect of removing 80% of all female yearlings and 85% of the male yearlings every year and removing all bulls over 5 years of age and all cows over 12 years of age. The model starts with a population comprised of 90% females, which is reasonable considering the culling objectives (see table below). The initial population size in this example is 100 animals.

**Initial Population Structure**

| Age | Female | Male | Total |
|---|---|---|---|
| 0 (Calves) | 10 | 2 | 12 |
| 1 (Yearlings) | 10 | 2 | 12 |
| 2 | 10 | 2 | 12 |
| 3 | 10 | 2 | 12 |
| 4 | 10 | 2 | 12 |
| 5 | 10 | 0 | 10 |
| 6 | 10 | 0 | 10 |
| 7 | 10 | 0 | 10 |
| 8 | 10 | 0 | 10 |

As can be seen below, the population peaks around 210 animals, but then declines to 103 animals in year 25. The adult bull:cow ratio averages 15:100. The number of animals culled ranges from 57 in the early years to 30 in year 25.

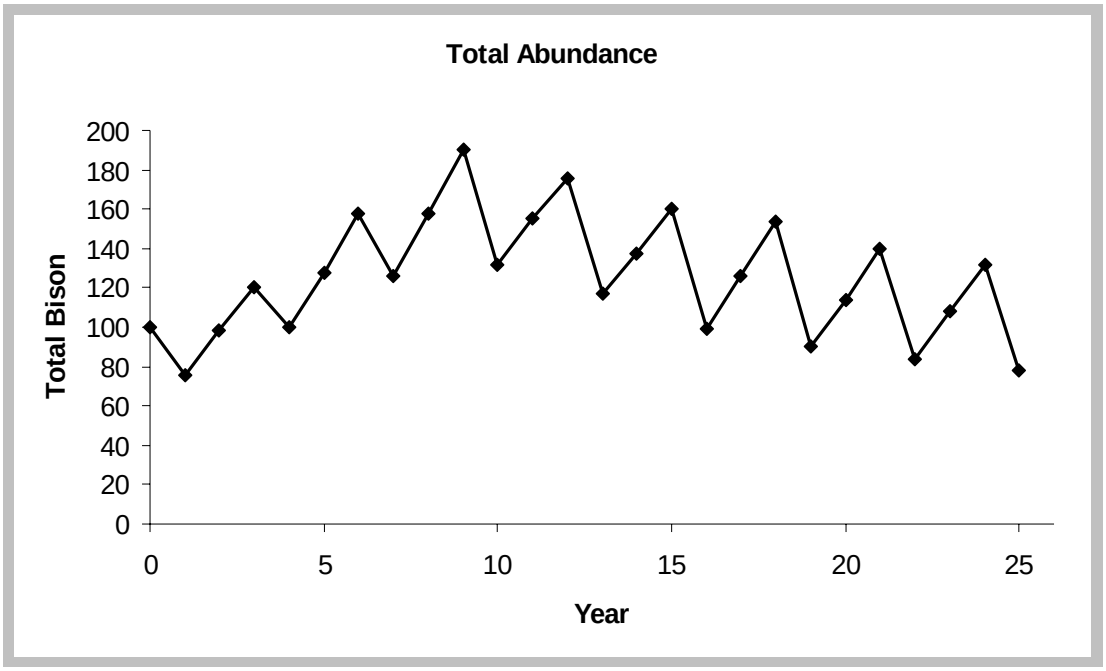


**#4. Mimic Natural Calamity Every Third Year.** This model simulates a natural calamity every third year (e.g., a blizzard) by removing all calves, yearlings, and animals older than 10, and 20% of the 2-year olds. This model is not currently used in NPS units with bison, but warrants consideration on small sites attempting to reduce handling while mimicking natural processes. The model starts with an even-sex population skewed toward a young herd, which is typical of how many new herds are started (see table below). The initial population size in this example is 100 animals.

**Initial Population Structure**

| Age | Female | Male | Total |
|---|---|---|---|
| 0 (Calves) | 10 | 10 | 20 |
| 1 (Yearlings) | 10 | 10 | 20 |
| 2 | 10 | 10 | 20 |
| 3 | 10 | 10 | 20 |
| 4 | 10 | 10 | 20 |

As can be seen below, the population peaks around 190 animals, but then declines to about 100 animals over the last 3 years. The adult bull:cow ratio averages 69:100. The number of animals culled averages 25 across all years, but during the actual cull-years it ranges from 88 to 44 (in year 1).

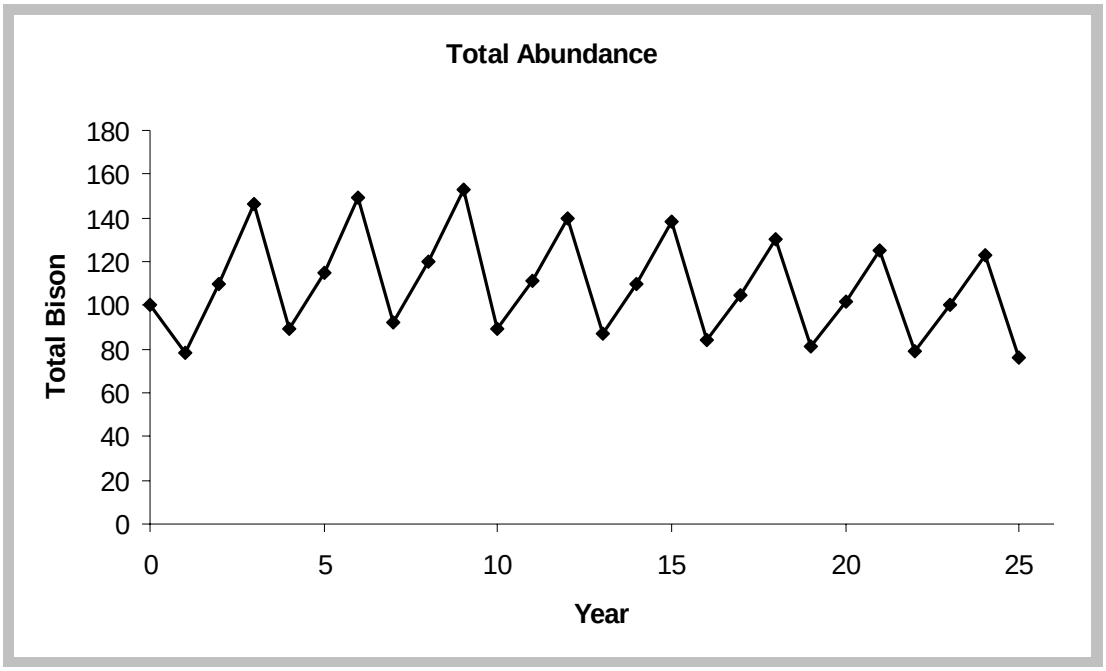


**#5. Maximum Production and Minimal Roundups.** This model attempts to maximize production and revenue while reducing the frequency of roundup operations. The model culls all cows older than 12 and 47% of all cows from all other age classes and all bulls older than 5 and 70% of all bulls from all other age classes every third year. Culling every third year was recommended by the experts at a bison workshop conducted at the Preserve (National Park Service 2004). The model starts with a population comprised of 90% females, which is reasonable considering the herd objectives (see table below). The initial population size in this example is 100 animals.

**Initial Population Structure**

| Age | Female | Male | Total |
|---|---|---|---|
| 0 (Calves) | 10 | 2 | 12 |
| 1 (Yearlings) | 10 | 2 | 12 |
| 2 | 10 | 2 | 12 |
| 3 | 10 | 2 | 12 |
| 4 | 10 | 2 | 12 |
| 5 | 10 | 0 | 10 |
| 6 | 10 | 0 | 10 |
| 7 | 10 | 0 | 10 |
| 8 | 10 | 0 | 10 |

As seen below, the population has a similar trajectory to model scenario #2. The population peaks around 150 animals with a low of about 80 animals. However, it differs dramatically from model scenario #2 in that the adult bull:cow ratio averages 15:100. The number of animals culled averages 25 across all years (during the actual cull-years it ranges from 83 to 50). As intended, this model has many of the desirable features of model scenarios #2 and #3.

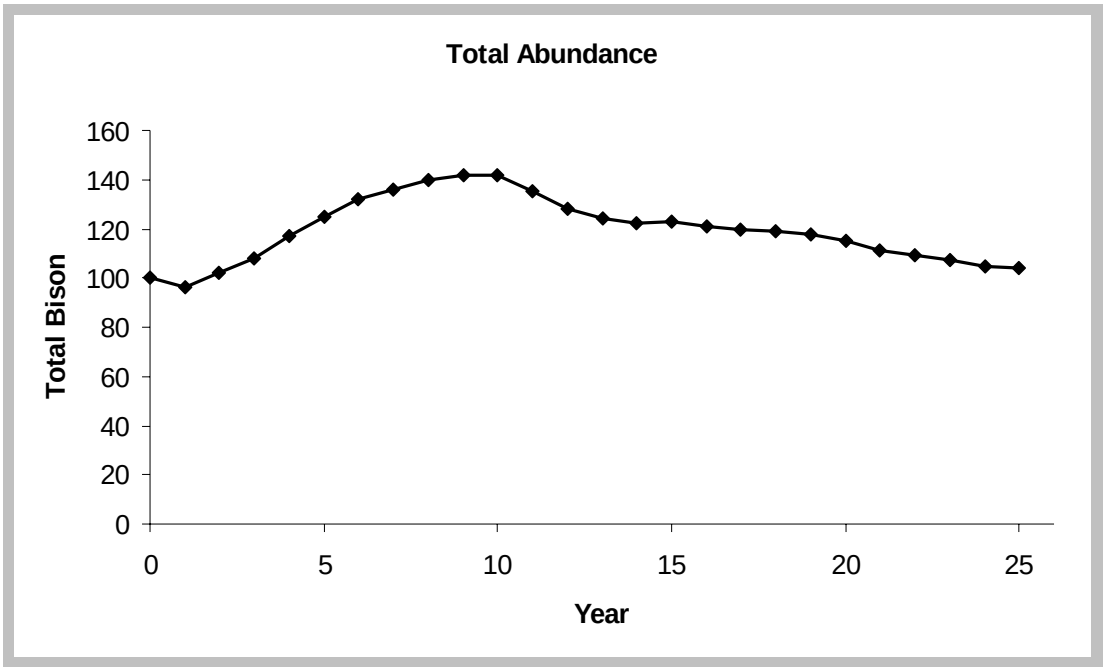


**#6. Mimic Natural Conditions and Processes.** This model attempts to mimic natural herd demographics in the presence of large predators. All age and sex classes are culled; however the young and old classes are culled disproportionately greater. Calves are culled at 70% and 75% for females and males, respectively, and yearlings are culled at 20% and 25%, respectively. The culling rate drops to only 5% for prime age animals, but then starts increasing at age 8 for males and age 11 for females (males are more vulnerable to predation due to rutting stress and injuries). This culling strategy has not been tried in NPS units primarily due to the challenges and risks of handling mature bulls, but also because such animals are hard to dispose of. The model starts with an even-sex population skewed toward a young herd, which is typical of how many new herds are started (see table below). The initial population size in this example is 100 animals.

**Initial Population Structure**

| Age | Female | Male | Total |
|---|---|---|---|
| 0 (Calves) | 10 | 10 | 20 |
| 1 (Yearlings) | 10 | 10 | 20 |
| 2 | 10 | 10 | 20 |
| 3 | 10 | 10 | 20 |
| 4 | 10 | 10 | 20 |

As can be seen below, the population has a fairly level trajectory even though it starts skewed toward the younger age classes. This is because the increased cull of the very early and late age classes (mimicking predation). The population peaks around 140 animals with a low of about 100 animals. There are an average of 53 bulls to every 100 cows. Calf births remain high (mean of 28) but only about one-fourth survive the first year. On average, 28 animals would have to be removed yearly.



Summary Table of Culling Scenarios.

| Scenario Title (all scenarios start with 100 animals, but sex and age may differ – see scenario description) | Culling Strategy Goal | Culling Frequency | Culling rate for each sex/age class | Mean fall population size / yr 25 | Mean # animals culled annually / yr 25 | Mean ratio of adult bulls to 100 cows / yr 25 | Mean # calves produced annually / yr 25 |
|---|---|---|---|---|---|---|---|
| #1. Cull 80% of Yearlings Annually. | Ease of handling young animals while maintaining relatively natural sex and age ratios | Annual | 85% of male and 85% of female yearlings | x = 132.6<br>end = 102 | x = 19.6<br>end = 16 | x = 73.0<br>end = 67 | x = 24.2<br>end = 18 |
| #2. Minimize Roundups and Maintain Natural Demographics. | Minimize frequency of culling operations and maintain natural sex and age ratios | Every third year | 45% of individuals in all age and sex classes | x = 98.2<br>end = 109* | x = 17.3<br>end = 17* | x = 51.0<br>end = 51* | x = 17.8<br>end = 19* |
| #3. Maximize Production. | Maximize production and revenue generation while keeping a relatively docile herd | Annual | 85% of male and 80% of female yearlings and all bulls > 6 yrs and cows > 12 yrs | x = 156.4<br>end = 103 | x = 39.1<br>end = 30 | x = 15.0<br>end = 15 | x = 40.3<br>end = 25 |
| #4. Mimic Natural Calamity Every Third Year. | Simulate a natural calamity and minimize frequency of roundups | Every third year | All calves, yearlings, and animals > 10 years, and 20% of 2-year olds | x = 126.2<br>end = 106* | x = 25.8<br>end = 25* | x = 69.0<br>end = 70* | x = 26.5<br>end = 23* |
| #5. Maximum Production and Minimal Roundups. | Maximize production, revenue generation, and docile behavior while minimizing the frequency of roundups | Every third year | All cows > 12 yrs and 47% of all other female age classes and all bulls > 6 years and 70% of other bull age classes | x = 109.2<br>end = 100* | x = 25.3<br>end = 21* | x = 15.0<br>end = 23* | x = 25.2<br>end = 21* |
| #6. Mimic Natural Conditions and Processes. | Mimic the take of large predators by removing more young, old, and male animals | Annual | 70/75% of female/male calves, 20/25% of female/male yearlings, rate declines to 5-10% for ages 2-11, but then increases for old age classes | x = 120.0<br>end = 104 | x =28.8<br>end = 25 | x = 53.0<br>end = 60 | x = 28.9<br>end = 23 |

* Averaged over the last three years to account for the wide variability due to the frequency of the culls.

# APPENDIX III: CONSULTATION LETTERS

STATE OF KANSAS
**Kansas Animal Health Department**
**George Teagarden, Livestock Commissioner**
708 SW Jackson, Topeka, Kansas 66603-3714
Phone 785-296-2326 Fax 785-296-1765
Email - gteagarden@kahd.ks.gov
web site – www.kansas.gov/kahd

August 27, 2009

Paula Matile
The Nature Conservancy
Kansas Flint Hills Office
226 Broadway
P.O. Box 58
Cottonwood Falls, KS 66850

Dear Paula,

I have reviewed brucellosis and tuberculosis test records of the Wind Cave National Park bison herd. This information was provided to me by the South Dakota State Veterinarian, Dr. Dustin Oedekoven.

The Kansas Animal Health Department will approve the importation of bison from Wind Cave with the following caveats: the bison being imported by the Nature Conservancy be tested negative for brucellosis within 30 days of import and tuberculosis within 60 days of import. Of course, the shipment must be accompanied by a valid certificate of veterinary inspection.

I understand that Wind Cave will be testing for brucellosis and TB when they round up the herd on Oct 19 and 20.

If you have questions regarding this permit, please contact me.

Sincerely,

George Teagarden

George Teagarden
Livestock Commissioner

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Kristen — provided
Tobin — circulate
Brian — copy
File —

## TRIBAL HISTORIC PRESERVATION OFFICE

**Date:** **January 2, 2008** **File: 0708-158OK-1**

**RE:** **Management Plan and Environmental Assessment for Future Bison Reintroduction Tallgrass Prairie National Preserve**

U.S. Department of Interior
National Park Service
Tallgrass Prairie National Preserve Office
ATTN: Stephen T. Miller
P.O. Box 585, 226 Broadway
Cottonwood Falls, Kansas 66845-0585

Dear Mr. Miller,

The Osage Nation Tribal Historic Preservation Office has received your notification letter dated December 20, 2007 regarding the proposed management plan and environmental assessment for future bison reintroduction to the Tallgrass Prairie National Preserve in Osage County, Oklahoma. Thank your for sending the information and requesting our comments.

The Osage Nation has a vital interest in protecting the tribe's cultural resources throughout our ancestral territory. It is important that cultural resources are taken into account when designating areas for the reintroduction of bison, as such herd animals have the capacity to totally destroy cultural sites. The Osage Nation Tribal Historic Preservation Office is interested in the bison reintroduction project for the Tallgrass Prairie Preserve and requests a consultation meeting to further discuss the management plan and environmental assessment.

Should you have any questions or need any additional information please feel free to contact me at the number and/or email address listed below. Thank you for consulting with the Osage Nation on this matter.

Andrea A. Hunter

Dr. Andrea A. Hunter
Tribal Historic Preservation Officer

Phone: (918) 287-5671 * Email: ahunter@osagetribe.org

627 Grandview, Pawhuska, OK 74056, (918) 287-5446, Fax (918) 287-5562

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1/10/08

# KANSAS

KSR&C No. 08-01-024

Kansas State Historical Society
Jennie Chinn, *Executive Director*

KATHLEEN SEBELIUS, GOVERNOR

January 9, 2008

Stephen Miller
Superintendent
Tallgrass Prairie National Preserve
P.O. Box 565, 226 Broadway
Cottonwood Falls, Kansas 66845-0585

RE: General Management Plan
Bison Reintroduction
Tallgrass Prairie National Preserve
Chase County

Dear Mr. Miller:

The Kansas State Historic Preservation Office has reviewed your notice of the park's General Management Plan and its section regarding reintroduction of bison into the Tallgrass Prairie National Preserve. Our office has no objections to bison reintroduction and assumes that (as indicated in the management plan) that any impacts to significant cultural resources will continue to be documented and submitted individually for cultural resources review as they have in the past.

This information is provided at your request to assist you in identifying historic properties, as specified in 36 CFR 800 for Section 106 consultation procedures. If you have questions or need additional information regarding these comments, please contact Tim Weston 785-272-8681 (ext. 214) or Julie Weisgerber at 785-272-8681 (ext. 226). Please refer to the Kansas Review & Compliance number (KSR&C#) above on all future correspondence relating to this project.

Sincerely,

Jennie Chinn
Executive Director and
State Historic Preservation Officer

for
Patrick Zollner
Deputy State Historic Preservation Officer

6425 SW Sixth Avenue • Topeka, KS 66615-1099
Phone 785-272-8681 Ext. 205 • Fax 785-272-8682 • Email jchinn@kshs.org • TTY 785-272-8683
www.kshs.org

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# United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kansas Ecological Services Field Office
2609 Anderson Avenue
Manhattan, Kansas 66502-2801

January 9, 2008

Stephen T. Miller, Superintendent
National Park Service
Tallgrass Prairie National Preserve
P.O. Box 585, 226 Broadway
Cottonwood Falls, KS 66845-0585

RE: Management Plan and Environmental Assessment for Bison Reintroduction

Dear Mr. Miller:

I am responding to your December 20, 2007 letter requesting Fish and Wildlife Service review of a proposal to reintroduce bison to portions of the Tallgrass Prairie National Preserve, in Chase County, Kansas. My staff has reviewed this proposal and we have no objection, but advise you that endangered species and migratory birds should be considered in this assessment.

The federally-listed endangered Topeka shiner occurs in some streams within the proposed bison reintroduction area. Consideration should be given of the potential impacts of the stocking rates of grazing animals, whether bison or cattle, on the integrity of the watershed and streambanks within the proposed area. If grazing animals are given free access to flowing streams, is there the potential for streambank erosion and resulting increases in sedimentation to adversely affect this species and its habitat? If it is determined the action may adversely affect this species, formal consultation pursuant to section 7 of the Endangered Species Act should be initiated between our agencies. If it is determined adverse impacts are not likely to occur, no further consultation is required.

The Migratory Bird Treaty Act prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior. Takings could result from projects in prairies, wetlands, stream and woodland habitats, and those that occur on bridges and other structures if swallow or phoebe nests are present. While the provisions of MBTA are applicable year-round, most migratory bird nesting activity in Kansas occurs during the period of April 1 to July 15. However, some migratory birds are known to nest earlier than this (e.g., hawks and owls) and some later (e.g., goldfinches). If any construction activities are required by the proposed project, and will occur during the nesting season in habitat capable of supporting bird nesting, I recommend a field survey during the nesting season of the affected habitats and structures to determine the presence of active nests. Our office should be contacted immediately for further guidance if a field survey identifies the existence of one or more active bird nests that you believe cannot be avoided temporally or spatially by the planned activities.

While the MBTA has no provision for allowing unauthorized take, the Service realizes that some birds may be killed during project construction and implementation even if all reasonable measures to protect them are used. Our Office of Law Enforcement carries out its mission to protect migratory birds through investigations and enforcement, as well as by fostering relationships with individuals, companies, and industries that have taken effective steps to minimize their impacts on migratory birds, and by encouraging others to enact such programs. It is not possible to absolve individuals, companies, or agencies from liability even if they implement avian mortality avoidance or similar conservation measures. However, the Office of Law Enforcement focuses its resources on investigating and prosecuting individuals and companies that take migratory birds without regard for their actions or without following recommendations to avoid take.

Thank you for this opportunity to review and provide input to your proposed bison reintroduction. If you have further comments or questions, please direct them to Dan Mulhern of this office at the letterhead address or at 785-539-3474, ext. 109.

Sincerely,

Michael J. LeValley
Field Supervisor

cc: KDWP, Pratt, KS (Environmental Services)

KANSAS
DEPARTMENT OF WILDLIFE AND PARKS

Kathleen Sebelius, Governor
J. Michael Hayden, Secretary

www.kdwp.state.ks.us

January 25, 2008

Mr. Stephen T. Miller
Superintendent
Tallgrass Prairie Preserve
PO Box 585, 226 Broadway
Cottonwood Falls, KS 66845

Ref: D1.0100
Chase
Track: 20070675

**RE: Evaluation and Comments on Bison Reintroduction to the Tallgrass Prairie Preserve**

Dear Mr. Miller:

At your request, we have evaluated the abbreviated General Management Plan prepared for the Tallgrass Prairie Preserve located in Chase County, Kansas. The project was reviewed for potential impacts on crucial wildlife habitats, current state-listed threatened and endangered species and species in need of conservation, and public recreation areas for which this agency has some administrative authority.

We have no major concerns with the reintroduction of Bison. Due to the presence of the Topeka shiner, we suggest investigating alternate water sources to maintain the integrity of natural waters and to ensure proper grazing distribution. Attached are two recent documents showcasing alternate water sources, availability, and cost breakdown for your reference.

http://www.oznet.ksu.edu/glwq/pdf/FINAL Waterer handbook.pdf *(very large pdf)*

http://www.kaws.org/PDF/Save%20Money%20and%20Time_10.21.05.pdf

Thank you for the opportunity to provide these comments and recommendations. If you have any questions or concerns, please contact me at (620)-672-0798 or ericj@wp.state.ks.us.

Sincerely,

Eric R. Johnson

Eric R. Johnson, Ecologist
Environmental Services Section

PRATT OPERATIONS OFFICE
512 S.E. 25th Ave., Pratt, KS 67124-8174
(620) 672-5911 • Fax: (620) 672-6020

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As the nation's principal conservation agency, the Department of the Interior has the responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national Parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

NPS September 2009