

3 Affected Environment

Threats to and Status of Resources

This chapter describes the biological, cultural, and socioeconomic resources most likely affected by establishing the Flint Hills Legacy Conservation Area.

The Flint Hills region provides habitat integral to larger national conservation efforts. Located in the Eastern Tallgrass Prairie Geographic Area, the Flint Hills region is a north-south migration corridor for many species.

Wildlife species dependent on tallgrass habitat are dependent on an increasingly shrinking ecosystem; a factor contributing to the rapid decrease of grassland birds dependent on the tallgrass prairie, such as that found in the project area. Intact, open landscapes are essential habitat components for the greater prairie-chicken and other grassland birds that are the priority species guild for this project.

Grasslands once dominated central North America. The eastern third of this vast grassland ecosystem, from southern Manitoba to Illinois and south to Texas, is known as the tallgrass prairie region. The tallgrass prairie, like the Great Plains as a whole, was shaped under disturbances such as fire, grazing and drought. During these cycles of change and disturbance, deep-rooted prairie plants assimilated nutrients and returned them to the surface, creating rich, dark soils considered to be some of the most fertile in the world.

The rich soils, combined with gently rolling topography, made the region prime for agricultural development. Much of the tallgrass prairie was converted to cropland in a single decade, 1870–80, as railroads and Land Acts provided economic incentives. The tallgrass prairie ecosystem has been plowed, fragmented, and in some cases severely degraded, making this once expansive, complex ecosystem one of North America's most altered and endangered ecosystems (Noss et al. 1995). Still relatively unspoiled by the pressures of modern development is the greater Flint Hills landscape of eastern Kansas.

BIOLOGICAL ENVIRONMENT

In this section climate; climate change; adaptation, mitigation, and engagement responses to climate change; geologic resources; habitat; and wildlife of the Flint Hills are discussed.

Climate

The climate of Kansas is continental, with characteristic hot summers, subject to periodic drought coupled with very cold winters. Temperatures can range from –40°F to 121°F.

There is a distinct east-west precipitation gradient across Kansas. The western edge of Kansas lies in a rain shadow of the Rocky Mountains, and receives only 16 inches of precipitation on average. The Flint Hills area receives approximately 33 inches of precipitation, most of which comes in the form of rain between the months of April and September.

Moist Gulf of Mexico air flows over the eastern portion of the state, providing at the easternmost counties on average 42 inches of precipitation. Rainfall events often exceed 3 inches or more. The moist air flow and warm temperatures are the source for convectional thunderstorms and tornadic activity in the area.

Climate Change

Climate change presents additional challenges to habitat conservation in the Great Plains. Temperatures are predicted to increase in future decades throughout the Great Plains (Fagre et al. 2009). The FHLCA provides the elements necessary to minimize the impact on wildlife: resilience, redundancy, adaptation potential, habitat connectivity, drought-tolerant plant communities, large and connected ecosystem segments, and the presence of natural disturbances (fire and grazing).

Due to its plant diversity, tallgrass prairie has a built-in resilience to climate variability. The hundreds of grass and broadleaf species represent a wide range of tolerance for annual rainfall and air temperature. Dominated by perennials, many tallgrass prairie species withstand multiple years of drought, as evidenced by the droughts of the 1950s. Within this diverse plant community, a particular group of species usually grows well, regardless of weather conditions.

Although the species composition of the prairie may shift if a multi-decade drought were to occur, the character of the tallgrass prairie would not be lost. During wet years, some species express themselves and show greater vigor. The same holds true for growing seasons with moderate rainfall and heat.

However, overall biomass is generally greater during years of abundant rainfall. Climate predictions vary, however some suggest warmer winters and similar spring precipitation in the mid-latitudes of the Great Plains (Fagre et al. 2009). Those rainfall events might be more episodic, bringing fewer, yet heavier rains. Whichever climate prediction holds true, the strength of the tallgrass prairie comes from its diverse species that are adapted to a wide range of climatic conditions.

With the species diversity providing resilience to climate change, the current condition of the Flint Hills region provides habitat representation and redundancy. Currently, the FHLCA provides a significant north-south migration corridor for grassland birds, and links many areas of high quality tallgrass habitat. Retaining migratory corridors is a key adaptation strategy for wildlife response to climate change (USFWS 2009).

Adaptation, Mitigation, and Engagement

The Service's strategic response to climate change involves three core strategies: adaptation, mitigation, and engagement (USFWS 2009). Through adaptation, the impacts of climate change on wildlife can be reduced by conserving habitats expected to be resilient. The FHLCA provides an anticipatory, rather than a reactive response. As preserving migratory corridors becomes increasingly important, the Flint Hills will provide a contiguous north-south stand of tallgrass prairie within the Central Flyway. Furthermore, if spring/summer precipitation were to increase in a changing climate, tree encroachment would present an accelerating threat of fragmentation to the Flint Hills. Thus conservation actions are warranted to maintain the intactness of the tallgrass prairie character of the Flint Hills.

Carbon sequestration forms one of the key elements of mitigation. The FHLCA easement program could secure the carbon already stored within Flint Hills soils. Prairie vegetation stores carbon in its deep fibrous roots, with approximately 80% of the plant biomass located belowground. It is equally as important to protect existing carbon stores as it is to sequester atmospheric carbon.

Engagement involves cooperation, communication, and partnerships to address the conservation challenges presented by climate change (USFWS 2009). The FHLCA serves as a model for engagement by working with producers, nongovernmental organizations (Tallgrass Legacy Alliance, The Nature Conservancy, Quail Unlimited, and the Kansas Livestock Association), state and local agencies (KDWP, Kansas Department of Health and Environment, Kansas Farm Bureau, Kansas Association of Conservation Districts) and federal agencies including the Natural Resources Conservation Service.

Geological Resources

The eastern margin of the Flint Hills is marked by a major escarpment that is especially prominent in northwestern Greenwood, southeastern Chase, and eastern Butler counties. Maximum elevations exceed 1,600 feet, with local relief up to 320 feet, and deeply entrenched stream valleys. The prominent escarpment that defines the eastern edge of the Flint Hills is the most rugged surface feature in Kansas. The Walnut, Verdigris, Cottonwood, and Fall river drainage basins meet at divides on the Flint Hills crest in this region. From their eastern crest, the Flint Hills slope gently westward, down the regional bedrock dip, to the western limits of the Walnut and Cottonwood drainage basins.

The Flint Hills are underlain by lower Permian limestone, shale, and evaporites. This bedrock generally dips gently toward the west or northwest. Local variations in bedrock dip are found over the crest of the buried Nemaha uplift. Erosion of shale and limestone strata has resulted in landscapes with steep east-facing escarpments separated by gentle west-sloping cuestas. Thick cherty limestone weathers to produce residual chert lag deposits that are highly resistant to chemical breakdown. Such residual chert, or flint, as it is commonly known, is responsible for maintaining high topographic relief and gives the Flint Hills their name. Unconsolidated sediments are common, especially within river valleys and on some upland areas. Soils are developed in residual (weathered) bedrock material, alluvial deposits, and loess sediment (Aber 1997).

The steep slopes and the thin, rocky soils of the Flint Hills limited crop cultivation to the flatter river and stream bottoms where there are deeper river-deposited sediments. The same rocky limestone soils which made crop cultivation difficult helped to preserve the native characteristics of the Flint Hills, and made the area ideal for cattle grazing. In fact, over a period of time the calcium in the limestone erodes into the soil, making the native prairie plants highly nutritious for grazing animals.

Habitat

Numerous hydrological features bisect the Flint Hills eastward into the prairie. Many other tributaries provide a diversity of riparian plant communities. More than 600 species of vascular plants occur within the project boundary, representing roughly 25% of all the plant species found in Kansas and indicating the significant biological diversity of the Flint Hills. (See figure 3 for land cover and habitat types.)

Fire History

The historic tallgrass prairie, or "true" prairie, occurred along the eastern Great Plains, with Prairie Peninsula radiating north and east into Indiana and



U.S. Fish & Wildlife Service
Flint Hills Legacy Conservation Area
 Eastern Kansas

NLCD Habitat Map

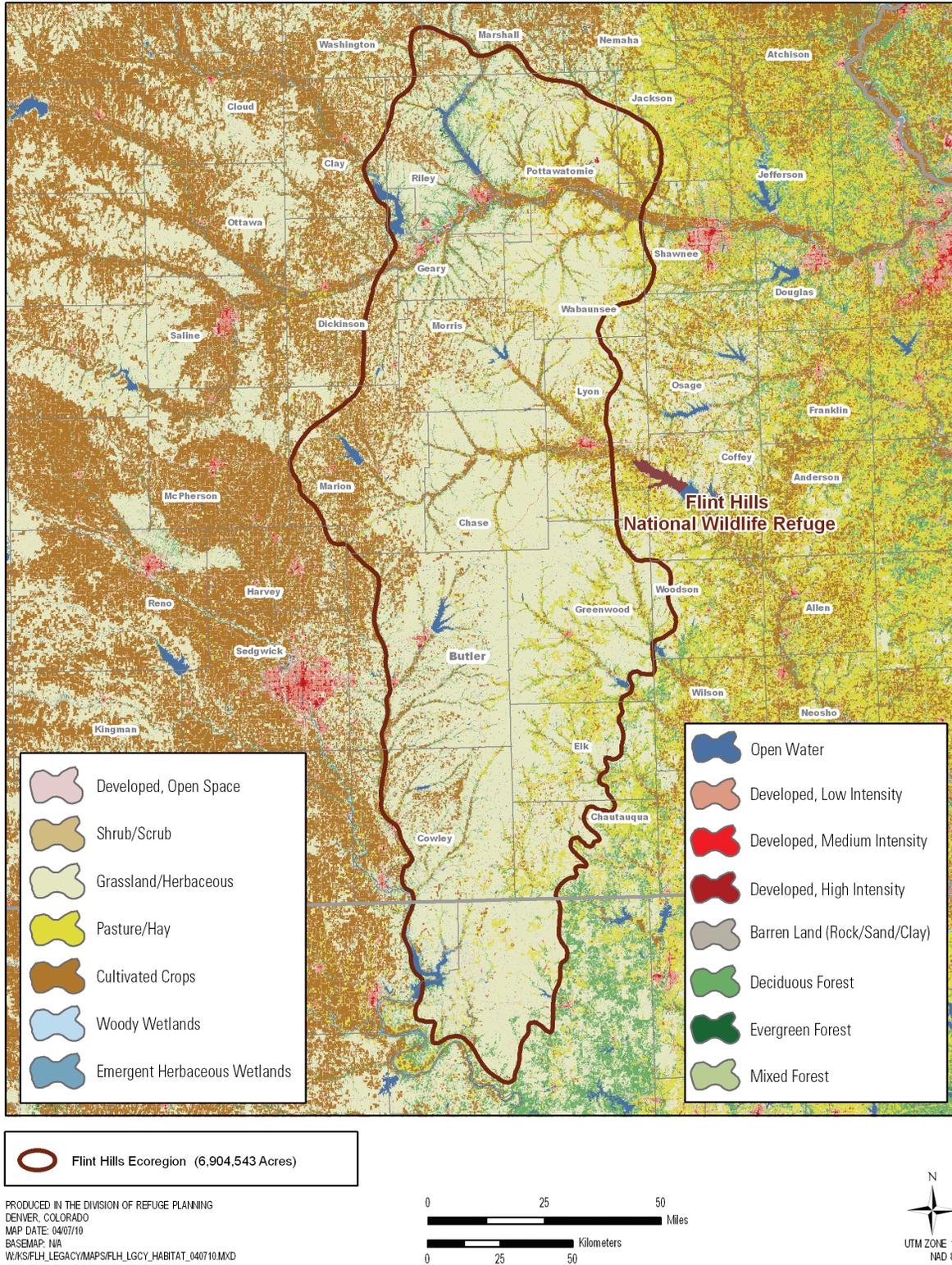


Figure 3. Land cover and habitat types in the Flint Hills Legacy Conservation Area.

Ohio during Pleistocene interglacials (Samson et al. 1999) Tallgrass prairie is considered by ecologists as a “fire climax” system, meaning without fire the tallgrass prairie will begin to shift towards a forest environment (Heisler et al. 2003). The tallgrass prairie we know today began taking shape during the close of North America’s most recent glaciation period. This glacial epic, known as the Wisconsin period, caused dramatic topographical, climatic, and ecological changes across the landscape (Axelrod 1985). Throughout this period, broad-scale climate gradients, driven by continental climate change, significantly influenced the composition, species richness, and distribution of the tallgrass prairie communities (Steinauer and Collins 1996).

With an existing fire-climax prairie in place, prehistoric man first entered the North America continent approximately 12,000 years ago (Meltzer 1989). Previously, lightning was the sole source of grassland fire ignition. It is noteworthy that the Flint Hills landscape experiences the second highest frequency per square kilometer of lightning strikes in North America (Higgins 1986). Lightning-caused fires presumably drove the region’s early beginnings as a fire- and herbivore-driven plant community (Mulchunas et al. 1998). As prehistoric man gained a landscape presence, it is suggested that fire frequency and temporal occurrence shifted from summer to a fall-dominated period (Shaw and Martin 1995).

This altering of fire shaped the tallgrass eco-regional plant community for several thousands of years (Moore 1972). The advent of early Euro-American explorations, beginning with the Spanish, first penetrated the tallgrass region with members of Coronado’s expedition in 1541 (Haines 1970, Roe 1970). Subsequent Native American ownership of the Spanish horse heralded great changes in their social behavior, biological success, and geographical coverage, initiating vast ecological change within the tallgrass region. An important component of this ecological change was fire, ignited for a variety of reasons, by an increasingly complex, more numerous,

and more mobile Native American population. Over time, this increased use of fire is believed to have substantially accelerated an eastward expansion of the tallgrass region (Kozlowski and Ahlgren 1974, Howe 1993).

While historical fire records are scant; they do indicate that the period between 1535 and 1890 supported a dominance of fall fires. Almost all fire records of this period are along major river systems due to the need for huntable game, fuel, and accessible water, all of which made the major rivers within the region the principal travel lanes for both Euro-American and Native American travelers of this time period (Moore 1972).

Pre-1840 fire re-occurrence rates in tallgrass prairie vary from a possible annual regime (Pyne 1982) of 2–5 times per decade (Hulbert 1976), to every 5–10 years (Wright and Bailey 1982). Cutter and Guyette (1994) suggest a 2.8 year fire interval for a Missouri savanna while Bragg (1986) and Hulbert (1976) suggest a 3–5 year pre-settlement fire interval for Nebraska and Kansas tallgrass prairie. Kelly Kindscher and Craig Freeman (Kansas Biological Survey, University of Kansas, Lawrence, Kansas, and Kansas Natural Heritage Inventory, respectively; personal communication) suggest a 3–5 year return interval for the Flint Hills ecoregion.

Historical fire-return interval loses some of its relevancy unless discussed within the context of spatial scale and temporal events across the landscape. Historical fire-grazing interaction on the Great Plains was a shifting mosaic of disturbance, including areas that were burned and grazed, along with regions that were not disturbed. As an area burned and consequently greened up over time, herbivores of all kinds would concentrate on it. This burned area, if heavily used could leave other areas with very little grazing pressure. This fire-grazing interaction would repeat itself across the landscape creating a moving mosaic across both space and time. This random disturbance pattern allowed for a diverse assemblage of species to exist simultaneously (Weir et al. 2007).

Modern era settlement and livestock usage of the Kansas Flint Hills began in the mid-1800s. During initial settlement most cattle came from Texas and were driven across open range to Kansas. Around the 1880s Kansas enacted a fence law, and within a decade the majority of the region was fenced and drive routes were blocked off, much as it exists today (Jim Hoy, historian, Emporia State University, Emporia, Kansas; personal communication). As early as 1863, cattlemen recognized that burning prairies benefited both cattle weight gains and the condition of their pastures.

In recent years, prescribed fires have largely been conducted by ranchers in the spring on an annual basis. Some ranchers have begun to use patch fires



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Riders and prescribed fire.

that is more representative of historical fire regimes in the region.

Prairie Uplands

The Flint Hills landscape is most often associated with bluestem grasses and about ninety native grass species are found here, with big bluestem, little bluestem, Indiangrass, switchgrass, eastern gamagrass and sideoats grama being some of the more important species from an ecological and livestock production perspective. The 500-plus native broadleaf prairie plant species (herbaceous forbs) documented as occurring in the Flint Hills are also important, not only for maintaining the ecological health of the prairie but also for providing added forage value.

As the seasons progress, new species will flower each week from March through September. This floral diversity provides benefits such as pollen and nectar foods for a diverse assemblage of pollinators, and a seed source variable in size, shape, and amino acid complex, all spatially and temporally available across the landscape. This rich array of food choices provides a quality foraging opportunity to numerous migratory and resident trust species.

Late-season rains often give rise to luxuriant fall grasses, which in turn provide important winter thermal protection for grassland birds and offer unique water quality and quantity benefits to the region.

As a result of interactions among climate, topography, fire, and bison herbivory, the vegetative structure and composition of the prairie varied both temporally and spatially across the landscape. Thus, grassland birds evolved in an ever-changing mosaic of habitats, and as a result, bird communities were likely to have varied both temporally and spatially across the landscape.

Oak Savanna and Woodlands

Although they represent a small percentage of the total acreage of the tallgrass prairie, native oak woodlands can be found throughout the project area. Species that are most commonly associated with these areas include white oak, post oak, and black oak, with a grass component including little bluestem. Post oak occurs as a dominant tree in savannas and in forests adjacent to grasslands, and will expand into adjacent prairies in the absence of fire.

Oak trees provide cover and habitat for birds and mammals. Cavities provide nest and den sites, and leaves are used for nest construction. Oak acorns provide food for numerous wildlife species including squirrels, mice, voles, white-tailed deer, and wild turkey. Bell's vireo, Bewick's wren, loggerhead

shrike, and red-headed woodpecker use this woody habitat.

Riparian Areas

The Flint Hills ecoregion, as defined by Chapman et al. (2001), contains the largest concentration of freshwater springs in Kansas (Kansas Geological Survey 2008) and is the source of the Caney, Cottonwood, Elk, Fall, Marais des Cygnes (Osage), Neosho, Verdigris, and Walnut rivers. This grassland region is drained by roughly 3,300 miles of perennially flowing streams and 14,000 miles of intermittent and ephemeral streams (USGS 1998). It boasts many of the state's most pristine surface waters (for example Dodds and Oakes 2004) and supports a rich variety of native fish and shellfish species, including the world's largest remaining populations of the federally protected Topeka shiner and Neosho madtom (Haslouer et al. 2005, Angelo et al. 2002a, 2009). Many streams in the Flint Hills currently serve as ecological "reference" systems in environmental monitoring programs administered by state and federal natural resource agencies (for example KDHE 2007). These streams approach the historical (pre-settlement) ecological condition and provide the physiochemical and biological data needed to assess changes in the state's more heavily impacted surface waters (Angelo et al. 2002b, KDHE 2008).

Wildlife

The Flint Hills prairie supports a wide variety of animal life. There are assemblages of amphibians and reptiles, fish, birds, mammals, and species of special concern in the project area. Appendix A contains the species list for the Flint Hills area.

Amphibians and Reptiles

The tallgrass prairie and stream corridors that run throughout the project area provide food and shelter for a number of terrestrial or semi-aquatic animals including salamanders, toads, frogs, skinks, lizards, snakes, and turtles.

Fish and Aquatic Species

The project area contains many of the state's most pristine surface waters (for example Dodds and Oakes 2004) and supports a rich variety of native fish (over eighty species), and shellfish, including the world's largest remaining populations of the federally protected Topeka shiner and Neosho madtom (Haslouer et al. 2005, Angelo et al. 2002a, 2009).

Protection of this tallgrass landscape is essential to sustaining these aquatic species. A number of watersheds situated in the tallgrass prairie of eastern Kansas are the last remaining strongholds for the federally endangered Topeka shiner, a small

minnow that inhabits headwater prairie streams. While the number of known occurrences of Topeka shiner populations throughout its historical range in Iowa, Kansas, Minnesota, Missouri, Nebraska, and South Dakota has been reduced by more than 80 percent, stable populations remain in many of the unfragmented prairie streams in the Flint Hills (Haslouer et al. 2005, Angelo et al. 2002a, 2009). Because the Topeka shiner is not negatively impacted by normal ranching practices, maintenance of native prairie watersheds through continued ranching, which Service conservation easements would allow, may be the best hope for long-term survival of the species.

Another federally listed species endemic to the tallgrass prairie region is the Neosho madtom, a threatened catfish found primarily in about a 200-mile stretch of the Neosho and Cottonwood rivers in eastern Kansas. Like the Topeka shiner, the Neosho madtom is dependent on healthy prairie watersheds.

Many of eastern Kansas' prairie streams also harbor diverse assemblages of freshwater mussels. Freshwater mussels are the most imperiled animal group in North America, with thirty-six species believed to have become extinct during the past century. Unfortunately, mussels in Kansas have undergone a similar trend of decline. Of the forty-eight species known to have occurred in Kansas, at least five of these are now believed to be extirpated from the state, and twenty-one species are state-listed as either endangered, threatened, or as a species in need of conservation (Brian Obermeyer, Flint Hills project coordinator, The Nature Conservancy, Topeka, Kansas; face to face meeting, 2009). While there are no federally listed mussels in Kansas, five species are classified by the Service as species of concern, and federal protection could soon be proposed for two of these—the Neosho mucket and the western fanshell—if their conservation status is further threatened. Protection of native prairie watersheds through the use of conservation easements may be one of the best defenses to preclude further listings and extirpations of aquatic mollusks in the Flint Hills.

Birds

The remaining portion of a once vast grassland provides essential habitat for numerous grassland bird species, including greater prairie-chicken, Henslow's sparrow, short-eared owl, Bell's vireo, American golden-plover, grasshopper sparrow, dickcissel, eastern meadowlark, upland sandpiper, buff-breasted sandpiper, scissor-tailed flycatcher, loggerhead shrike, Smith's longspur, Harris' sparrow, Swainson's hawk and northern harrier. Among bird species, grassland birds have shown the fastest rate of decline. Of forty-six grassland-breeding bird species, 48% are species of conservation concern nationwide, including four populations that are

federally endangered. Of the forty-two grassland species with sufficient monitoring, twenty-three are declining significantly (North American Bird Conservation Initiative 2009).

Within the Flint Hills, birds require a mosaic of vegetation structure within the tallgrass prairie. The intent of the FHLCA is to maintain the contiguity of the tallgrass prairie, thus protecting it from fragmentation caused by woody encroachment or development. In large parcels of grassland habitat, bird diversity increases when grazing and fire create a mosaic of vegetation structure (Fuhlendorf et al. 2006). When fire or grazing reduce the height and density of grasses, habitat becomes more suitable for grasshopper sparrow (Vickery 1996). Conversely, a 3-year absence of fire promotes habitat for Henslow's sparrow (Zimmerman 1988). Grassland birds evolved under the combined influence of fire and grazing (Fuhlendorf et al. 2006). Those two disturbances are inseparable, interacting through positive and negative feedbacks to create a shifting mosaic of vegetation structure across the landscape (Fuhlendorf and Engle 2004). This diversity of vegetation height, structure, and location creates the heterogeneity necessary to support an entire guild of grassland birds: migrants, nesters, and wintering species. Homogenous grassland habitat, with similar vegetation height and litter depth, cannot support the entire community of grassland birds (Fuhlendorf and Engle 2004).

Several species within the Flint Hills are identified as grassland obligate birds: northern harrier, upland sandpiper, greater prairie-chicken, horned lark, Savanna sparrow, grasshopper sparrow, Henslow's sparrow, dickcissel, eastern meadowlark (Ribic et al. 2009). Researchers at Konza Prairie found low-intensity cattle grazing to positively affect upland sandpipers, grasshopper sparrows, and eastern meadowlarks (Powell 2008). Grasshopper sparrows avoid areas with extensive shrub cover, selecting areas burned within the past 1–2 years (Powell 2008, Vickery 1996). Eastern meadowlarks use habitats with taller grasses of greater density, mixed with forbs (Powell 2008).

Continuing along the spectrum of denser vegetation and greater time since disturbance, Henslow's sparrows prefer significantly greater cover of standing dead vegetation created by a 2–3 year absence of fire (Zimmerman 1988). Dickcissels select areas of tall (10–59 inches) and dense (90–100%) cover (Powell 2008). Finally, Bell's vireo nests in low-shrub vegetation within draws (Brown 1993). Although each species has different habitat needs, they share a common element—intact tallgrass prairie with a diversity of vegetation structure.

These grassland birds all require relatively large blocks of healthy tallgrass prairie at various ecological stages of succession. Project size becomes important within the context of providing adequate

numbers of suitable habitat units dispersed within the proper spatial scale, all of which are necessary to provide resilient, quality migrational and breeding habitat within the context of seasonal weather variations and the resultant plant community responses. Additionally, avian predator concerns and temporal shifts in migration further substantiate the need for large, well-dispersed areas of a mosaic of tallgrass habitat types along the entire migrational corridor for these species. The requirements of these tallgrass-dependent migrant birds make them a priority species guild for conservation management.

Important year-round avian species such as the greater prairie-chicken (a Flint Hills umbrella species) require a similar mosaic of habitat types. Specific successional stages of the tallgrass plant community are necessary for many different stages of the greater prairie-chicken's life cycle. The greater prairie-chicken requires visually open areas with short vegetation for lek displays, dense almost shrubby habitat for nesting, moderate densities for brood rearing, and dense herbaceous cover for winter thermal protection. All of these habitat stages needed by greater prairie-chickens are representative of the various size and distribution requirements for avian migrants, making the prairie-chicken a useful umbrella species for habitat conservation management decisions. Home ranges of prairie-chicken flocks may be greater than 9,900 acres during certain times of a year (Robel et al. 1970). The number of acres necessary for a genetically viable population of greater prairie-chickens varies depending on large part on the quality and juxtaposition of habitats within a given area. Suggested size for a Minnesota population located in fragmented habitat was a minimum of 1 million acres (Johnson et al. 2004).

Unlike migrant species, the greater prairie-chicken must obtain all of its requirements within the context of tallgrass prairie. This affinity for open tallgrass makes it imperative to have habitat dispersed over as large a geographical area as possible.

Mammals

Uplands and stream corridors provide habitat for many small mammals including shrews, mice, voles, pocket gophers, ground squirrels, weasels, mink, and bats. These mammals provide critical food sources for prairie raptors such as bald eagles, ferruginous hawks, northern harriers, prairie falcons, and short eared owls. In addition, big game animals such as white-tailed deer, pronghorn, and the occasional mule deer use the upland prairie habitat. Mountain lion, badger, bobcat, coyote, and red fox are examples of carnivores that occur throughout the project area.

Species of Special Concern

At the federal level, eleven Flint Hills species are listed as threatened and endangered, or are

candidates for listing: these include the American burying beetle, piping plover, Topeka shiner, least tern, whooping crane, Neosho madtom, western prairie-fringed orchid, Arkansas River shiner, and the Arkansas darter, Neosho mucket, rabbitsfoot (candidates for listing). Refer to appendix A, which includes the federally listed animals documented as occurring in the project area.

CULTURAL RESOURCES

Current archaeological evidence indicates that the earliest humans, called the Paleoindians, migrated to the region at the close of the last Ice Age approximately 12,000 years ago. These people had a highly mobile lifestyle that depended on big game hunting, including mammoths and the huge now-extinct ancient bison. The hallmark of most Paleoindian sites are the beautiful but deadly spear points that are generally recovered from animal kill and butchering sites, and small temporary camps. Evidence of the Paleoindian occupation of the Flint Hills area is sparse and most often consists of isolated spear points.

There was a gradual but definite shift in the pattern of human use of the region beginning about 9,000 years ago. The changes are due to a combination of regional climatic fluctuations and an increasing population, coupled with tremendous social change and technological innovation. Although this stage, referred to as the Archaic and lasting until about 2,000 years ago, is better represented in the archaeological record than the preceding Paleo-Indian stage, the interpretation of the remains is difficult. Evidence of a greater diversity of tools and increased use of native plants is found on many sites but the remains also suggest a more localized and less mobile population.

By approximately 2,000 years ago the populations of the Flint Hills region exhibited a combination of distinctive local traits and the effects of contact with neighboring groups. This period is referred to as the Plains Woodland or Ceramic Period and lasted up to approximately 350 years ago. Along with an increasing population and regional variation came great changes and innovation, including the advent of pottery, the bow and arrow, and semi permanent dwellings. Small villages began to be established and evidence of early agriculture is found along some of the waterways.

When the Coronado expedition reached what would become central Kansas in 1541, the area was occupied by several of Native American groups. Over the next 300 years, various tribes lived in the Flint Hills region including the Pawnee, Wichita, Plains Apache, Kansa, Kiowa, and the Osage. Although many tribes moved, or were moved, in and out of the region, by the mid-1800s the influx of emigrants of European ancestry was prevalent. By the late 1870s many of the tribes had been relocated to Oklahoma.

The Service has a trust responsibility to American Indian tribes that includes protection of the tribal sovereignty and preservation of tribal culture and other trust resources. Currently, the Service does not propose any project, activity, or program that would result in changes in the character of, or adversely affect, any historical cultural resource or archaeological site. When such undertakings are considered, the Service takes all necessary steps to comply with section 106 of the National Historic Preservation Act of 1966, as amended. The Service pursues compliance with section 110 of the act to survey, inventory, and evaluate cultural resources.

SOCIOECONOMIC ENVIRONMENT

The project area includes portions of twenty-one counties; Butler, Chase, Chautauqua, Clay, Cowley, Dickinson, Elk, Geary, Greenwood, Harvey, Jackson, Lyon, Marion, Marshall, Morris, Pottawatomie, Riley, Shawnee, Washington, Woodson, and Waubensee. A number of small communities are within the project area, mostly located adjacent to Highway I-35 and the eastern portion of I-70. Some of the largest communities in the state are immediately adjacent to the project area. Wichita has a population of over 366,000, Kansas City 142,562, and Topeka 123,446. Over 2.8 million persons live in the state of Kansas (U.S. Census Bureau 2009). Although there are several large communities adjacent to the FHLCA, the economy of the project area is tied to ranching and agriculture.

The strong agricultural tradition in Kansas has been contributing to the economies of small towns and the state's overall well-being since before statehood. Known as "cow towns," many towns in Kansas were dependent on the large cattle drives of the mid- and late-eighteenth century. As the drives changed and eventually disappeared, these cow towns had to change their economic base to survive—towns such as Abilene and Dodge City had to reinvent themselves. Though not totally dependent on the cattle industry now, many towns still rely on the economics of the industry. The grasslands of the Flint Hills provide summer grazing grounds that provide cattle to the numerous feed lots in other portions of Kansas.

The importance of the Flint Hills to the cattle industry cannot be overstated. The Flint Hills grasslands provide cattle to the feedlots that supply the processing facilities, thus supporting a state-wide cattle industry. With Kansas ranking second in cattle and calves, the Flint Hills plays a major role in the \$6.24 billion cattle industry in Kansas, processing over 22% of all beef in the United States (Kansas Department of Agriculture 2010). The Flint Hills ranchers' livelihood depends on natural resources (grass, water, and open space) and these ranchers have a deep-rooted attachment to the land.

Unlike many other areas in the country, the key to protecting the tallgrass prairie lies primarily in

sustaining the current land use pattern of livestock ranching and the use of prescribed fire.

Reasonably foreseeable actions are actions and activities that are independent of the conservation area proposed action but could result in the cumulative or additive effects when combined with the proposed alternatives. They are anticipated to occur regardless of which alternative is selected. The cumulative effects of these activities are described in the "Cumulative Impacts" sections in chapter 4. Energy development (oil and gas, and wind) and residential development, and future prairie conservation efforts by a variety of organizations are the primary, reasonably foreseeable actions occurring in the Flint Hills region and are also discussed in chapter 4.

Landownership

More than 98 percent of the property within the project boundary is in private ownership. Many Flint Hills properties are in the possession of absentee landowners, with ranch managers controlling the day-to-day operations.

Property Tax

Currently, landowners pay property taxes on their private lands to the counties. Since the proposed project is a conservation easement program, the land does not change hands and, therefore, the property taxes paid by the landowner to the county are not affected. Kansas property taxes are based on agricultural value, and as easements will not affect the agricultural value of the property, no changes to the tax base are anticipated.

Public Use and Wildlife-dependent Recreational Activities

Visitors to the Flint Hills are attracted by opportunities for bird and other wildlife viewing, nature photography, canoeing, fishing, hunting, wildflower touring, hiking, and horseback riding.

The 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation found that \$5.58 million were spent in Kansas on equipment and various trip-related expenditures for hunting and fishing. An additional \$1.56 million was spent on food, lodging, and various equipment used for wildlife watching. In 2008, the sale of hunting and fishing licenses alone in Kansas generated approximately \$10.8 million in revenue (Kansas Department of Revenue 2008).

There is increasing interest in developing agritourism opportunities in the Flint Hills. Many tourists travel on the Native Stone Scenic Byways and Flint Hills Scenic Byway located within the project area.

